

# **K L UNIVERSITY**

## **DEPARTMENT OF COMMERCE**

### **ACADEMIC YEAR 2016-17**

## **UNIVERSITY VISION AND MISSION**

### **Vision**

To be a globally renowned university.

### **Mission :**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

## **DEPARTMENT OF COMMERCE VISION AND MISSION**

### **Vision:-**

To be a center for excellence and globally competitive in the core areas of accounting and finance.

### **Mission:-**

1. To be involved in consultancy services in the areas of accounting, finance and taxation.
2. After examining the current need of the market the department is actively focusing on Summer internship and industrial training.
3. To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and responsible citizens with intrinsic values.

### **PEO'S**

- 1 To produce best commerce (H) graduates in the country as well as in Global
2. To equip students with updated inputs in the field of accounting and finance
3. To provide practical exposure as per corporate needs through summer internship and industrial training.

### **Program outcomes: -**

PO1	An ability to apply knowledge of Accounting, Finance and Taxation
PO2	An ability to develop each graduate to be adept in identifying and understanding major commerce trends both locally and globally
PO3	An ability to develop each graduate to be a critical thinker and strong decision maker.
PO4	An ability to develop each graduate to be an effective and professional communicator.
PO5	An understanding of professional and ethical responsibility
PO6	Knowledge of contemporary issues.
PO7	A recognition of the need for and an ability to engage in life-long learning

PO-MISSION MAPPING

S.No	Description of PEOs	Key Components of Mission		
		M 1	M 2	M 3
		To be involved in consultancy services in the arias of accounting, finance and taxation	After examining the current need of the market the department is actively focusing on Summer internship and industrial training.	To impart quality higher education and to undertake research
PEO 1	To produce best commerce (H) graduates in the country as well as in Global	.	. ✓	. ✓
PEO 2	To equip students with updated inputs in the field of accounting and finance		✓	✓
PEO 3	To provide practical explore as per corporate needs through summer internship and industrial training.	✓		✓

PO		P E O		
		1	2	3
		To produce best commerce (H) graduates in the country as well as	To equip students with updated inputs in the field of accounting and	To provide practical explore as per corporate needs through summer
1	An ability to apply knowledge of Accounting, Finance and Taxation	YES	YES	YES
2	An ability to develop each graduate to be adept in identifying and understanding major commerce trends both	YES	YES	YES
3	An ability to develop each graduate to be a critical thinker and strong decision maker.	YES	YES	YES
4	An ability to develop each graduate to be an effective and professional communicator.	YES	YES	YES
5	An understanding of professional and ethical responsibility	YES	YES	YES
6	Knowledge of contemporary	YES	YES	YES
7	A recognition of the need for and an ability to engage in life-long	YES	YES	YES

## K L UNIVESITY

## DEPARTMENT OF COMMERCE

2016-17

Course Code	Course Title	S NO	CO NO	Description of the Course Outcome	1	2	3	4	5	6	7
15EN1101	Rudiments of Communication Skills	1	CO1	Speak with confidence & Understand the importance of listeni Make presentations fluently in English.				2			2
			CO2	Understand the basic concepts of grammar and usage.				2			2
			CO3	Implement English Grammar rules while writing or speaking				2			2
			CO4	Express or present in written form				2			
15CM1101	Fundamentals of Accounting	2	CO1	Understand how financial transactions flow through the bookkeeping-accounting cycle..	3	2			2		
			CO2	To help students to understand fundamental accounting concepts and principles	3	2			2		
			CO3	To develop the capability to perform the basic accounting functions	3	2			2		
			CO4	To nurture students to record financial transactions and preparing financial statements independently	3	2			2		
15CM1102	Business Economics	3	CO1	Understand the basics in micro and macroeconomics.	1	2	2				
			CO2	Acquire knowledge in consumer behavior and law of demand.	1	2	2				
			CO3	<b>Have applied knowledge in law of proportions and elasticity of demand.</b>	1	2	2				

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			CO4	<b>Acquaint with theories of market and price determination.</b>	1	2	2				
15ES118	Information Technology	4	CO1	This Course provides a contemporary and forward-looking on the theory and practice of Computers and Information Technology and strongly emphasizes upon practice of theory in Applications and Practical-oriented approach.			3				2
			CO2	Trains the students to develop the basic Management Information Systems using application like Access and Excel.			3			2	
			CO3	Prepare the students technological competitive and make them ready to self-upgrade with the higher technical skills, either in their post graduation program or in the work place.			3			2	2
			CO4	This Course provides a contemporary and forward-looking on the theory and practice of Computers and Information Technology and strongly emphasizes upon practice of theory in Applications and Practical-oriented approach.			3				2
15MT1149	Statistics for Business	5	CO1	To provide an understanding for the graduate business student on basic statistical concepts	2		2				
			CO2	To develop the analytical ability among the students.	2		1				
			CO3	To provide fundamental knowledge of statistical techniques to solve various business problems	2		2				
			CO4	To impart knowledge on the application of statistical tools and techniques in business decision-making	2		2				
15CM1103	Organization	6	CO1	Understand the basics such as business, profession, business ethics and social responsibilities.	2		2				

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	&Management		CO2	Have knowledge in pros and cons of forms of organizations and source of finance.	2		2				
			CO3	Have applied knowledge about Management Vs. Administration and levels of management.	2		2				
			CO4	Acquaint with various functions of management.	2		2				
15HS103	Professional Communication Skills	7	CO1	Identify the meaning of words from context. Frame sentences using words. Understand the method of identifying antonyms.					1		2
			CO2	Develop different reading skills Comprehend given information					1		2
			CO3	Write different types of office communication Understand and write good summaries					1		2
			CO4	Understand and value diverse societies. Respond effectively to cultural communication differences Demonstrate understanding of ethical values central to the communication discipline					1		2
15AC104	Advanced Accounting (AA)	8	CO1	understand the fundamentals of accounting for bills of exchange.	3	2			2		
			CO2	Know about consignment and joint venture accounts	3	1			2		
			CO3	Have knowledge in accounting of non-trading concerns	3	2			2		
			CO4	Acquaint with accounting knowledge in partnership accounting.	3	2			2		
15AC105	Cost Accounting (CA)	9	CO1	Understand the basics of cost accounting and preparation of cost sheet.	3		2				
			CO2	Acquaint with the purchase procedure of materials and control.	3		2				
			CO3	Know about the labor cost methods and control.	3	2	2				
			CO4	Capable of dealing with Job and contract costing.	3	2	2				

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15CO104	Business Law (BL)	10	CO1	It is essential that students of commerce should have knowledge of the appropriate legal	2				2		
			CO2	To test the general comprehension of elements of business laws.	2				2		
			CO3	Understanding of fundamental legal terminology regarding contracts;	2				2		
			CO4	To understand essentials of a valid contract, sale of goods act, partnerships, agency.	2				2		
15CO105	Banking Law & Practice	11	CO1	Know the basics of Banking Regulation Act, Role of Commercial Banks and RBI.	2	1			2	2	3
			CO2	Understand the Bank and customer relationship and borrowing and lending of money.	2	1			2	2	3
			CO3	Have knowledge about Negotiable Instruments Act.	2	1			2	2	3
			CO4	Know about Banker and customer relationship and borrowing and lending policy of banks.	2	1			2	2	3
15CO106	Fundamentals of Income Tax	12	CO1	Know the basics of Income tax.	1	2	2		1		
			CO2	Understand the treatment of Income from Agriculture.	2	2	2		1		
			CO3	Have knowledge about Residential status and incidence of tax.	2	2	2		1		
			CO4	Gain knowledge to compute Income under five heads.	2	2	2		1		
15CO107	Principles of auditing	13	CO1	Know the basics of auditing and commencement of audit.	2	2			2	1	
			CO2	Understand the qualifications of statutory auditor and audit planning.	2				2		
			CO3	Acquire the knowledge in Internal check and vouching.	1				2	2	
			CO4	Learn about verification and valuation of assets and liabilities	2				2	2	

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14BC31K0	Soft Skills	14	CO1	Writing personal profile & Company profile				2	2		
			CO2	Answering unconventional HR questions				2	2		
			CO3	Develop personal communication skills				2	2		2
14BC31C1	Advanced Corporate Accounting(ACA)	15	CO1	Understand the accounting procedure of amalgamation and absorption.	3						
			CO2	have knowledge in holding companies	3						
			CO3	know about liquidation of a company	3						
			CO4	learn the final accounts of banking and insurance companies.	3						
14BC31C2	Accounting & Reporting Standards (ARS)	16	CO1	Understand the accounting standards and its application.	3	1			2		
			CO2	Have knowledge in International Accounting standards.	3	1			2		
			CO3	Know about the corporate financial reporting.	3	2			2		
			CO4	Learn the developments in financial reporting.	2	2			1		
14BC31C3	Indirect Taxes	17	CO1	Understand the basics of customs duty.	2	1			2		
			CO2	Have knowledge in excise duty.	2	1			2		
			CO3	Know about the provisions of Central Sales Tax Law.	2	1			2		
			CO4	Learn the procedure of VAT and Service Tax.	2	1			2		
11BC31C4	Direct Taxes – I (DT.I)	18	CO1	Understand the concepts of direct taxes	3	1			1		
			CO2	To know computation of income from salary	3	1			1		
			CO3	To know the computation of income from house property	3	1			1		
			CO4	To know the computation of income from business and capital gains	3	1			1		
14BC31F7	Elective.I Financial Services (FS)	19	CO1	Understand the frame work of financial services	2	1	2		2		
			CO2	Understand the asset financing services	2	1	2		2		

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			CO3	Understand the asset merchant banking services	2	2	2		2		
			CO4	Understand the allied financial services	2	2	2		2		
14BC31C4	Elective.II. Corporate Tax Planning & Management (CTPM)	20	CO1	Understand the tax planning for companies	2	2	2		2		
			CO2	Understand the tax planning for direct taxes	2	2	2		2		
			CO3	Understand the tax planning for indirect taxes	2	2	2		2		
			CO4	Understand the tax management for assesses	2	2	2		2		
14BC41F0	Elective.III. Financial Management (FM)	21	CO1	Know the basic of Financial Management and time value of money.	2		2				
			CO2	Understand the Long term investment decision making.	2		2				
			CO3	Acquaint with capital structure and cost of capital.	2		2				
			CO4	Analyze the inventory, receivables and cash management and dividend decisions.	2		2				
11BC41C0	Business Strategy	22	CO1	To develop an understanding of the general and competitive business environment	1						
			CO2	to develop an understanding of strategic management concepts and techniques	2		1				
			CO3	Understand the business polices and strategic management	2		1				
			CO4	How to formulate functional strategy	2		1		2		
11BC41C1	Ecommerce	23	CO1	Understand E-commerce, E-business and E-marketing	1			2			
			CO2	Understand the legal frame work of E-commerce	1			2			
			CO3	Understand the E-payments	1			2			
			CO4	Understand the operating system	1			2			
11BC41K2	Soft skills	24	CO1	Understand verbal and non-verbal communications				2	2		1

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			CO2	To know about GD, CV preparation, career objectives				2	2		1
			CO3	Understand the interpersonal communication skills				2	2		1
			CO4	Understand goal setting skills and management skills				2	2		1
11BC41A2	Elective.I, Mergers & Acquisitions (M&A)	25	CO1	understand the basics of mergers and acquisitions.	2	2	2	1	1		
			CO2	have knowledge in legal frame work of mergers & acquisitions.	2	2	2	2	2		
			CO3	know about corporate takeovers.	2	2	2	2	2		
			CO4	learn the corporate restructuring and valuations in mergers.	2	2	2	2	2		
11BC41FO	Elective.II: Security Analysis and Portfolio Management( SAPM)	26	CO1	To make the students to understand basics of process of investment, recent developments in stock market, concept of risk and return and measurement of risk..	2	2	2		2		
			CO2	To develop applied knowledge in fundamental analysis, economic analysis, company analysis, Industryanalysis and technical analysis	2	2	2		2		
			CO3	To develop the students' in portfolio analysis, measurement of portfolio risk and return	1	2	2		2		
			CO4	To develop the students' in portfolio selection and portfolio revision.	2	2	2		2		
11BC41A6	Elective.III. Corporate Tax Planning & Management	27	CO1	Know the basic of tax planning, avoidance, evasion and management.	2	1	1		2		2
			CO2	Understand Planning of Direct taxes.	2	1	1		2		2
			CO3	Acquaint with management of Direct taxes.	2	1	1		2		
			CO4	Analyse the planning and management of Indirect taxes.	2		1		2		

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15EN1202	Interpersonal Communication Skills(IPCS)	28	CO1	Identify the meaning of words from context. Frame sentences using words. Understand the method of identifying antonyms.				2			2
			CO2	Develop different reading skills Comprehend given information				2			2
			CO3	Write different types of office communication Understand and write good summaries				2			2
			CO4	Understand and value diverse societies. Respond effectively to cultural communication differences Demonstrate understanding of ethical values central to the communication discipline				2			2
15CM1204	Financial Accounting	29	CO1	understand the fundamentals of accounting for bills of exchange.	3	2		1	2		
			CO2	Know about consignment and joint venture accounts.	3	2		1	2		
			CO3	have knowledge in accounting of non-trading concerns.	3	2		1	2		
			CO4	acquaint with accounting knowledge in partnership accounting.	3	2		1	2		
15CM1205	Monetary Economics	30	CO1	Understand the various concepts relating to Macro Economics	2	1			2		
			CO2	Have knowledge in measurement of aggregate economic variables.	2	1			2		
			CO3	Have knowledge in theory of Money, Consumption function and saving function.	2	1			2		
			CO4	Acquaint with various phases of balance of payments and exchange rate system.	2	1			2		
15CM1206	Accounting Packages	31	CO1	Understand the fundamentals of computerized accounting.	2		2				

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	(AP)		CO2	Know about tally basics.			1					
			CO3	Have knowledge in accounting vouchers	2		1					
			CO4	Acquaint with knowledge in inventory accounting.	2		1					
15CM1250	Business Mathematics (BM)	32	CO1	Fundamentals of functions			1		2			
			CO2	Graphical Representation of Functions and Limits			1		2			
			CO3	Derivatives and their Applications			1		2			
			CO4	Elements of Matrix Algebra			1		2			
15GS1208	Environmental Studies (ES)	33	CO1	Understand about environment and its functioning	2							
			CO2	Develop knowledge regarding availability of natural resources						2	2	
			CO3	Aware about the environmental problems and issues						2		
15EN2204	Employability Skills (ES)	34	CO1	Speaking and listening exercises		1		2				
			CO2	WRITING SKILLS				2	2			
			CO3	Reading Comprehension (GRE, GMAT Pattern)					2	2		
			CO4	People skills					2	2		
15CM2215	Corporate	35	CO1	Understand issue and forfeiture of shares.	3	2	1		2			

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	Accounting (CA)		CO2	Have knowledge in issue and redemption of debentures.	3	2	3				
			CO3	Gain knowledge in redemption of preference shares.	3	2	3				
			CO4	Acquaint with final accounts of company and valuation of shares.	3	2	3				
15CM2216	Cost & Management Accounting (CMA)	36	CO1	Understand Process costing and operating costing.	3	2	2				
			CO2	Have knowledge in standard costing and variance analysis.	3	2	2				
			CO3	Gain knowledge in various concepts in Management Accounting.	3	2	2				
			CO4	acquaint with funds flow, cash flow and budgetary control.	3	2	2				
15CM2217	Corporate & Allied Laws (CAL)	37	CO1	Understand companies Act-2013 and company management	1				2		1
			CO2	Have knowledge in regulation of competition Act.	1				2		1
			CO3	Gain knowledge in regulation and management of foreign exchange.	1				2		1
			CO4	Acquaint with information technology Act.	1				2		1
15CM2218	Corporate Banking (CB)	38	CO1	Understand the Corporate Banking and various services provided by Corporate Banks.	2	1	2		1		
			CO2	Acquire the knowledge in corporate deposits and corporate finance.	2	1	2		1		
			CO3	Know the Investment banking and merchant banking.	2	1	2		1		

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			CO4	Guide in mergers and acquisitions and corporate restructuring.	2	2	1		1		
15CM2219	Assessment of Direct Taxes (ADT)	39	CO1	Acquaint with provisions of set off and carry forward of losses.	3		2		2		
			CO2	Analysis of deductions under Sec 80.	3		2		2		1
			CO3	Understand the taxable income of an individual.	3		2		2		
			CO4	Know about taxable income of Firm and HUF.	3		2		2		
15EN3206	Corporate Communication Skills(CCS)	40	CO1	Speak fluently and effectively in interpersonal contexts			1	1			2
			CO2	Write technically sound English	2			2			2
			CO3	Read and interpret expeditiously			2	1			
			CO4	Understand and apply the basic techniques to crack Quantitative Reasoning sections in Campus Recruitment Tests, GRE, GMAT, CAT and other types of Competitive Exams			2	2			
15CM4250	Industrial training(iii yr ii sem)	41	CO1	An ability to apply knowledge of Accounting, Finance and Taxation	3		2		2		
			CO2	An ability to develop each graduate to be adept in identifying and understanding major commerce trends both locally and globally	3		2		2		
			CO3	An ability to develop each graduate to be a critical thinker and strong decision maker.	3		2				
			CO4	An ability to develop each graduate to be an effective and professional communicator.	3		2		2		
11BC42P0	Industrial training(iv yr, ii sem)	42	CO1	An ability to apply knowledge of Accounting, Finance and Taxation	3		2				

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			CO2	An ability to develop each graduate to be adept in identifying and understanding major commerce trends both locally and globally	3		2				
			CO3	An ability to develop each graduate to be a critical thinker and strong decision maker.	3		2				
			CO4	An ability to develop each graduate to be an effective and professional communicator.	3		2				
Total					133	17	40	25	120	7	18



**KONERU LAKSHMAIAH EDUCATIONAL FOUNDATION  
K L UNIVERSITY**

**Vision**

To be a globally renowned university.

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## **Mission**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

## **K L COLLEGE OF PHARMACY**

**(2016)**

## **VISION**

Lead the future of global healthcare and well-being of the communities we serve.

## **MISSION**

The Department of Pharmacy is committed to:

- 1. Education:** Provide the most comprehensive and highest quality education for pharmaceutical sciences in a learning environment that embraces diversity, equity, integrity, ethics, moral courage and accountability.
- 2. Community service:** Conduct health education programs to the community to prevent disease and improve public health and well-ness by fostering an environment that promotes the safe, efficacious, and cost-effective use of medications.
- 3. Research:** Develop a passion for discovery and innovations with multidisciplinary collaborative research and engage in creative partnerships locally and globally to advance health education, research, and practice.

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**4. Entrepreneurship:** Encourage and support resourcefulness, originality, imagination, ingenuity, and vision in our students, faculty, and staff. Foster the development of entrepreneurs who have the ability to dream, inspire and innovate and courage to envisage the commercial success and socio economic productivity of innovations.

#### **PROGRAMME EDUCATION OBJECTIVES**

<b>S.No</b>	<b>PROGRAMME EDUCATION OBJECTIVES (PEOs)</b>
1	To produce pharmacist workforce competent for the society.
2	To produce pharmacy graduates with employable skills and high technical competence in pharmaceutical industry and health care sectors
3	To inculcate research activity and develop passion for discovery and innovations
4	To develop entrepreneurship qualities that support growth of pharmaceutical intellectual property and contribute for economic development throughout the world.

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## PROGRAMME OUTCOMES

S.No	PROGRAMME OUTCOME (PO)
1 <b>Pharmacy Knowledge</b>	Provide basic knowledge for understanding the principles and their applications in the area of Pharmaceutical Sciences and Technology.
2 <b>Technical Skills</b>	Develop an ability to use various instrument and equipment with an in depth knowledge on standard operating procedures for the same.
3 <b>Modern tool usage</b>	Develop/apply appropriate techniques, resources, and IT tools including prediction and modeling to complex health issues and medicine effect with an understanding of the limitations.
4 <b>Research and Development</b>	To demonstrate knowledge of identifying a problem, critical thinking, analysis and provide rational solutions in different disciplines of Pharmaceutical Sciences and Technology.
5 <b>Lifelong Learning</b>	Develop an aptitude for continuous learning and professional development with ability to engage in pharmacy practice and health education programs.
6 <b>Communication</b>	Communicate effectively on health care activities with the medical community and with society at large, to comprehend drug regulations, write health reports and provide drug information.
7 <b>The Pharmacist and Society</b>	Apply reasoning informed by the contextual knowledge to comprehend medical prescription, perform patient counselling and issue or receive clear instructions on drug safety and the consequent responsibilities relevant to the professional pharmacy practice.

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8 <b>Ethics</b>	Follow the code of ethics and commit to professional values and responsibilities and norms of the pharmacy practice.
PSO 1 <b>Pharmaceutical product development</b>	To apply the knowledge of manufacturing, formulation and quality control of various pharmaceutical and cosmetic products in the form of powders, tablets, capsules, parenteral, solutions, suspensions, emulsions, creams, lotions and aerosols etc.
PSO 2 <b>Invention and Entrepreneurship</b>	Find the application of modern tools to integrate health care systems, design an effective product with commercial advantage and societal benefit, perform risk analysis and become entrepreneur.

### O Vs Mission Mapping

	M1	M2	M3	M4
PEO1	√	√		
PEO2	√		√	
PEO3			√	√
PEO4		√	√	

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**PO/PSO Vs PEOs Mapping**

	<b>PEO1</b>	<b>PEO2</b>	<b>PEO3</b>	<b>PEO4</b>	<b>PEO5</b>
<b>PO1</b>	√	√			
<b>PO2</b>		√	√		
<b>PO3</b>		√		√	
<b>PO4</b>			√	√	
<b>PO5</b>	√				√
<b>PO6</b>	√				√
<b>PO7</b>		√			√
<b>PO8</b>					
<b>PSO1</b>		√	√		
<b>PSO2</b>			√	√	

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### CO Vs PO/PSO Mapping

COURSE	Credits	Course outcome (CO)	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
16PH1101: Dispensing and General Pharmacy	5	CO1	Know the history of profession of pharmacy	3						2			
		CO2	Understand the basics of different dosage forms	3						2			
		CO3	Understand the pharmaceutical incompatibilities and pharmaceutical calculations	3						2			
		CO4	Understand the professional way of handling the prescription	3						2			
		CO5	Apply the knowledge to prepare various conventional dosage forms		3							2	
16PH1102: Pharmaceutical Organic Chemistry I	5	CO1	write the structure, name and the type of isomerism of the organic compound		1							2	
		CO2	write the reaction, name the reaction and orientation of reactions		1							2	
		CO3	account for reactivity/stability of compounds,		1							2	
		CO4	identify/confirm the identification of organic compound		1							2	
		CO5	Apply the knowledge to synthesize various organic compounds		3							2	
16PH1103: English Communication Skills	1	CO1	Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation						3	2			
		CO2	Communicate effectively (Verbal and Non Verbal)						3	2			
		CO3	Effectively manage the team as a team player						3	2			

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		CO4	Develop interview skills							3	2			
16PH1104: Remedial Biology (optional)	3	CO1	Introduce biology to non biology students	1										
		CO2	know the classification and salient features of five kingdoms of life	1										
		CO3	understand the basic components of anatomy & physiology of plant	1										
		CO4	know understand the basic components of anatomy & physiology animal with special reference to human	1										
		CO5	Perform biology experiments	1										
16PH1105:Remedial Mathematics (optional)	2	CO1	Introduce essential of mathematics to biology students	1										
		CO2	Know the theory and their application in Pharmacy	1										
		CO3	Solve the different types of problems by applying theory	1										
		CO4	Appreciate the important application of mathematics in Pharmacy	1										
16PH1106: Anatomy Physiology & Health Education	5	CO1	Explain the gross morphology, structure and functions of various organs of the human body.	2			1							
		CO2	Describe the various homeostatic mechanisms and their imbalances.	2			1							
		CO3	Identify the various tissues and organs of different systems of human body.	2			1							
		CO4	Understand the organ functions	2			1							
		CO5	Perform the various experiments related to physiology and health.	1	2									
16PH1107: Pharmaceutical Inorganic Chemistry	5	CO1	know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals	2			1							
		CO2	understand the medicinal and pharmaceutical importance of inorganic compounds	2			1							
		CO3	Know the preparation and analysis of inorganic medicinal compounds	2			1							

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		CO4	Know their diagnostic applications	2			1						
		CO5	Apply the knowledge to prepare various inorganic pharmaceuticals	1	2								
16PH1208: Community Pharmacy	3	CO1	Know the history of profession of pharmacy	2						3			
		CO2	Understand the basics of different dosage forms	2						3			
		CO3	Understand the pharmaceutical incompatibilities and pharmaceutical calculations	2						3			
		CO4	Understand the professional way of handling the prescription	2							3		
16PH1209: Pharmaceutical Organic Chemistry II	5	CO1	write the structure, name and the type of isomerism of the organic compound		1							2	
		CO2	write the reaction, name the reaction and orientation of reactions		1							2	
		CO3	account for reactivity/stability of compounds,		1							2	
		CO4	identify/confirm the identification of organic compound		1							2	
		CO5	Apply the knowledge to synthesize various organic compounds		3							2	
16PH1210 : Pharmaceutical analysis I	5	CO1	understand the principles of volumetric and electro chemical analysis	2	1								
		CO2	carryout various volumetric and electrochemical titrations	2	1								
		CO3	develop analytical skills	2	1								
		CO4	Reporting analytical result and data integrity	2	1								
		CO5	Perform various analytical experiments	1	2								
16PH12011: Pharmacognosy I	5	CO1	to know the techniques in the cultivation and production of crude drugs	3								2	
		CO2	to know the crude drugs, their uses and chemical nature	3								2	
		CO3	know the evaluation techniques for the herbal drugs	3								2	
		CO4	Understand the microscopic and	3								2	

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			morphological features of crude drugs											
		CO5	Perform the microscopic experiments and morphological evaluation of crude drugs	1	3									
16PH1212 : Environmental science	3	CO1	Create the awareness about environmental problems among learners.				1			2				
		CO2	Impart basic knowledge about the environment and its allied problems.				1			2				
		CO3	Develop an attitude of concern for the environment.				1			2				
		CO4	Motivate learner to participate in environment protection and environment improvement.							2	3			
16PH1213: Pharmaceutical biochemistry	5	CO1	Understand the principles of chemistry in biology	2			1							
		CO2	Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.	2			1							
		CO3	Understand the metabolism of nutrient molecules in physiological and pathological conditions.	2			1							
		CO4	Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.	2			1							
		CO5	Apply the knowledge to estimate various biochemical parameters in physiological systems	1	2									
16PH2114: PHYSICAL PHARMACEUTICS-I	6	CO1	Understand the principles of physical chemistry in pharmaceutical technology	3	1									
		CO2	Understand various physicochemical properties of drug molecules in the designing the dosage forms	3	1									
		CO3	Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations	3	1									

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		CO4	Understand the use of physicochemical properties in the formulation development and evaluation of dosage forms.	3	1								
		CO5	Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.	2	3								
16PH2115 : Anatomy Physiology & Pathophysiology	6	CO1	Explain the gross morphology, structure and functions of various organs of the human body.	2			1						
		CO2	Describe the various homeostatic mechanisms and their imbalances.	2			1						
		CO3	Identify the various tissues and organs of different systems of human body.	2			1						
		CO4	Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.	2			1						
		CO5	Apply the knowledge to perform various physiology experiments	1	2								
16PH2116 : PHARMACEUTICAL ENGINEERING	6	CO1	To know various unit operations used in Pharmaceutical industries.	3			1						
		CO2	To understand the material handling techniques.	3			1						
		CO3	Understand various processes involved in pharmaceutical manufacturing process.	3			1						
		CO4	Aquire knowledge on operation of pharmaceutical manufacturing equipment	3			1						
		CO5	Demonstrate the ability to use and operate pharmaceutical manufacturing equipment	3	2								
16PH2217: Computer applications	6	CO1	know the various types of application of computers in pharmacy				3						1
		CO2	know the various types of databases				3						1
		CO3	know the various applications of databases in pharmacy				3						1
		CO4	Know the web based tools for pharmacy				3						1

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			practice											
		CO5	Apply the knowledge to design and develop digital tools for pharmaceutical applications						3					1
16PH2218: Pharmaceutical microbiology	6	CO1	Understand methods of identification, cultivation and preservation of various microorganisms	2			1							
		CO2	To understand the importance and implementation of sterilization in pharmaceutical processing and industry	2			1							
		CO3	Learn sterility testing of pharmaceutical products.	2			1							
		CO4	Understand microbiological standardization of Pharmaceuticals.	2			1							
		CO5	Apply microbiological testing tools in pharmaceutical products.		2		1							
16PH2219: MEDICINAL CHEMISTRY – I	6	CO1	understand the chemistry of drugs with respect to their pharmacological activity	3										
		CO2	understand the drug metabolic pathways, adverse effect and therapeutic value of drugs	3										
		CO3	know the Structural Activity Relationship (SAR) of different class of drugs	3			2							
		CO4	write the chemical synthesis of some drugs	3			2							
		CO5	Perform chemical synthesis of some drugs				2						3	
16PH2220 : PHYSICAL PHARMACEUTICS-II	6	CO1	Understand the principles of physical chemistry in pharmaceutical technology	2			1							
		CO2	Understand various physicochemical properties of drug molecules in the designing the dosage forms	2			1							
		CO3	Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations	2			1							
		CO4	Understand the use of physicochemical properties in the formulation development	2			1							

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			and evaluation of dosage forms.										
		CO5	Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.		2		1						
16PH2221 : PATHOPHYSIOLOGY	4	CO1	Understand the conditions leading to a disease	2					1				
		CO2	Describe the etiology and pathogenesis of the selected disease states;	2					1				
		CO3	Name the signs and symptoms of the diseases; and	2					1				
		CO4	Mention the complications of the diseases.	2					1				
16PH2222 : PHARMACOLOGY-I	6	CO1	Understand the pharmacological actions of different categories of drugs	3			2		1				
		CO2	Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.	3			2						
		CO3	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.	3			2						
		CO4	Understand the effect of drugs on physiological systems	3			2						
		CO5	Observe the effect of drugs on animals by simulated experiments				3						
16PH3123 : Medicinal Chemistry II	4	CO1	understand the chemistry of drugs with respect to their pharmacological activity	3			2						
		CO2	understand the drug metabolic pathways, adverse effect and therapeutic value of drugs	3			2						
		CO3	know the Structural Activity Relationship (SAR) of different class of drugs	3			2						
		CO4	write the chemical synthesis of some drugs	3			2						
		CO5	Perform chemical synthesis of some drugs		3							2	
16PH3124: Industrial Pharmacy I	6	CO1	Know the design and layout of various procedures in pharmaceutical industry	3								1	
		CO2	Know the various pharmaceutical dosage	3								1	

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			forms and their manufacturing techniques.										
		CO3	Know various considerations in development of pharmaceutical dosage forms	3								1	
		CO4	Understand the quality control of solid, liquid and semisolid dosage forms	3								1	
		CO5	Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality		3							2	
16PH3125: Pharmacology II	6	CO1	Understand the mechanism of drug action and its relevance in the treatment of different diseases	3			1						
		CO2	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.	3			1						
		CO3	Understand the effect of drugs on physiological systems	3			1						
		CO4	Appreciate correlation of pharmacology with related medical sciences	3			1						
		CO5	Perform various invitro experiments to demonstrate receptor actions using isolated tissue preparation		3		2						
16PH3126 : Pharmacognosy and Phytochemistry II	6	CO1	to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents	3									1
		CO2	to understand the preparation and development of herbal formulation.	3									1
		CO3	to understand the herbal drug interactions	3									1
		CO4	Understand the isolation procedures and identification of phytoconstituents	3									1
		CO5	to carryout isolation and identification of phytoconstituents		3								2
16PH3127 : PHARMACEUTICAL JURISPRUDENCE	4	CO1	The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.	3							1		

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		CO2	Various Indian pharmaceutical Acts and Laws	3							1		
		CO3	The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals	3							1		
		CO4	The code of ethics during the pharmaceutical practice	3							1		
16PH3228: MEDICINAL CHEMISTRY – III	6	CO1	Understand the importance of drug design and different techniques of drug design.	3			2						
		CO2	Understand the chemistry of drugs with respect to their biological activity.	3			2						
		CO3	Know the metabolism, adverse effects and therapeutic value of drugs.	3			2						
		CO4	Know the importance of SAR of drugs.	3			2						
		CO5	Understand the importance of drug design and different techniques of drug design.		3							2	
16PH3229: PHARMACOLOGY-III	6	CO1	understand the mechanism of drug action and its relevance in the treatment of different infectious diseases	3			1						
		CO2	comprehend the principles of toxicology and treatment of various poisonings and	3			1						
		CO3	appreciate correlation of pharmacology with related medical sciences.	3			1						
		CO4	To be able to ascertain the pharmacodynamics of medicinal agents	3			1						
		CO5	Perform various invitro experiments to demonstrate receptor actions using isolated tissue preparation		3		2						
16PH3230 : HERBAL DRUG TECHNOLOGY	6	CO1	understand raw material as source of herbal drugs from cultivation to herbal drug product	2									3
		CO2	know the WHO and ICH guidelines for evaluation of herbal drugs	2									3
		CO3	know the herbal cosmetics, natural sweeteners, nutraceuticals	2									3
		CO4	appreciate patenting of herbal drugs,	2									3

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			GMP .											
		CO5	Prepare various herbal formulations		3							2		
16PH3231 : BIOPHARMACEUTICS AND PHARMACOKINETICS	4	CO1	Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.		2							1		
		CO2	Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.		2							1		
		CO3	To understand the concepts of bioavailability and bioequivalence of drug products and their significance.		2								1	
		CO4	Understand various pharmacokinetic parameters, their significance & applications.		2								1	
16PH3232: PHARMACEUTICAL BIOTECHNOLOGY	4	CO1	Understanding the importance of Immobilized enzymes in Pharmaceutical Industries	1			2							
		CO2	Genetic engineering applications in relation to production of pharmaceuticals	1			2							
		CO3	Importance of Monoclonal antibodies in Industries	1			2							
		CO4	Appreciate the use of microorganisms in fermentation technology	1			2					2		
16PH3233: PHARMACEUTICAL QUALITY ASSURANCE	4	CO1	understand the cGMP aspects in a pharmaceutical industry	3								2		
		CO2	appreciate the importance of documentation	3								2		
		CO3	understand the scope of quality certifications applicable to pharmaceutical industries	3								2		
		CO4	understand the responsibilities of QA & QC departments	3								2		
16PH4134: INSTRUMENTAL METHODS OF ANALYSIS	6	CO1	Know about various instruments and standard operating procedures		2		1							
		CO2	Understand the interaction of matter with electromagnetic radiations and its		2		1							

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			applications in drug analysis										
		CO3	Understand the chromatographic separation and analysis of drugs.		2		1						
		CO4	Understand the principle and application of advanced analytical instruments.		2		1						
		CO5	Perform quantitative & qualitative analysis of drugs using various analytical instruments.		3		2						
16PH4135 : INDUSTRIAL PHARMACYII	4	CO1	Know the process of pilot plant and scale up of pharmaceutical dosage forms	2								3	
		CO2	Understand the process of technology transfer from lab scale to commercial batch	2								3	
		CO3	Know different Laws and Acts that regulate pharmaceutical industry	2								3	
		CO4	Understand the approval process and regulatory requirements for drug products	2								3	
16PH4136: PHARMACY PRACTICE	4	CO1	know various drug distribution methods in a hospital				2		3				
		CO2	appreciate the pharmacy stores management and inventory control				2		3				
		CO3	monitor drug therapy of patient through medication chart review and clinical review				2		3				
		CO4	obtain medication history interview and counsel the patients				2		3				
16PH4137: NOVEL DRUG DELIVERY SYSTEMS	4	CO1	Know about current developments in drug delivery technologies		3								2
		CO2	To understand various approaches for development of novel drug delivery systems.		3								2
		CO3	To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation		3								2
		CO4	To be able to design or recommend a drug delivery system		3								2
16PH4138. PRACTICE	6				2							3	

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SCHOOL														
16PH4239: BIOSTATISTICS AND RESEARCH METHODOLOGY	4	CO1	Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)				3	1						
		CO2	Know the various statistical techniques to solve statistical problems				3	1						
		CO3	Appreciate statistical techniques in solving the problems.				3	1						
		CO4	Know the applications of statistics in clinical data management				3	1						
16PH4240: SOCIAL AND PREVENTIVE PHARMACY	4	CO1	Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.							3	2			
		CO2	Have a critical way of thinking based on current healthcare development.							3	2			
		CO3	Evaluate alternative ways of solving problems related to health and pharmaceutical issues								3	2		
		CO4	Design a better health care service system								3	2		
16PH4241ET. PHARMA MARKETING MA- GEMENT	2 X 4	CO1	to provide an understanding of sales and marketing of pharmaceutical products.						3				2	
		CO2	Know about various policies for drug inventory management						3				2	
		CO3	Know about retail and wholesale marketing						3				2	
		CO4	Understand business potential and development in product sales and manufacturing						3				2	
16PH4242ET: PHARMACEUTICAL REGULATORY SCIENCE	2 X 4	CO1	Know about legal aspects and quality policies for drug manufacturing	3									2	
		CO2	Know about the process of drug discovery and development	3									2	
		CO3	Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals	3									2	
		CO4	Know the regulatory approval process	3									2	

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		and their registration in Indian and international markets										
16PH4243ET: PHARMACOVIGILANCE	CO1	Why drug safety monitoring is important?						3				2
	CO2	History and development of pharmacovigilance						3				2
	CO3	National and international scenario of pharmacovigilance						3				2
	CO4	Dictionaries, coding and terminologies used in pharmacovigilance						3				2
16PH4244ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS	CO1	know WHO guidelines for quality control of herbal drugs		3							2	
	CO2	know Quality assurance in herbal drug industry		3							2	
	CO3	know the regulatory approval process and their registration in Indian and international markets		3							2	
	CO4	appreciate EU and ICH guidelines for quality control of herbal drugs		3							2	
16PH4245ET. COMPUTER AIDED DRUG DESIGN	CO1	Design and discovery of lead molecules			3							2
	CO2	The role of drug design in drug discovery process			3							2
	CO3	The concept of QSAR and docking			3							2
	CO4	Various strategies to develop new drug like molecules.			3							2
16PH4246ET: CELL AND MOLECULAR BIOLOGY	CO1	Summarize cell and molecular biology history.		2		3						
	CO2	Summarize cellular functioning and composition.		2		3						
	CO3	Describe the chemical foundations of cell biology.		2		3						
	CO4	Summarize the DNA properties of cell biology.		2		3						
16PH4247ET. COSMETIC SCIENCE	CO1	Principles of formulation and building blocks of skin care products									3	2
	CO2	Principles of formulation and building blocks of Hair care products									3	2
	CO3	Role of herbs in cosmetics									3	2

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		CO4	Principles of Cosmetic Evaluation								3	2
16PH4248ET. EXPERIMENTAL PHARMACOLOGY		CO1	Appreciate the applications of various commonly used laboratory animals.		2		3					
		CO2	Appreciate and demonstrate the various screening methods used in preclinical research		2		3					
		CO3	Appreciate and demonstrate the importance of biostatistics and research methodology		2		3					
		CO4	Design and execute a research hypothesis independently		2		3					
16PH4249ET. ADVANCED INSTRUMENTATION TECHNIQUES		CO1	understand the advanced instruments used and its applications in drug analysis		3		2					
		CO2	understand the chromatographic separation and analysis of drugs.		3		2					
		CO3	understand the calibration of various analytical instruments		3		2					
		CO4	know analysis of drugs using various analytical instruments.		3		2					
16PH4250ET. DIETARY SUPPLEMENTS AND NUTRACEUTICALS		CO1	Understand the need of supplements by the different group of people to maintain healthy life.								3	2
		CO2	Understand the outcome of deficiencies in dietary supplements.								3	2
		CO3	Appreciate the components in dietary supplements and the application.								3	2
		CO4	Appreciate the regulatory and commercial aspects of dietary supplements including health claims.								3	2
16PH4251PW. PROJECT WORK	6				2		3				1	1

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**K L UNIVERSITY**  
**Vision and Mission Statement**  
**2016-17**

**Vision**

To be globally renowned university

**Mission**

To impart quality in higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging social needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values

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**K L UNIVERSITY**  
**SCHOOL OF BIOSCIENCES AND BIOENGINEERING**  
**DEPARTMENT OF BIOTECHNOLOGY**  
**2016-17**

**VISION, MISSION, LONG TERM GOALS, SHORT TERM GOALS, PEO'S AND PO'S**

**VISION:**

Attaining new heights in academic and research with global perspective for creation of health, wealth and welfare by applying engineering knowledge, creativity and technologies that will provide solutions to environmental, industrial, agricultural and health based problems.

**MISSION:**

- Impart scientific knowledge, strengthen R&D and educate the student to cater the global requirements in bioengineering technologies leading to an all-round professional and societal development by the student to empower India's incomparable human resource.

**LONG TERM GOALS:**

- To develop center for excellence.
- To achieve International projects and Patents.
- To develop incubation center for global needs.
- To attain DST-FIST level II.

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### **SHORT TERM GOALS:**

- To conduct International Conferences.
- To uplift all the laboratories so as to promote research and consultancy.
- To provide an excellent infrastructure facility to publish high indexed journals.
- To encourage teaching assistantship for the development of human values.
- To attract international students in UG, PG and PhD courses.
- To place students in core companies.

### **PROGRAM EDUCATIONAL OBJECTIVES**

The Program Educational Objectives (PEOs) of a program that describes the expected achievements of graduates while completion of their graduation. Long term vision of the program outcome is to guide the students at National & International standards of the institutes. The below chosen PEO's lead to the selection of courses under different categories in B.Tech Biotechnology are as follows:

- A. Practice engineering in a broad range of industrial, societal and real world applications.
- B. Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.
- C. Conduct themselves in a responsible, professional, and ethical manner.
- D. Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.

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## **STUDENT OUTCOMES**

The **Student Outcomes** are the skills and knowledge which the students have at the time of graduation. These Outcomes are generic and are common to all engineering programs. The BTech programs at KL University are designed to meet the **Student Outcomes** as identified by Washington Accord. These constitute a superset of program outcomes identified by National Board of Accreditation.

- a. An ability to apply knowledge of mathematics, science, and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## **PROGRAM SPECIFIC OUTCOME**

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**PSO1:** Knowledge and hands on training to solve engineering and scientific problems.

**PSO2:** Ability to work in interdisciplinary areas of science and technology towards industrial and academic research applications.

**MAPPING OF PEOs WITH THE MISSION OF THE DEPARTMENT**  
**DEPARTMENT OF BIOTECHNOLOGY 2016-17**

<b>Key components From Department Mission</b>		<b>Mission 1</b>	<b>Mission 2</b>
		Strengthen R&D and impart scientific to the student to cater the global requirements in bioengineering technologies.	Implement the scientific knowledge and understanding towards the all-round professional and societal development by the student.
<b>PEO1</b>	Practice engineering in a broad range of industrial, societal and real world applications.	✓	✓
<b>PEO2</b>	Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.	✓	

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<b>PEO3</b>	Conduct themselves in a responsible, professional, and ethical manner.		✓
<b>PEO4</b>	Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.	✓	✓

**MAPPING OF PEOs WITH THE POs OF THE DEPARTMENT**  
**DEPARTMENT OF BIOTECHNOLOGY 2016-17**

SOs		PEO1	PEO2	PEO3	PEO4
<b>a</b>	An ability to apply knowledge of mathematics, science, and engineering	✓	✓	✓	✓
<b>b</b>	An ability to design and conduct experiments, as well as to analyze and	✓	✓		✓
<b>c</b>	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		✓		✓
<b>d</b>	An ability to function on multidisciplinary teams	✓	✓		✓
<b>e</b>	An ability to identify, formulate, and solve engineering problems	✓	✓		✓
<b>f</b>	An understanding of professional and ethical responsibility			✓	
<b>g</b>	An ability to communicate effectively	✓	✓	✓	
<b>h</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context		✓		

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<b>i</b>	A recognition of the need for, and an ability to engage in life-long learning				
<b>j</b>	A knowledge of contemporary issues		✓		✓
<b>k</b>	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	✓	✓		✓
<b>PSOs</b>					
<b>1</b>	Knowledge and hands on training to solve engineering and scientific	✓	✓		✓
<b>2</b>	Ability to work in interdisciplinary areas of science and technology towards industrial and academic research applications.	✓	✓	✓	✓

**DEPARTMENT OF BIO-TECHNOLOGY**  
**K L UNIVERSITY**  
Green fields, Vaddeswaram, Guntur

**MAPPING OF COURSES WITH STUDENT OUTCOMES (2016 Regulations)**

S No	Course Code	Course Title	Category	L-T-P	Credits	Pre-Requisite	Student Outcome										
							a	b	c	d	e	f	g	h	i	j	k
1	15 GN 1001	Ecology and Environment	Humanities & Social Sciences	2-0-0	2	NIL								2	1		
2	15 GN 1002	Human Values	Humanities & Social Sciences	2-0-0	2	NIL					2						
3	15 EN 1101	Rudiments of Communication Skills	Humanities & Social Sciences	2-0-0	2	NIL						1					
4	15 EN 1202	Interpersonal Communication Skills	Humanities & Social Sciences	2-0-0	2	NIL				1		2					

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5	15 EN 2103	Professional Communication Skills	Humanities & Social Sciences	0-0-4	2	NIL							1	3				
6	15 EN 2204	Employability Skills	Humanities & Social Sciences	0-0-4	2	NIL							2	3				
7	15 EN 3105	Verbal and Quantitative Reasoning	Humanities & Social Sciences	0-0-4	2	NIL										1		
8	15 EN 3206	Corporate Communication Skills	Humanities & Social Sciences	0-0-4	2	NIL							3	3				
9	15 MT 1001	Single Variable calculus and Matrix Algebra	Basic Sciences	2-2-- 2	4	NIL					1							1
10	15ME1001	Mechanics	Basic Sciences	2-2-- 2	4	NIL	2				1							
11	15 PH 1001	Engineering Materials	Basic Sciences	2-2-- 2	4	NIL			1									
12	15 CY 1001	Engineering Chemistry	Basic Sciences	2-2-- 2	4	NIL		1	1									
13	15 BT 1001	Biology for Engineers	Basic Sciences	2-0-0	2	NIL									1		2	
14	15 MT 1102	Basic Mathematics	Basic Sciences	2-2-- 2	4	NIL	1				1							1
15	15 MT 2103	Probability & Statistics	Basic Sciences	3-0-0	3	NIL	2				2							
16	15 CS 1001	C Programming & Data Structures	Engineering Sciences	2-4-- 2	5	NIL	2				2							2

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17	15 ME 1002	Engineering Graphics	Engineering Sciences	0-0-6	3	NIL												2
18	15 GN 1004	Introduction to Engineering	Engineering Sciences	2-0-2	3	NIL						3		2				
19	15 GN 1003	Measurements	Engineering Sciences	0-0-4	2	NIL	2	2										
20	15 BT 1102	Process Engineering Principles	Engineering Sciences	3-2--0	4	NIL	2					2						
21	15 CS 2002	Object Oriented Programming	Engineering Sciences	2-2--2	4	NIL						2						3
22	15 BT 2104	Fluid Mechanics and Heat Transfer	Engineering Sciences	3-2--0	4	NIL		2				2						
23	15 BT 1203	Cell Biology	Professional Core	3-2--0	4	NIL	2											
24	15 BT 2105	Microbiology	Professional Core	3-0--2	4	NIL		2				2						3
25	15 BT 2106	Biochemistry	Professional Core	3-0--2	4	NIL			2									2
26	15 BT 2207	Bioanalytical techniques	Professional Core	3-0--2	4	NIL			3									3
27	15 BT 2208	Molecular Biology	Professional Core	3-2--0	4	NIL	2	2										
28	15 BT 2209	Biochemical reaction engineering	Professional Core	3-0--2	4	NIL		2				3						2
29	15 BT 3110	Immunology	Professional Core	3-0--2	4	NIL	1	2										2

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30	15 BT 3111	Genetic Engineering	Professional Core	3-0--2	4	NIL		3			3						
31	15 BT 3112	Bioinformatics	Professional Core	3-0--2	4	NIL		2									3
32	15 BT 3113	Fermentation Technology	Professional Core	3-0--2	4	NIL					3						2
33	15 BT 3114	Mass Transfer Operations	Professional Core	3-0--2	4	NIL		2									3
34	15 BT 3215	Bioprocess Dynamics and Control	Professional Core	3-2--0	4	NIL					3						2
35	15 BT 3216	Plant and Animal Biotechnology	Professional Core	3-0--2	4	NIL						2		3			
36	15 BT 2218	Biochemical Thermodynamics	Engineering Sciences	3-2--0	4	NIL	1	3									2
37	15 BT 3217	Down Stream Processing	Professional Core	3-0--2	4	NIL		3			2						2
38	15 IE 3250	Term Paper	Professional Core	3-0--2	2	NIL		2		3	3		3			2	
39	15 IE 4049	Minor Project	Professional Core	0-0-4	2	NIL	3						3				
40	15 IE 4048	Practice School	Professional Core	0-0-16	8	NIL											
41	15 IE 4050	Major Project	Professional Core	0-0-16		NIL	3		3					3	3	3	3
42	15 BT 3251	Molecular Genetics & DNA forensics	Professional Elective	3-0-0	15	NIL	2							1			

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43	15 BT 4155	Transgenic Technology	(Genetic Engineering)	3-0-0
44	15 BT 4156	Genomics & Proteomics		3-0-0
45	15 BT 4157	Molecular Expression Technology		3-0-0
46	15 BT 4158	Biosafety & Bioethics		3-0-0
47	15 BT 3252	Food Biotechnology	Professional Elective (Industrial & Food Technology)	3-0-0
48	15 BT 4159	Microbial Biotechnology		3-0-0
49	15 BT 4160	Metabolic Engineering		3-0-0
50	15 BT 4161	Bioprocess Plant Design and Economics		3-0-0
51	15 BT 4162	Pharmaceutical Biotechnology		3-0-0
52	15 BT 3253	Molecular Modelling and Drug Design		3-0-0
53	15 BT 4163	Bioperl & Perl Programming	Professional Elective (Bioinformatics)	3-0-0
54	15 BT 4164	Biomedical Informatics		3-0-0
55	15 BT 4165	Systems Biology		3-0-0
56	15 BT 3254	Cancer Biology	Professional Elective	3-0-0

NIL	2				2					
NIL	2				2					
NIL	2					2		1		
NIL						1			1	
NIL	2					1		1		2
NIL	2						1			
NIL	1									2
NIL		1								2
NIL	1					1				
NIL	2	2								
NIL	2						1			
NIL	1	1								
NIL	2						1			
NIL	1							1		

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57	15 BT 4167	Stem Cell Technology	(Medical Biotechnology)	3-0-0		NIL	2					1							
58	15 BT 4168	Nano Biotechnology		3-0-0		NIL	1												2
59	15 BT 4169	Tissue Engineering		3-0-0		NIL	1												2
60	15 BT 4170	Neuro Biology		3-0-0		NIL	1												2
61	15 BT 30A1	IPR & Patent Laws	Open Electives	3-0-0	6	NIL	1			2								3	
62	15 CE 30A2	Environmental Pollution Control Methods		3-0-0		NIL			2										2
63	15 CE 30A3	Solid and Hazardous waste management		3-0-0		NIL			2										2
64	15 CE 30A4	Remote Sensing & GIS		3-0-0		NIL			2										2
65	15 CE 30A5	Disaster Management		3-0-0		NIL			2										2
66	15CS30A6	Fundamentals of DBMS		3-0-0		NIL		2			2								
67	15CS30A7	Fundamentals of Software Engineering		3-0-0		NIL		2			2								
68	15CS30A8	Fundamentals of Information Technology		3-0-0		NIL	2				2								
69	15 EC 30A9	Image Processing		3-0-0		NIL	2				2								
70	15 EM 30B1	Linux Programming		3-0-0		NIL	2				3								

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71	15 EM 30B2	E-Commerce		3-0-0		NIL					1				2	2
72	15 EE 30B3	Renewable Energy Sources		3-0-0		NIL	1	2		2				1		
73	15 ME 30B4	Robotics		3-0-0		NIL		2	2							
74	15 ME 30B5	Mechatronics		3-0-0		NIL		2	2							
75	15 ME 30B6	Operations Research		3-0-0		NIL	2	2	2	2						
76	15 PH 30B7	Nano Materials & Technology		3-0-0		NIL			1					1		
77	15 PE 30B8	Subsea Engineering		3-0-0		NIL	1			2						
78	15 PE 30B9	Oil and Gas Management		3-0-0		NIL	1									
79	15 GN 30C1	Self Development		3-0-0		NIL					2		2	2		
80	15 GN 30C2	Indian Culture and History		3-0-0		NIL							1			
81	15 GN 30C3	Emotional Intelligence		3-0-0		NIL			2						3	
82	15 GN 30C4	Professional Ethics and Values		3-0-0		NIL					3					
83	15 GN 30C5	Behavioral Sciences		3-0-0		NIL			3		1					
84	15 GN 3051	Arabic	Foreign Language	3-0-0	3	NIL						2				

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85	15 GN 3052	Bengali		3-0-0		NIL							2				
86	15 GN 3053	Chinese		3-0-0		NIL							2				
87	15 GN 3054	French		3-0-0		NIL							2				
88	15 GN 3055	German		3-0-0		NIL							2				
89	15 GN 3056	Hindi		3-0-0		NIL							2				
90	15 GN 3057	Italian		3-0-0		NIL							2				
91	15 GN 3058	Japanese		3-0-0		NIL							2				
92	15 GN 3059	Kannada		3-0-0		NIL							2				
93	15 GN 3060	Russian		3-0-0		NIL							2				
94	15 GN 3061	Simhali		3-0-0		NIL							2				
95	15 GN 3062	Spanish		3-0-0		NIL							2				
96	15 GN 3063	Tamil		3-0-0		NIL							2				
97	15 GN 3064	Urdu		3-0-0		NIL							2				
98	15MB 51	Paradigms in Management thought	Management Elective	3-0-0	3	NIL								1	2	3	

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99	15MB3052	Indian Economy		3-0-0	NIL											3	1	2								
100	15MB3053	Managing Personal Finances		3-0-0	NIL												3	1								
101	15MB3054	Basics of Marketing for Engineers		3-0-0	NIL												3	1								
102	15 MB 3055	Organization Management		3-0-0	NIL												3	2	1							
103	15 MB 3056	Resources Safety and Quality Management		3-0-0	NIL												3	2	1							
<b>Totals</b>																37	22	13	4	26	15	26	16	18	9	24

**DEPARTMENT OF BIOTECHNOLOGY  
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COURSE ARTICULATION MATRIX 2016 Regulations**

Course Code	Course Title	S No	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	
15BT2104	FLUID MECHANICS & HEAT TRANSFER	1	CO1	Understand and analyze fluid flow problems with the applications of bioprocess technology	1											2
		2	CO2	Capability to analyze pipe flows as well as fluid machinery					2							2

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		3	CO3	Understand and solve the heat transfer mechanism problems and analyze the performance of heat exchangers	1					2									2
		4	CO4	Design and analyze the evaporators and drying of process materials						3									
15BT2105	MICROBIOLOGY	5	CO1	Acquire the knowledge about history and classification of microorganisms	1														
		6	CO2	identify morphology and cell structure of microorganisms						2									
		7	CO3	categorize growth phases and factors affecting growth						2									2
		8	CO4	examine types of media sterilization and various diseases															3
		9	CO5	formulate various sterilization, isolation, culturing techniques for microbes															3
15BT2106	BIOCHEMISTRY	10	CO1	Define, describe and discuss the functions and properties of biomolecules (carbohydrates, nucleic acids, proteins, lipids) in biological systems	1														
		11	CO2	Outline, classify and compare the organization and biochemical properties of biomolecules	1														
		12	CO3	Distinguish metabolism and metabolic pathways of biomolecules in biological systems	2														
		13	CO4	Interpret and appraise the role of metabolism and functions of biosignaling in biological systems	2														

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		14	CO5	Evaluate and test the presence of macromolecules in biological compounds		3			3										
13BT301	FLUID MECHANICS & HEAT TRANSFER	15	CO1	Understand and analyze fluid flow problems with the applications of bioprocess technology	1												2		
		16	CO2	Capability to analyze pipe flows as well as fluid machinery					2									2	
		17	CO3	Understand and solve the heat transfer mechanism problems and analyze the performance of heat exchangers	1				2									2	
		18	CO4	Design and analyze the evaporators and drying of process materials					3										
13BT302	GENETIC ENGINEERING	19	CO1	Understand the methods of recombinant DNA technology	1														
		20	CO2	Compare different vectors and assess recombinant DNA molecules	1														
		21	CO3	Distinguish types of PCR, gene transfer methods					2										
		22	CO4	Compile gene technology methods					3										
		23	CO5	Design and construct recombinant DNA molecule		3	3												
13BT303	BIOINFORMATICS	24	CO1	Acquire the theoretical basis of bioinformatics and understand, assess and retrieval of biological information from databases	1			1											
		25	CO2	mainpulate the DNA/Protein sequences using stanalone PC programs and with the help of WWW		2													

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		26	CO3	Develop multiple sequence alignment tools to find homologs, analyze sequences, construct and interpret the evolutionary trees															3
		27	CO4	demonstrate the protein structure using retrieved sequences from databases	3			3											
13BT304	FERMENTATION TECHNOLOGY	28	CO1	Demonstrate the basic knowledge of fermentation process	1														
		29	CO2	Use principles of optimization techniques and interpret mass balance equation of biological system to assess the microbial kinetics.				2											
		30	CO3	Use various principles of biocatalytic processes to assess the sterilization efficiency, produce value added products and assess mass transfer effects on the growth of bacteria, yeast and other microorganisms .				2											2
		31	CO4	Design and construct bioreactor systems to scale up and scale down fermentation process for better yield of biomass and product formation															3
		32	CO5	Evaluate fermentation processes to produce value added proteins and other biological substances for human, animal therapeutic use, food production processing and bio fuels		2													
13BT307	Food Technology	33	CO1	Understand the role of microorganisms in food	1														
		34	CO2	Understand the food processing	1														

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				and preservation															
		35	CO3	understand the concept of food quality	1						1		1				1		
		36	CO4	Apply scientific principles to advance in food industry	2												2		
		37	CO5	Apply and test the principles of food processing in practice	2														
13BT401	MASS TRANSFER OPERATIONS	38	CO1	Understand and analyze the mass transfer in diffusion process	1					2									2
		39	CO2	Understand and analyze the mechanism of crystallization and absorption	1					2									2
		40	CO3	Separation by liquid-liquid Extraction and adsorption						2									2
		41	CO4	Evaluate design calculation of distillation methods and Separation by leaching						3									
		42	CO5	Evaluate the methods for analysis of binary and ternary mixtures.		3	3												
13BT402	Down Stream processing	43	CO1	Acquire the knowledge of rheological properties of fermentation broth, principle behind the unit operations for Recovery of intracellular products and removal of suspended solids.	1														
		44	CO2	Acquire the knowledge of, Product Enrichment Operations, principle behind the unit operations for membrane separations and Design Combinations of Unit operation for process development.	1														

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		45	CO3	Acquire the knowledge of chromatography; Understand the principle behind the Alternative Separation	1													
		46	CO4	Methods and unit operations for polishing and formations. Application of appropriate technique/unit operation for the process and evaluate the financial feasibilities of the newly designed process. Design new processes for purification of products,			3											
		47	CO5	Acquire the practical knowledge of unit operations.		3	3											
13BT431	Genomics and Proteomics	48	CO1	Acquire the knowledge about genome and genomic analysis	1													
		49	CO2	Understand the concepts of comparative and functional genomics in relation to molecular diagnosis	1													
		50	CO3	Analyze the importance of microarrays and proteomic analysis techniques.	2				2									
		51	CO4	Compare various protein networks and protein mapping techniques	2				2									
13BT 432	Molecular Expression Technology	52	CO1	Explain the gene expressions in prokaryotes and yeast	1								1					
		53	CO2	Apply the Insect and Mammalian expression system	2					2								
		54	CO3	Understand the different Protein purification methods	1													
		55	CO4	Apply the Invitro protein folding and protein stability	2						2							

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13-BT433	Molecular Markers and Diagnostics	56	CO1	Describe the basic concepts of Molecular Markers and breeding	1																1					
		57	CO2	Understand Molecular assisted breeding program	1																		1			
		58	CO3	Understand Molecular Diagnostics	1																			1		
		59	CO4	Applications of Molecular Diagnostics	1																				1	
		60	CO5																							
13BT333	molecular modelling and Drug Design	61	CO1	Demonstrate the Principles of molecular modeling techniques	1																					
		62	CO2	Analyze the protein structure determination	1																					
		63	CO3	Perform Monte-Carlo and Molecular dynamics simulations		2																				
		64	CO4	Analyze applications of drug design		2																				
13BT 435	Structural Biology	65	CO1	Understand the network properties	1																					
		66	CO2	Design regulatory network through systems biology software	1																					
		67	CO3	Perform Algorithms for biochemical network construction		2																				
		68	CO4	Apply applications and perspectives of systems biology		2																				
15BT2218	BIOCHEMICAL THERMODYNAMICS	69	CO1	Ability to understand fundamental concepts of thermodynamics to biochemical engineering applications	1																				2	
		70	CO2	Ability to estimate thermodynamic properties of substances in gas and liquid states	1																					2

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		71	CO3	Capability to determine thermodynamic efficiency of various energy related processes	1														2	
		72	CO4	Ability to apply various thermodynamic models for microbial growth	1														2	
15BT2207	BIOANALYTICAL TECHNIQUES	73	CO1	Understand various types of centrifuges	1															
		74	CO2	Analyze chromatographic methods for the estimation and identification of biomolecules	2															
		75	CO3	Application of electrophoresis methods for the analysis of the biomolecules					2											
		76	CO4	Spectroscopic and Isotopic methods for the analysis of biomolecules					2											
		77	CO5	Evaluate various techniques for the identification and estimation of biomolecules		3	3													
15 BT 2208	Molecular Biology	78	CO1	Genome organization & dna structure	1															
		79	CO2	DNA replication, DNA Mutations, Repair Mechnaisms	1															
		80	CO3	Transcription and Translation in Prokaryotes and Eukaryotes	2				2											
		81	CO4	Regulation of gene expression in Prokaryotes, Antisense RNA	2				2											
15BT2209	Biochemical Reaction Engineering	82	CO1	Acquire the knowledge of terminology in principles of reaction engineering.	1	1														
		83	CO2	Interpret the experimental kinetic data obtained from batch bioreactors.		2			2											

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		84	CO3	Illustrate the various types of single and multiphase bioreactors.														2	2	
		85	CO4	Design the construction and configuration of bioreactors.			3												3	
		86	CO5	Evaluate the kinetic parameters in designing the bioreactors.		3	3													
15BT2209	Biochemical Reaction Engineering	87	CO1	Acquire the basic knowledge of Biochemical Reaction Engineering	1															
		88	CO2	Use principles of batch reactor system to interpret the reaction kinetic data					2											
		89	CO3	Use various principles of ideal and Non ideal systems to asses the biochemical reaction kinetics and estimate the mass balance equations from enzyme reactors					2											
		90	CO4	Develop mass balance design equations from the various biological systems to analyze the biomass yield and product formation																3
		91	CO5	Evaluate the effect of various biochemical parameters on microbial growth and product formation		2														
13BT306	IMMUNOLOGY	92	CO1	Understand the concepts of immunity	1														1	
		93	CO2	Understand assays related to immunology	1															
		94	CO3	Understand the mechanisms of innate and adaptive immunity	1															
		95	CO4	Apply the knowledge and concepts of immunity w.r.t	2															

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				diseases																
		96	CO5	Conduct various immunological assays and apply them to diagnostics	2	2													2	
13BT308	Plant and Animal Biotechnology	97	CO1	Understand the basics of Plant Tissue Culture	1									1						
		98	CO2	Apply the Plant Tissue culture to Genetic engineering	2					2										
		99	CO3	Understand the importance of Animal Tissue culture	1															
		100	CO4	Apply the Transgenic technology to Animals	2					2										
		101	CO5	Produce <i>In vitro</i> culture plants and cells		3									1					
13 BT 334	BIOPERL AND PERL PROGRAMMING	102	CO1	Knowing perl variables and datatypes	1															
		103	CO2	understand control sutures and string manipulation	1															
		104	CO3	Identify mechanisms input and output files		1														
		105	CO4	Examine various bioperl and its modules		1														
13BT434	BIOMEDICAL INFORMATICS	106	CO1	Introduction of medical informatics	1															
		107	CO2	understand the techniques used for MI	1															
		108	CO3	Understand the models and modules of networking		1														
		109	CO4	Examine applications of MI in various fields		1														
13BT437	MEDICAL BIOTECHNOLOGY	110	CO1	UNDERSTAND THE ROLE OF BIOTECHNOLOGY IN MEDICAL FIELD	1															

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		111	CO2	UNDERSTAND THE ROLE OF HEALTH CARE PRODUCTS FROM BIOTECH INDUSTRY	1														
		112	CO3	UNDERSTAND THE ROLE OF STEM CELLS	1					1								1	
		113	CO4	UNDERSTAND THE ROLE OF BIOTECHNOLOGY IN DISEASE DIAGNOSIS AND CLINICAL TRIALS	1					1								1	
13BT336	Stem Cell Technology	114	CO1	Describe the basic concepts of Stem Cells	1													1	
		115	CO2	Understand Stem Cell Characterization	1													1	
		116	CO3	Understand Tissue Engineering	1													1	
		117	CO4	Applications of Biopharming	1													1	
15 BT 1203	Cell Biology	118	CO1	Acquire the knowledge of cell, cell organelles and cytoskeleton	1														
		119	CO2	Compare the various transport mechanisms of plasma membrane	2														
		120	CO3	Compare Cell division , cell cycle ,tissues and Receptors	2														
		121	CO4	Analyze the importance of embryo development, organogenesis and cell death	2														
15- BT1001	Biology for Engineers	122	CO1	Understand the basis of Life, Living organisms and human body systems														1	1
		123	CO2	Understand the importance of Diet and Nutrition														1	1
		124	CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors														1	1
13BT204	Bioanalytical Techniques	125	CO1	Understand the various types of centrifuges	1														

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		126	CO2	Analyze biomolecules by chromatographic methods	2												
		127	CO3	Evaluate biomolecules by electrophoresis methods					2								
		128	CO4	Compare various techniques used for analysis of biomolecules		3	3										
		129	CO5	Evaluate the methods for analysis of biomolecules													
13-ES207	Biomedical Signals and Systems	130	CO1	Understand and apply the various biomedical signals on human body with reference to rehabilitation engineering and neuroengineering	2	2		2	2		2						2
		131	CO2	Apply the fundamental principles various biomedical systems on solving problems in the areas of human anatomy signals(calculation of an ECG spectrum using Fourier Series and calculation of Heart Rate Variability using Fourier Transforms)	2	2		2	2		2						2
		132	CO3	Apply the Noise and Feed Back System on cardiovascular processes with reference to biomedical engineering and signal imaging processes.	2	2		2	2		2						2
		133	CO4	Analyze the biomedical signals and systems on various physiological system with reference to biomedical electronics, medical instrumentation, medical imaging, biomedical signal processing, rehabilitation engineering, and	2	2		2	2		2						2

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				neuroengineering															
13 BS109	Cell and Molecular biology	134	CO1	Remember cellcycle,regulation,cytoskeleton and adhesion components	1														
		135	CO2	understand dna damage ,replication and repair	1														
		136	CO3	Identify mechanisms of transcription,translation and splicing		2													
		137	CO4	Examine various gene regulation mechanisms															3
13 BS 202	COMPLEX VARIABLES AND DISCRETE MATHEMATICS	138	CO1	Construct the analytic function and evaluate the contour integrals also represent analytic function as a series.	2														
		139	CO2	Evaluate the integrals involving Bessel and Legendre polynomials and Model the given phenomena as difference equation and solve it.	2														
		140	CO3	Use graphs and trees as tools to visualize network problems	1														
		141	CO4	Apply algorithms and theorems for construction of spanning trees	2														
13 BS 203	Complex Variables and Finite Difference	142	CO1	Apply Cauchy-Riemann equations to test the analyticity of a complex function and Compute the complex integrals, using Cauchy theorem and Cauchy Integral formulae.	2														

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		143	CO2	Compute real and complex integrals using the Residue theorem and represent analytic functions as Taylor, Maclaurin and Laurent series expansions. Also transform complex functions using bilinear transformation.	2														
		144	CO3	Derive generating function, recurrence relations, orthogonality relations of Bessel and Legendre polynomials and develop integral form of these functions.	2														
		145	CO4	Apply finite difference method to find solutions of boundary value problems associated with ordinary and partial differential equations-elliptic (Laplace and Poisson), parabolic (one dimensional heat) and hyperbolic equations (One dimensional wave)	2														
15-BT1001	Biology for Engineers	146	CO1	Understand the basis of Life, Living organisms and human body systems									1		1				
		147	CO2	Understand the importance of Diet and Nutrition										1		1			
		148	CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors										1		1			
15 BT 1203	Cell Biology	149	CO1	Acquire the knowledge of cell, cell organelles and cytoskeleton	1														
		150	CO2	Compare the various transport mechanisms of plasma membrane	2														

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		151	CO3	Compare Cell division , cell cycle ,tissues and Receptors	2													
		152	CO4	Analyze the importance of embryo development, organogenesis and cell death	2													
13-BS 206	Discrete Mathematics	153	CO1	Apply various Set Operations and Logical Inferences for solving problems and the principle of Mathematical Induction.	2				2									
		154	CO2	Analyze Combinatorial and Permute Analysis, Binomial theorem, Multinomial theorem and Principle of Inclusion and Exclusion.					2									
		155	CO3	Analyzedifferent types of Graphs,Lattices, Sorting and Searchingtechniques and Applications of Graphs	2													
		156	CO4	Applyprocedure for solving Spanning Trees and different methods for solving Recurrence Relations.					2									
13 BS109	Cell and Molecular biology	157	CO1	Remember cellcycle,regulation,cytoskeleton and adhesion components	1													
		158	CO2	understand dna damage ,replication and repair	1													
		159	CO3	Identify mechanisms of transcription,translation and splicing		2												
		160	CO4	Examine various gene regulation mechanisms														3
15- BT1001	Biology for Engineers	161	CO1	Understand the basis of Life, Living organisms and human body systems									1				1	

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		162	CO2	Understand the importance of Diet and Nutrition										1		1	
		163	CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors										1		1	
11BTE34	MOLECULAR MODELING AND DRUG DESIGN	164	CO1	Understand basic concepts in generation of reliable model molecules and various strategies of molecular modeling													
		165	CO2	Understand various methods for predicting protein structure.													
		166	CO3	Understand methods of exploring dynamics of proteins, identification of putative drug targets and potential drug lead molecules.													
11BTE-41	Cancer Biology	167	CO1	Describe the basic concepts of cancer and carcinogenesis	1												1
		168	CO2	Understand Molecular Biology of cancer and cancer metastasis	1												1
		169	CO3	Understand immunological response against cancer	1												1
13 BT 332	Transgenic Technology	170	CO1	Acquire the knowledge about various vectors and basic gene constructs involved in transgenic technology	1												
		171	CO2	Understand the importance of transgenic plants in agriculture and biopharming.	1												
		172	CO3	Compare gene transfer methods involved in transgenic animals	2				2								
		173	CO4	Analyze various gene silencing & gene knock out technologies	2				2								
13BT308	Plant and Animal	174	CO1	Understand the basics of Plant	1									1			

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	Biotechnology			Tissue Culture														
		175	CO2	Apply the Plant Tissue culture to Genetic engineering	2					2								
		176	CO3	Understand the importance of Animal Tissue culture	1													
		177	CO4	Apply the Transgenic technology to Animals	2					2								
		178	CO5	Produce Invitro culture plants and cells		3												
13BT331	Molecular Genetics and DNA Forensics	179	CO1	Understand the organization and functions of chromosomes; types of sequences.	1					1								
		180	CO2	Understand the importance of genetic recombination and regulation of gene expression.	1					1								
		181	CO3	Apply the knowledge of DNA forensics to crime scenario and the importance of molecular techniques in DNA forensics.	2													
		182	CO4	Analyze the role and importance of X, Y chromosome and mtDNA in DNA forensics and Case studies involving various techniques in forensic investigations	2													
13-BT306	Immunology	183	CO1	Understand the concept of immunity	1												1	
		184	CO2	Understand assays related to immunology	1													
		185	CO3	Understand mechanisms of immunity	1													
		186	CO4	Apply concept of immunity w.r.t diseases	2													
		187	CO5	assays and apply the Conduct various immunologicalm to diagnostics	2	2												2

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13 BT 305	Biochemical Reaction Engineering	188	CO1	Acquire the knowledge of terminology in principles of reaction engineering.	1															
		189	CO2	Interpret the experimental kinetic data obtained from batch bioreactors.		2														
		190	CO3	Illustrate the various types of single and multiphase bioreactors.														2		
		191	CO4	Design the construction and configuration of bioreactors.			3													
		192	CO5	Evaluate the kinetic parameters in designing the bioreactors.		3														
11BTE34	MOLECULAR MODELING AND DRUG DESIGN	193	CO1	Understand basic concepts in generation of reliable model molecules and various strategies of molecular modeling																
		194	CO2	Understand various methods for predicting protein structure.																
		195	CO3	Understand methods of exploring dynamics of proteins, identification of putative drug targets and potential drug lead molecules.																
11BTE-41	Cancer Biology	196	CO1	Describe the basic concepts of cancer and carcinogenesis	1													1		
		197	CO2	Understand Molecular Biology of cancer and cancer metastasis	1													1		
		198	CO3	Understand immunological response against cancer	1														1	
12BTE33	Molecular Expression Technology	199	CO1	Explain the gene expressions in prokaryotes and yeast	1								1							
		200	CO2	Apply the Insect and Mammalian expression system	2					2										

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		201	CO3	Understand the different Protein purification methods	1													
		202	CO4	Apply the Invitro protein folding and protein stability	2					2								
12BTE42	Microbial Technology	203	CO1	Understand the history of the benefits of microorganisms to mankind													1	
		204	CO2	Apply the knowledge of microbial technology, principles and techniques (physical, chemical and molecular methods) involved in microbial strain development	2													
		205	CO3	Analyze the role of microbes in the development of primary and secondary metabolites of industrial importance		2												
		206	CO4	Ability to assess the concepts involved in microbial bioprocess like biopreservation, biofertilizer etc.														3
11BT402	Down Stream Processing (DSP)	207	CO1	Acquire the knowledge of rheological properties of fermentation broth, principle behind the unit operations for Recovery of intracellular products and removal of suspended solids.	1													
		208	CO2	Acquire the knowledge of Product Enrichment Operations, principle behind the unit operations for membrane separations and Design Combinations of Unit operation for process development.	1													

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		209	CO3	Acquire the knowledge of chromatography; Understand the principle behind the Alternative Separation Methods and unit operations for polishing and formations.	1													
		210	CO4	Design new processes for purification of products, application of appropriate technique/unit operation for the process and evaluate the financial feasibilities of the newly designed process.	2													
11BT401	Bioprocess Dynamics and Control	211	CO1	Acquire the knowledge of bioprocess Dynamics and Control basics.	1													
		212	CO2	Use various control strategies to monitor and control bio process variables for better yield of biomass and product formation.		2												
		213	CO3	Design and construct advanced control systems to regulate the progress of biological system.														3
		214	CO4	Develop various strategies for steam jacketed cattle and microprocessor based control systems.														3

**K.L.UNIVERSITY**

**SCHOOL OF CIVIL AND MECHANICAL SCIENCES**

**Department of Civil Engineering**

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## **K L UNIVERSITY:**

### **Vision**

- To be a globally renowned university

### **Mission**

- To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

## **VISION, MISSION, LONG TERM GOALS, SHORT TERM GOALS, PEO's PO's and GA's OF DEPARTMENT:**

### **Vision**

- To impart knowledge and excellence in Civil Engineering with global perspectives to the student community and to make them ethically strong engineers to build our nation.

### **Mission**

- Our mission is to provide holistic development of student community to meet the ever changing needs of civil engineering industry and to be involved in forward looking research and consultancy useful to society.

## **B. Tech. - CIVIL ENGINEERING PROGRAMME**

### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs):**

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- To acquire, a strong foundation in basic sciences and technical knowledge, for successfully competing in executive positions and earn the highest qualification, in the field of Civil Engineering.
- To be a professional with high caliber in theoretical and practical applications in executing live projects with in-depth knowledge in CAD and analysis software packages.
- To possess strong application techniques with an understanding of multi-cultural, multi-linguistic, multi-disciplinary team work.
- To protect, sustainable development, environmental degradation and professional ethics.

### **PROGRAMME OUTCOMES (POs):**

On completing the B. Tech. – Civil Engineering Programme successfully the students will exhibit the following capabilities:

- a. Knowledge in Mathematics, basic sciences, problem solving skills, practical experience to enter career growth related to civil engineering.
- b. Possessing practical knowledge in knowing the experiments that have to be conducted on site and in lab to ensure quality in construction.
- c. Be a designer and analytical expert to design various structures based on the need.
- d. Possessing field experience, design skills and abilities to shine as an independent Structural engineer / Foundation Engineer / Highway Engineer / Surveyor or any other specialization.
- e. Apply Computer Aided Design practices to generate plan and elevation of buildings / structures of any shape.
- f. Adopt new materials in the construction of buildings and other structures, without degrading the environment.
- g. Competency in using BIS codes, International Specifications, Handbooks, Manuals and appropriate software packages for the application of Disaster mitigation techniques.
- h. Understanding the three R's with respect to sustainable development and Environmental protection, i.e. Reduce, Reuse, and Recycle.
- i. Rendering consultancy services independently, with respect to Civil Engineering applications.
- j. Understanding the concepts of architectural needs, Socio economical issues and professional ethics as applicable to Civil Engineers.
- k. Knowledge of project management and finance management.

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**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

1. Function as design consultants in construction industry for the design of civil engineering structures.
2. Provide sustainable solutions to the Civil Engineering Problems.

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## DEPARTMENT OF CIVIL ENGINEERING

### MAPPING OF PEOs vs. Mission Statement (Undergraduate)

		Mission Statement		
		To provide holistic development of student to meet the ever changing needs of civil engineering industry	To be involved in forward looking research	To be involved in consultancy useful to society
<b>Programme Educational Objectives</b>				
1	Practice engineering in a broad range of industrial, societal and real world applications.	√	√	√
2	Practice engineering in a broad range of industrial, societal and real world applications.	√	√	√
3	Practice engineering in a broad range of industrial, societal and real world applications.	√	√	√
4	Practice engineering in a broad range of industrial, societal and real world applications.	√		√

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**K L UNIVERSITY DEPARTMENT OF CIVIL ENGINEERING**

**MAPPING OF POs & PSOs vs. PEOs (Undergraduate)**

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		<b>Programme Educational Objectives</b>			
		Practice engineering in a broad range of industrial, societal and real world applications.	Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.	Conduct themselves in a responsible, professional, and ethical manner.	Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.
	<b>Program Out Comes &amp; Program Specific Outcomes</b>				
a	Ability to apply knowledge of mathematics, science, and engineering	√		√	
b	Ability to design and conduct experiments, as well as to analyze and interpret data	√			
c	Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and	√	√		
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	sustainability				
d	Ability to function on multidisciplinary teams	√			
e	Ability to identify, formulate, and solve engineering problems	√	√		
f	Understanding of professional and ethical responsibility	√		√	√
g	Ability to communicate effectively	√			
h	Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	√		√	√
i	Recognition of the need for, and an ability to engage in life-long learning	√	√		
j	Knowledge of contemporary issues	√	√		
k	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√			
PSO1	Function as design consultants in	√	√	√	

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	construction industry for the design of civil engineering structures.				
2	Provide sustainable solutions to the Civil Engineering Problems.	√			√

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### DEPARTMENT OF CIVIL ENGINEERING

#### MAPPING OF Courses & Cos vs. PEOs (Undergraduate)

Course Code	Course Title	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	PSO 1	PSO 2
15GN1001	Ecology and Environment	CO1	Understand the importance of Environmental education and conservation of natural resources								1					2

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		CO2	Understand the importance of ecosystems and biodiversity.										1					2
		CO3	Understand the knowledge on solid waste management, disaster management and EIA process											1				2
15GN1002	Human Values	CO1	Realize and understand the basic aspiration, harmony in the human being.						1								2	2
		CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.						2								2	
		CO3	analyze the profession and his role in this existence.						2								2	
15EN1101	Rudiments of Communication Skills	CO1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills							2							2	
		CO2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar							2							2	
		CO3	Understand the types of texts and tone of the author.								2						2	
		CO4	Understand the importance of interpersonal skills							2							2	
15EN1202	Inter Personal Communication Skills	CO1	Understand the method of identifying the meaning of words and apply them in contexts.							2						2		

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		CO2	Understand and analyze different cultures and the importance of empathy in cross-cultural communication.						<b>2</b>					2		
		CO3	Understand and analyze seven techniques of reading and improve reading speed.							<b>2</b>				2		
		CO4	Understand and apply writing strategies in office/ formal communication							<b>2</b>				2		
15 EN 2103P	Professional Communication Skills	CO1	Apply the various strategies of presentation Skills.							<b>1</b>				2		
		CO2	Analyze the given topics and situations and applying the strategies of group discussion.							<b>2</b>				2		
		CO3	Analyze the basic concepts of critical and analytical reading skills.								<b>3</b>				2	
		CO4	Apply the strategies of sentence formation and sentence completion.							<b>1</b>					2	
15 EN 2204	Employability Skills	CO1	Analyze one's own strength as a speaker/communicator and use discretion while listening							<b>2</b>				2		
		CO2	Apply and analyze various concepts of writing strategies in professional communication skills like, reports, resume and minutes of the meeting							<b>3</b>				2		

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		CO3	Understand the organisation of the passage and also analyze the tone, attitude and style of the author							2					2			
		CO4	Acquire knowledge of and apply people skills in various social organizational and corporate ambience							2					2			
15 EN 3105	Verbal and Quantitative Reasoning	CO1	Understand the method of identifying synonyms and antonyms and analyze the meaning of a word from the context									1			2			
		CO2	Analyze issues and arguments in the process of critical reasoning and apply grammar rules to correct sentences										1			2		
		CO3	Apply the concepts of basic algebra and their importance while solving the problems											1			2	
		CO4	Apply the short cut methods on the concepts of different models in calendars, clocks, blood relations and various types of arrangements											1			2	
15 EN 3206	Corporate Communication Skills	CO1	Understand and analyze the depth of a topic and use the advanced levels in creative speaking and debating.												2			

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		CO2	Understand and analyze various strategies involved in writing an essay and apply various styles in writing															2						2					
		CO3	understand and analyze the given text critically and answer questions on critical reasoning based on the given information																						2				
		CO4	Acquire knowledge on various employability skills & analyze a situation and develop adaptability										3	3												2			
		CO5	Apply the concepts of basic geometry and their importance while solving the problems																						2				
15MT1001	Single Variable Calculus and Matrix Algebra	CO1	Model physical laws and relations mathematically as a first order differential equations, solve by an appropriate method and interpret the solution.	2																						2			
		CO2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by an appropriate method and interpret the solution.	2																								2	
		CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve differential equations.	2																								2	

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		CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values	2										2	
		CO5	Verify the solution of problems through MATLAB.										2	2	
15ME1001	Mechanics	CO1	Understand the concept of forces and apply the static equilibrium equations.	1				2						2	
		CO2	Analyze co-planar and non co-planar system of forces.	2				2						2	
		CO3	Apply the concept of centroid & centre of gravity to determine moment of inertia.	2				2						2	
		CO4	Analyze the rigid bodies under translation and rotation with and without considering forces.	2				2						2	
		CO5	Understand the engineering systems to prepare and demonstrate the models with the help of mechanics concept to solve the engineering problems.	1				2						2	
15PH1001	Engineering Materials	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.	1									2		

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		CO2	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.	1											2		
		CO3	Understands role of molecular vibrations in determining thermal properties of materials and deformation of materials in response to action of load, for identification of materials having specific engineering applications.	1											2		
		CO4	Understands spin and orbital motion of electrons in determining magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.	1											2		
		CO5	Apply the knowledge on structure and properties of materials while executing related experiments and develop some inter disciplinary projects.		2										2		
15CY1001	Engineering Chemistry	CO1	Examine water quality and select appropriate purification technique for intended problem		2	2									2		
		CO2	Predict potential complications from combining various chemicals or metals in an engineering setting		2	2										2	
		CO3	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion		2	2										2	

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			phenomena													
		CO4	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes			2								2		
		CO5	An ability to analyze & generate experimental skills		2	2								2		
15BT1001	Biology for Engineers	CO1	Understand the basis of Life, Living organisms and human body systems							1		1			2	
		CO2	Understand the importance of Diet and Nutrition							1		1			2	
		CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors							1		1			2	
15MT1203	Multivariate Calculus	CO1	Determine extreme values for functions of several variables	2										2		
		CO2	Determine area, volume through multiples integrals	2										2		
		CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length, areas of surfaces and volume of solids in practical problems	2											2	
		CO4	Obtain analytical and numerical solutions of Heat and wave	2											2	

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			equations														
		CO5	Verify the solution of problems through MATLAB										1	2			
15 CE 2103	Engineering Geology	CO1	Understand various geological processes operate on the surface of the earth, impact of the processes on the construction materials.	2	2			2							2		
		CO2	Understand the formation of different types of rocks and their identification and properties and use in sourcing suitable geological materials for construction	2				2								2	
		CO3	Equip with factors leading to various geological hazards and able to identify areas vulnerable to sliding, come out measures to stabilize slopes and seismic vulnerability.	2		2		2									2
		CO4	Equip with basic knowledge required for identification of suitable site for the proposed construction project, Equip with basic knowledge of hydro geological properties of rocks, identification of potential pockets for tapping groundwater and geological settings that are unfavorable / unsafe for construction of dams and driving	2		2		2									2

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			the tunnels.														
15MT2104	Probability and Optimization Techniques	CO1	Demonstrate Probability, theorems of probability and their applications in discrete probability distributions to the real world problems.	2											2		
		CO2	Apply Continuous distributions to analyze various real-world situations and also Construct the linear and non-linear regression lines.	2												2	
		CO3	Determine the relationship between two variables for grouped and ungrouped data using correlation coefficient and also Formulate the given industrial problems as a linear programming problem and solve it by graphical method	2												2	
		CO4	Obtain the solutions of linear and non-linear programming problems using different methods	2												2	
		CO5	Verify the solution of the problems through MATLAB/Excel											1	2		
15CS1001	C Programming and Data Structures	CO1	Illustrate how problems are solved using computers and programming.	2				2							2		

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		CO2	Interpret & Illustrate user defined C functions and different operations on list of data.	2											2		
		CO3	Implement Linear Data Structures and compare them.		2										2		
		CO4	Implement Binary Trees.		2										2		
		CO5	Apply the knowledge obtained by the course to solve real world problems.	2	2										2		
15ME1002	Engineering Graphics	CO1	Draft Orthographic views, projections of planes and , solids manually and by using CAD software Tool (AutoCAD)												2		
		CO2	Drafting Sectional views , Isometric views ,development of surfaces and perspectives views manually and by using AutoCAD													2	
		CO3	Project based workshop to prepare different models with the aid of workshop trades i.e., Carpentry, Tin smithy, House wiring and Fitting												2	2	
15GN1003	Measurements	CO1	Understand and apply the fundamentals of a measurement system, characteristics, transducers and metrology using simulation and experimentation tools.	2	2									2	2		

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		CO2	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.	2	2								2	2		
		CO3	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.	2	2								2	2		
		CO4	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.	2	2								2	2		
15GN1004	Introduction to Engineering	CO1	Understand the basic principles of engineering design							1				2		
		CO2	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.						3						2	
		CO3	Understand the aspects of critical thinking and problem solving in engineering								2				2	
		CO4	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such								2				2	

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			problems from engineering perspective														
15 CE 1201	Solid Mechanics	CO1	Associate with the stress-strain diagrams and the relationship between the elastic constants, estimate temperature stresses in compound bars and find the stresses in thin walled pressure vessels	2			2							2			
		CO2	Draw Shear force and Bending moment diagrams for statically determinate beams	2			2								2		
		CO3	Calculate the Bending and shear stresses and draw the distribution diagrams for various cross sections.	2			2								2		
		CO4	Estimate the transformation of stress in a plane and draw Mohr's circle, Estimate stresses due to torsion for circular shafts and find buckling load for centric and eccentric columns	2			2								2		
15 CE 2102	Mechanics of Fluids	CO1	To understand concept of flow phenomenon and determination of fluid properties.	1	1		1			1				1	2		
		CO2	To understand the mechanics pressure and its measurement.	2	2		2			2					2	2	
		CO3	To get the concepts of kinematic principles and solutions for simple mathematical equations, To	2	2		2			2						2	2

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			understand the energy principle, continuity equation of fluid in 3-dimensions												
		CO4	To know various hydraulic principles of pipe flow and losses in pipe systems.	2	2			2			2			2	2
		CO5	To Understand the Dimensional analysis concept and deriving the relevant equations.							2					2
15 CE 2206	Construction Materials and Concrete Technology	CO1	Compare the properties of most common and advanced building materials	2				2							2
		CO2	Understand the typical and potential applications of these materials such as concrete and its mix proportioning	2				2							2
		CO3	Understand the relationship between material properties and structural form	2				2							2
		CO4	Understand the importance of experimental verification of material properties.	1				1					1		2
15ES2002	Signal Analysis	CO1	Understand the representation, manipulation and operations of continuous Time signals and Systems					2							2
		CO2	Explore the continuous Time signals in Fourier domain and illustration of sampling theorem					2							2

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		CO3	Understand the Laplace transforms and its applications in LTI Systems												2					2		
		CO4	Analyze Discrete time signals in Fourier and Z Transform domain												2					2		
		CO5	Apply and evaluate signals and systems concept to various applications under time domain and transform domain																3	2		
15 CE 2105	Surveying	CO1	Understand basic concepts of surveying	1	1															2		
		CO2	Understand how to operate instruments required for surveying	1												1					2	
		CO3	Applying the surveying equipments required based on the functionality and nature of work													2	2				2	
		CO4	Apply field data to prepare a plan required for a given civil engineering project													2	2				2	
15 CE 2207	Building Planning and Construction	CO1	Understand the concept of building planning and the building bye laws and the regulations	1											1					1	2	
		CO2	Understand the stages involved in building planning	1												1					1	2
		CO3	Understand different techniques Of construction viz., Brick Masonry and stone Masonry	1												1					1	2

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		CO4	Understand the different types of floors, roofs, doors, stairs and its use, know about the supporting structures and building amenities.	1			1						1	2	
15 CE 2208	Environmental Engineering	CO1	Understand various aspects related to water supply process and water quality	a,b,c										2	
		CO2	Design and analyze water treatment system			2		2						2	
		CO3	Assess Sewage quantity and design of sewerage system	2		2		2						2	
		CO4	Design and analyze of sewage treatment process, Learn the impacts of air pollution its control techniques and disposal of solid wastes			2		2		2				2	
15 CE 2209	Hydraulics and Hydraulic Machines	CO1	To understand open channel flow through Chezy's, Kutter's and Manning's formula, design economical channel sections, Rapidly Varied Flow and applications.	2	2			2		2			2		2
		CO2	To understand the mechanics of impact of jet on various types of vanes.	2	2			2		2			2		2
		CO3	To understand the components, function and uses of Pelton turbine, Francis turbine and Kaplan turbine.	2	2			2		2			2		2

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		CO4	To performance of hydraulic design of turbines and pumps(C.P and R.P), To know various hydraulic aspects of components function and uses of Centrifugal Pumps and Reciprocating Pumps.	2	2			2						2	
15 CE 2210	Soil Mechanics	CO1	Understand origin, index & engineering properties of soil	2				2						2	
		CO2	Classify the soil according to I.S. guidelines and to know the stresses in soil	2				2						2	
		CO3	Analyze stresses developed at various points below the ground surface using various methods and Analyze important engineering property of soil such as permeability	2		2		2						2	
		CO4	Analyze important engineering properties of soil such as compaction, compressibility and consolidation of soil, Analyze important engineering property of soil such as shear strength of soil	2				2						2	
15 CE 3111	Foundation Engineering	CO1	Carry out geotechnical field investigation and can prepare field reports and Thoroughly understand different geotechnical investigation methodologies and can handle individually	2				2					2		

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		CO2	Can compute stress distribution using different techniques and can carry settlement analysis in different soil types	2			2							2		
		CO3	Compute bearing capacity of shallow and deep foundations in laboratory and field using different methods	2			2							2		
		CO4	Can analyze stability of slopes for finite and infinite in different soil conditions and methods, Carry earth pressure analysis and can design retaining walls	2			2							2		
15 CE 3112	Design of Reinforced Concrete Structures	CO1	Design RC beams subjected to bending using Working Stress Method.	2		2	2							2		
		CO2	Explain the concept of Limit State Design and apply it to beams	2		2	2							2		
		CO3	Apply Limit state design for flanged sections subjected to shear, torsion and concept of bond	2		2	2								2	
		CO4	Design one-way, two-way and continuous slabs, Design columns and isolated footings subjected to axial load, uni-axial and bi-axial bending	2		2	2								2	
15 CE 3113	Design of Steel Structures	CO1	Analyse and design bolted and welded connections	2		2	2							2		

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		CO2	Design single and compound beams as per IS code	2		2		2						2	
		CO3	Design simple and built-up columns as per IS code	2		2		2						2	
		CO4	Design column base systems as per IS code, Calculate wind forces and design roof trusses	2		2		2						2	
15CE301	Advanced Structural Analysis	CO1	Students will be able to draw influence line diagrams for determinate structure and able to estimate maximum bending moment and absolute maximum bending moment.	2				2						2	
		CO2	Students will be able to analysis cable structure and three hinged arches.	2				2						2	
		CO3	Students will be able to carry plastic analysis of structures	2				2						2	
		CO4	Analyze beams and frames using matrix methods of analyze such as force method and displacement method	2				2				2		2	
15 CE 3115	Transportation Engineering	CO1	Know Versatile with history - current trends of transportation and Carry engineering surveys and can decide the alignment							3	3			2	
		CO2	Analyze and design highway geometric elements			3		3						2	

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		CO3	Analyze and design of flexible, rigid pavements, Pavement Drainage			3		3						2		
		CO4	Handle pavement construction activities and also conduct quality control at site and Evaluate pavement condition and can identify and suggest remedial measures, Understand traffic Rules, Analyze and design of traffic infrastructure							3			3	2		
15 CE 3216	Quantity Surveying and Estimation	CO1	To understand the fundamentals of estimation and specification	2				2						2		
		CO2	To provide exposure to rate analysis	2			3			3				2		
		CO3	To provide hands on experience on estimation				3	3		3					2	
		CO4	To study the fundamentals of evaluation, To carry out valuation by different methods	2				2							2	
15CE302	Advanced Design of Reinforced Concrete Structures	CO1	Design different types of stair cases.	2		2		3						2		
		CO2	Select appropriate foundation system.	2		2		3						2		
		CO3	Apply the design principles of retaining walls.	2		2		3						2		

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		CO4	Differentiate types of rectangular water tanks and analyse as per IS code methods, Select types of circular water tanks and analyse as per IS code methods	2		2		3						2	
15 CE 3218	Water Resources Engineering	CO1	Understand movement of water, hydrologic cycle, rainfall measurement and analysis.	2	2			2			3			3	2
		CO2	Understand the concept of runoff, the factors affecting it and some methods of estimation.	2	2			2			3			3	2
		CO3	Analysis of Hydrograph, derivation of Unit hydrograph (UHG) and computation of flood hydrograph from UHG.	2	2			2			3			3	2
		CO4	Understand movement of Ground Water and design of tube wells, Understand irrigation terminology and computation of irrigation demands, Design of canals based on regime theory, Lacey's method, Khoshla's methods.	2	2			2			3			3	2
15 IE 3250	Term Paper					3								2	
15 IE 4049	Minor Project					3								2	
15 IE 4050	Major Project					3								2	

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15 IE 4048	Industrial Practice School							3							2	
	Industrial Training (Summer Break in II/IV year)							3							2	
15 CE 3251	Advanced Design of Steel Structures	CO1	Analyse and design a beam-column	1											2	
		CO2	Explain the need of plate girder and its design as per IS code			3									2	
		CO3	Calculate the loads on gantry girder and its design	1											2	
		CO4	Design a simple truss for wind loads and design of gable frame, Explain the concepts of pre-engineered buildings and their design	1											2	
15 CE 4156	Bridge Engineering	CO1	To design slab culvert as per IRC Code	1											2	
		CO2	To design simple supported T-beam girder beam					2							2	
		CO3	To design pier and abutments					2							2	
		CO4	To design various bridge bearing, To design bridge foundation like well foundation					2							2	

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15 CE 4157	Earthquake Resistant Design of Structures	CO1	To understand the principles of vibration with regard to single degree of freedom system and multy degree of freedom system		2											2		
		CO2	To understand the seismo resistant building Architecture.		2												2	
		CO3	To determine the design lateral forces by means of codal provisions.					2									2	
		CO4	To introduce the concept of ductility and corresponding detailing, To expose the students to earthquake resistant design of masonry buildings		2												2	
15 CE 4158	Prestressed Concrete	CO1	To introduce prestressing methods, principles and concepts	1												2		
		CO2	To determine losses in prestress	1													2	
		CO3	To Analyse PSC Sections both at transfer of prestress and Service load conditions				3										2	
		CO4	To design prestressed concrete beams as per IS Code, To design end block of PSC beams.				3										2	
15 CE 4159	Prefabricated Structures	CO1	To Analyze Structural Components in Prefabricated Components				2									2		

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		CO2	To Analyze Joints for different Structural connections										2			2		
		CO3	Able to design abnormal loads using code provisions			3										2		
		CO4	Able to analyze abnormal effects using code provisions			2										2		
15 CE 3252	Ground Improvement Techniques	CO1	Knowledge about the different techniques of ground improvement and their suitability.			2										2		
		CO2	Understanding and design of stone columns for enhancing soil bearing capacity.											2			2	
		CO3	Knowledge of the grouts, their types, properties and application.			2											2	
		CO4	Introduction to geo synthetics, their types, function and application, Ability to design and analyse the earth-reinforcements with their connections											2			2	
15 CE 4160	Advanced Foundation Engineering	CO1	Knowledge about the different techniques for laying foundations in expansive soils.		3											2		
		CO2	Understanding and design of different types of footings.						2								2	
		CO3	Various factors to be considered in foundation design.						2								2	

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		CO4	Understanding the design criteria of Machine foundations, Understanding the design criteria of Mat and For designing and construction of foundations for reciprocating machines as per IS.													2				
15 CE 4161	Geotechnical Earthquake Engineering	CO1	Knowledge of the seismic phenomenon, its occurrence, tectonic theories, seismic waves and their motion in different media and measurement of ground motions.															2		
		CO2	Analysis skills of 1-D ground responses using linear and non-linear approaches.																2	
		CO3	Ability to analyze the seismic hazard through deterministic and probabilistic approaches.																	2
		CO4	Ability of modifying the actual ground motion records and their time and frequency domain generation. Knowledge of dynamic soil properties and their measurements using field and laboratory tests, Knowledge of the liquefaction phenomenon and its effects and the remedial measures to be taken for soil improvement.																	2
15 CE 4162	Design of Earth Retaining Structures	CO1	Knowledge about the different techniques of earth retaining structures and their suitability.															2		

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		CO2	Understanding and design of retaining walls, braced cuts and sheet piles.					2						2		
		CO3	Knowledge of the grouts, their types, properties and application.		3									2		
		CO4	Introduction to reinforced earth and geo synthetics, their types, function and application, Ability to design and analyse the earth-reinforcements and coffer dams with their functions.		2			2						2		
15 CE 4163	Geosynthetics and Reinforced Soil Structures	CO1	Understand about Geosynthetics and Reinforced Soil retaining wall and Identifying suitable testing methods for Geosynthetics					2						2		
		CO2	Able to understand the stability of slopes and application of geosynthetics in foundations								2			2		
		CO3	Able to understand the application of geosynthetics in pavement and the use in construction of landfills									2			2	
		CO4	Able to identify different land filling techniques									2			22	
15 CE 3253	Design of Hydraulics Structures	CO1	To Design vertical drop weir on foundations	1										2		
		CO2	To Design vertical drop weir on a canal regulator , irrigation canal,direct sluice and surplus			3								2		

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			weir of tank												
		CO3	To design Profile of a Ogee spillway			3								2	
		CO4	To design Profile of a Cross Drainage works.			3								2	
15 CE 4164	Advanced Water Resources Engineering	CO1	Understand stream flow and its measurements	1										2	
		CO2	Understand the classification of the rivers and design of cross drainage works			3								2	
		CO3	Understand the reservoir planning and classification of dams			3								2	
		CO4	Able to design gravity and earth dams			3								2	
15 CE 4165	Environmental Impact Assessment	CO1	Understand the basic concept of Environmental impact assessment, types of environmental impacts, significance and criteria for selection			2									2
		CO2	Select methodology for identification of environmental impact.								2				2
		CO3	Apply the knowledge of predicting impact of proposed project on air & water								2				2

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		CO4	Acquire knowledge of predicting impact of proposed project on Noise, Soil, Biological and Socio-economic conditions, Acquire the skills of preparing environment management plans.									2				2		
15 CE 4166	Solid Waste Management and Landfills	CO1	Understand types, sources of solid waste, composition and their Properties.			2										2		
		CO2	Understand the present scenario, challenges of solid waste management and various waste disposal options available.										2				2	
		CO3	Understand methods of solid waste disposal methods of land filling, systems adopted for conversion of solid waste and recovery of materials and energy from solid waste.											2				2
		CO4	Understand the components of hazardous waste types, composition, properties and acquire skills of designing of various lining system for landfill and treatment as per MoEF and CPCB											2				2
15 CE 4167	Advanced Environmental Engineering	CO1	Understand the basic concepts of Stream Sanitation & design of Stabilization ponds			2											2	
		CO2	Acquire the knowledge of industrial wastewater treatment											2				2

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			process												
		CO3	Acquire the knowledge on new concepts in biological waste treatment									2			2
		CO4	Analyze air pollution and plume behavior, measuring of noise pollution, Understand various aspects related to Solid & Hazardous waste management									2			2
15 CE 3254	Advanced Highway Engineering	CO1	Understand about the Alignment, Geometrics, Analyze and Design of Hill Roads		3									2	
		CO2	Know the Importance of Low Volume roads in Indian scenario & Analyze and design Low Volume Roads including quality control aspects					2						2	
		CO3	Know the Importance of Desert Roads, and Guidelines for Design					2						2	
		CO4	Know the Importance of Roads in Swampy, water-logged areas and in Black cotton Soil, Versatile with various components of Special Roads such as Expressways, Toll Roads, Urban Roads.					2						2	
15 CE 4168	Traffic Engineering	CO1	Apply the Concepts of Probability in traffic Engineering		2								2		

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		CO2	Know the Fundamental design concepts of Interchanges, Parking Facilities, Freeways								2				2		
		CO3	Design Traffic Facilities include Un signalized Intersections (Rotary), Signalized Intersection (signal design)		2										2		
		CO4	Know the Accident Situation in India, road safety measures, Understand Detrimental Effects of traffic on the environment								2				2		
15 CE 4169	Advanced Pavement Design Engineering	CO1	Characterize pavement materials and also carry the advance tests on bituminous mixtures		2										2		
		CO2	Thorough with stresses and strains of flexible and rigid pavements.								2				2		
		CO3	Thorough with analysis and design of flexible highway and airport pavements									2				2	
		CO4	Thorough with analysis and design of rigid highway and airport pavements									2				2	
15 CE 4170	Urban Transport Systems Planning	CO1	Learn the concept of travel demand and supply and modes available for transportation		2										2		
		CO2	Understand the different types of Traffic Surveys used in planning									2				2	

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		CO3	Identify and analyze trips as a part of transport planning		2									2		
		CO4	Plan Public Transport Systems, Utilize ITS in Transport Planning		2									2		
15 CE 4171	Railway, Airport and Dock & Harbour Engineering	CO1	Interpret historical Components of Railway Engineering.	1										2		
		CO2	Understand about the Railway Track Geometric Elements and Turnouts	1											2	
		CO3	Design geometric elements of Airport Runway and Taxiway										2	2		
		CO4	To study about various components of docks and harbours	1											2	
15 CE 4174	Green Buildings	CO1	Understand Necessity and Role of Green Buildings & Regarding Indian Green Building Council	2											2	
		CO2	Understand the usage of Water, Site and Material Parameters.										2		2	
		CO3	Understand Passive Solar Design & Economics of a Green Buildings										2		2	
		CO4	Understand Construction and Maintenance of Green Buildings										2		2	
15 CE 30A2	Environmental Pollution Control	CO 1	To identify the sources of Air pollution, effects and control			2								2		

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	Methods		methods.															
		CO 2	To Identify the sources of water pollution, effects and control methods.									2					2	
		CO 3	To identify the sources of solid waste and disposal methods.			2											2	
		CO 4	To identify the sources of noise pollution, effects and control methods.			2											2	
15 CE 30A3	Solid and Hazardous Waste Management	CO 1	Understand the importance types, sources and disposal methods of Solid waste Management.			2											2	
		CO 2	To understand the importance of conversion and recycling of waste.			2												2
		CO 3	Understand the types and Sources of Hazardous waste										2					2
		CO 4	Understand the disposal methods of Hazardous waste										2					2
15 CE 30A4	Remote Sensing and GIS	CO 1	To get the Knowledge of Remote sensing Technology.			2											2	
		CO 2	Strong base of knowledge to Integrate the Remote sensing and GIS			2												2

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		CO 3	Design of Geospatial Information systems using RS									2				2	
		CO 4	Design of Geospatial Information systems using GIS in solving societal problems									2				2	
15 CE 30A5	Disaster Management	CO 1	Define and describe types of disasters, related hazards and the causes for disasters									2				2	
		CO 2	Know the effects, remedial measures, mitigation measures to be taken with respect to the kind of disaster that occur.			2											2
		CO 3	To know about the disaster risk, reduction and the various organizations involved with related to disasters			2											2
		CO 4	To know about the vulnerability and mitigations of various disasters with the help of case studies			2											2
15ME2106	Strength of Materials	CO1	Analyze stresses in members with 1D axial loading or torsion		2											2	
		CO2	Analyze shear force and bending moment diagrams		2					2						2	
		CO3	Analyze deflections and stresses in beams							2						2	

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		CO4	Design columns and pressure vessels								2					2		
15 CS 30A7	Fundamentals of Software Engineering	CO1	Comprehend software development life cycle and prepare SRS document		2											2		
		CO2	Apply software design and development techniques, understand software process improvement						2								2	
		CO3	Identify verification and validation methods in a software engineering project		2												2	
		CO1	Understand the architectural design of a computer and various basic concepts of operating systems and programming fundamentals	2													2	
15 EM 30B2	E-Commerce	CO1	Analyze various E-Commerce Business Models and Infrastructure										2			2		
		CO2	Understand the Ethical, Social and Political issues in E-Commerce						1								2	
		CO3	Analyze Marketing communications and Internet resources for E-Commerce												2		2	
		CO 1	Understand and analyze the solar thermal applications and solar photovoltaic cells.	1											1		2	

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15 ME 30B6	Operations Research	CO 1	Model and solve for the optimum solutions using LPP	2											2			
		CO 2	Model and optimize transportation and assignment problems		2											2		
		CO 3	Model and optimize Game theory, DPP, Queuing theory & Simulation problems					2								2		
		CO 4	Understand concepts of PERT/CPM			2										2		
15 PH30B7	Nano Materials and Technology	CO 1	Understand the essentials of nanomaterials and nanotechnology along with various methods used to fabricate nanomaterials. Also, recognize the several techniques used to characterize nanomaterials			1								1	2			
		CO 2	Understand the mechanical, optical & electrical properties of nanomaterials and also understand the concepts and applications of carbon based nanomaterials			1									1	2		
		CO 1	Understand the subsea engineering, field development, distributions system used in subsea.	1													2	
		CO 2	Apply the surveying to the subsea, understand the control system in subsea, understand the	2				2									2	

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			effect of corrosion and scale on the subsea equipment															
15 GN 30C1	Self-Development	CO1	Illustrate and realign values based on goal.						2		2	2			2			
		CO2	Demonstrate various types of Yoga and identify commonalities of different religions.						2		2	2			2			
		CO3	Illustrate practices of different Schools of Meditation and self-motivated approach to pursue a balanced life						2		2	2			2			
		CO4	Demonstrate techniques of stress management and Self-management focused interest in a Spiritual Practice						2		2	2			2			
15 GN 30C2	Indian Culture and History	CO1	Understand the basic features of Indian Culture and early civilizations of Indian History up to Religious Movements								1				2			
		CO2	Gain basic knowledge in the major socio political concepts of important kingdoms from Mauryas to Mughals.									1				2		
		CO3	Gain Knowledge in the aspects of Modern India and Indian National Movement up to										1				2	
		CO4	Acquire Knowledge in the area of Final Phase of Indian National Movement and partition of India														2	

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15 MB 3051	Paradigms in Management Thought	CO1	Understand the basic management concepts along with an insight into levels of management.									2			2		
		CO2	Understand the key contributions of classical approach to Management										2			2	
		CO3	Understand and apply Quantitative methods to improve Management performance.										2			2	
		CO4	Understand the key contributions of Behavioral and contemporary approaches to Management.										2			2	
15 MB 3052	Indian Economy	CO1	Understand the structure of Indian Economy									2			2		
		CO2	Understand the role of the Indian Economy in the global context.										2			2	
		CO3	Develop a perspective on the different problems and approaches to economic planning and development in India								2					2	
15 MB 3053	Managing Personal Finances	CO1	Understand the need for effective financial planning									2			2		
		CO2	Analyze the basic concepts of money management, tax planning, consumer credit, housing and other consumer decisions, insurance, investments, retirement planning etc.										2			2	

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		CO3	Evaluate various financial tax saving schemes to save money to get tax benefits.								2				2		
		CO4	Design savings and investment plans.								2				2		
15 MB 3054	Basics of Marketing for Engineers	CO1	Understand the concepts of marketing, factors influencing the consumer behavior, decision making process and strategic areas of 4Ps									2			2		
		CO2	Analyze the markets and consumers, the changing environmental factors with special focus on technology products		2											2	
		CO3	Create an appropriate strategy for the marketing of high tech products and services.			2										2	

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**K.L.UNIVERSITY**

**Department of Computer Science Engineering**

**Academic Year 2016-17 PDD**

**K L UNIVERSITY:**

**Vision**

- To be a globally renowned university

**Mission**

- To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**VISION, MISSION, PEO's PO's and GA's OF DEPARTMENT:**

**Vision**

- To be a department of International repute through continuous research, innovation and industry led curriculum.

**Mission**

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To Impart Quality Education with social consciousness and make them Globally Competent.

- Provide quality undergraduate and graduate education in both the theoretical and applied foundations of computer science.
- Train students to effectively apply this education to solve real-world problems
- Give students a competitive advantage in the ever-changing and challenging global work environment
- Conduct research to advance the state of the art in theoretical computer science and integrate results, innovations into other scientific disciplines

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs):**

1. Practice engineering in a broad range of industrial, societal and real world applications.
2. Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.
3. Conduct themselves in a responsible, professional, and ethical manner.
4. Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.

**PROGRAMME OUTCOMES (POs):**

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At the end of the B.Tech Program the student will attain the following outcomes:

1. An ability to apply knowledge of mathematics, science and engineering
2. An ability to identify, formulate, and solve engineering problems
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. An ability to design and conduct experiments, as well as to analyze and interpret data
5. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
6. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
7. A knowledge of contemporary issues
8. An understanding of professional and ethical responsibility
9. An ability to function on multidisciplinary teams
10. An ability to communicate effectively (3g1 orally, 3g2 written)
11. A recognition of the need for, and an ability to engage in life-long learning

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

3. Function as design consultants in construction industry for the design of civil engineering structures.
4. Provide sustainable solutions to the Civil Engineering Problems.

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		<b>Mission Statement</b>			
<b>Programme Educational Objectives</b>		Provide quality undergraduate and graduate education in both the theoretical and applied foundations of computer science	Train students to effectively apply this education to solve real-world problems	Give students a competitive advantage in the ever-changing and challenging global work environment	Conduct research to advance the state of the art in theoretical computer science and integrate results, innovations into other scientific disciplines
1	Practice engineering in a broad range of industrial, societal and real world applications.	✓	✓		
2	Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.	✓			✓
3	Conduct themselves in a responsible, professional, and ethical manner.		✓	✓	✓
4	Participate as leaders in their fields of expertise and in activities that support service		(Dr G Chakravarthi)	Signature of Head of the Institution	

	and economic development throughout the world.				
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**MAPPING OF PEOs vs. Mission Statement (Undergraduate) MAPPING OF POs & PSOs vs. PEOs (Undergraduate)**

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		<b>Programme Educational Objectives</b>			
		Practice engineering in a broad range of industrial, societal and real world applications.	Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.	Conduct themselves in a responsible, professional, and ethical manner.	Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.
	<b>Program Out Comes &amp; Program Specific Outcomes</b>				
a	Ability to apply knowledge of mathematics, science, and engineering	√	√		
b	an ability to identify, formulate, and solve engineering problems	√	√		
c	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety,				
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	manufacturability, and sustainability				
d	an ability to design and conduct experiments, as well as to analyze and interpret data	√			
e	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√			
f	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context				
g	a knowledge of contemporary issues	√	√	√	√
h	an understanding of			√	√

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	professional and ethical responsibility				
i	an ability to function on multidisciplinary teams	√		√	
j	an ability to communicate effectively (3g1 orally, 3g2 written)	√		√	√
k	a recognition of the need for, and an ability to engage in life-long learning				√
PSO1	An ability to design and develop software projects as well as to analyze and test user requirements.	√			
PSO2	Working knowledge on emerging software tools and technologies.		√		

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### MAPPING OF Courses & Cos vs. PEOs (Undergraduate)

Course Code	Course Title	S NO	CO NO	Description of the Course Outcome	A	b	c	d	E	f	g	h	i	i	k	PSO 1	PSO 2
15CS1101	<b>C PROGRAMMING &amp; DATA STRUCTURES-1</b>	1	CO1	.Illustrate how problems are solved using computers and programming.	2				2							3	
		2	CO2	Illustrate and use Control Flow Statements in C..	2				2							3	
		3	CO3	Interpret & Illustrate user defined C functions and different operations on list of data.	2				2							3	
		4	CO4	Implement Linear Data Structures and compare them.		2										3	
		5	CO5	Apply the knowledge obtained by the course to solve real world problems.	2	2			2							3	
15CS1201	C Programming & Data Structures -2	6	CO1	Solve typical problems using computers and programming.	2				2							3	

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		7	CO2	Apply linear Data Structures in solving problems..	2				2								3	
		8	CO3	Implement Non - Linear Data Structures.	2				2								3	
		9	CO4	Implement Height balanced trees & Hashing.		2											3	
		10	CO5	Apply the knowledge obtained by the course to solve real world problems.	2	2			2								3	
15 CS 2208	Computer Networks	11	CO1	Understand OSI and TCP/IP Models and basics of physical layer and their issues	1												2	
		12	CO2	Demonstrate Data Link layer issues and medium access control sub layers concepts					2								2	
		13	CO3	Analyze and implement the algorithms of network and transport layers and concerned services					2								2	
		14	CO4	Evaluate and execute the concepts of TCP ,UDP and the application layer conceptions					3								2	

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		15	CO5	Demonstrate the basic concepts of protocols and their design including client/server models, connection oriented and connection-less models					2									2					
15CS2007	Data Base System	16	CO1	Explain the advantages of DBMS, its Characteristics, Concepts and ER-Model.	1														3				
		17	CO2	Demonstrate Relational Database using SQL detailing the role of Relational Algebra and Relational Calculus	2															3			
		18	CO3	Illustrate the normal forms of Relational DBMS detailing the process of normalization.						2											3		
		19	CO4	Examine Transaction Management, Concurrency Control, File Organizations, Indexing, and Storing data.						2												3	
		20	CO5	Create and Access Data Base for given Applications		2																	3
15CS2003	Discrete Mathematics	21	CO1	Apply the concept of sets,	2																	2	

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		relations, functions and discrete structures , Count discrete event occurrences															
22	CO2	Apply Propositional logic and First order logic to solve Problems	2														2
23	CO3	Formulate and solve recurrence relations, Apply algebraic structures and lattices.														2	
24	CO4	To identify the basic properties of graphs and trees and model simple applications														2	
25	CO5	Relate practical examples to the appropriate set, function or relation model and interpret the associated operations														2	

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				and terminology in context														
15CS 2002	Object Oriented Programming (through Java)	26	CO1	The student will be able to understand Basic Concepts of OOP, apply the concepts of classes and objects through Java Language.	2				2								3	
		27	CO2	The student will be able to apply the concepts of constructors, Overloading, parameter passing, access control, Inheritance.	2				2								3	
		28	CO3	The student will be able to apply Packages, Interfaces, Exception Handling.	2				2									3
		29	CO4	The student will be able to apply I/O Streams and understand Basic Concepts of Multi – Threading	2				2									3
		30	CO5	Students will be able to develop programs and projects in java.	2				2									3
15CS2206	Operating	31	CO1	Understand the basic concepts of operating system, OS structure and process concepts.	1				1								2	
		32	CO2	Apply the concepts Process Scheduling algorithms and	2				2								2	

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	Systems			Process Synchronization Problems.															
		33	CO3	Solve the concept of the Deadlock, Memory Management and Virtual Memory Concepts.	2				2									2	
		34	CO4	Demonstrate file system interface, structure, file allocation methods, free space management and threads.	1				1										2
		35	CO5	Create and develop a project along with his/her team members.					3										2
15 CS 2105	Software Engineering	36	CO1	Comprehend software development life cycle and prepare SRS document					2									3	
		37	CO2	Apply software design and development techniques, understand software process improvement					2										3
		38	CO3	Identify verification and validation methods in a software engineering project												2			3
		39	CO4	Analyze and Apply Human Computer techniques for a case study					2										3

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		40	CO5	Apply UML Specification and analysis techniques to software designs and programs											2	3			
15 CS 3109	Theory of Computation	41	CO1	Understand formal machines, languages and computations	2											2			
		42	CO2	Design finite state machines for acceptance of strings and context free grammars for formal languages	2												2		
		43	CO3	Develop pushdown automata accepting strings					2									2	
		44	CO4	Distinguish between decidability and undecidability					2									2	
		45	CO5	Design Turing machine					2									2	
15 CS 3110	Algorithm Design and Analysis	46	CO1	Analyze time and space complexity					2								3		
		47	CO2	Identify algorithm design methodology to solve problems.					2									3	
		48	CO3	Design algorithms for network flows and string processing					2									3	
		49	CO4	Distinguish between P and NP classes of problems and solve complex problems												3		3	

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		50	CO5	Apply algorithm design techniques to solve any real world problems													3				
15 CS 3112	Information Assurance & Security	51	CO1	Perform packet sniffing and analyze packets for vulnerabilities	2													2			
		52	CO2	Identify system vulnerabilities of communication Protocols	2														2		
		53	CO3	Design firewalls , Authentication Protocols					2											2	
		54	CO4	Analyze encryption algorithms					2											2	
		55	CO5	Developing an application using public key encryption techniques which supports digital signing concepts					2											2	
13 CS 304	Artificial Intelligence	56	CO1	Students will able to apply PROLOG programming for the AI concepts					2										3		
		57	CO2	Students will be able to relate methods for encoding Knowledge In computer systems	1															3	
		58	CO3	Students will be able to Interpret the Problems and search related to AI	1															3	

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		59	CO4	Students will be able to infer Slot-and-filler structures and architecture of neural networks as connectionist models	1													3				
		60	CO5	Demonstrate the basic concepts of artificial intelligence in the Laboratory					2										3			
15 CS 3216	Graphics & Visualization	61	CO1	Analyze and select visualization techniques for specific problems														2	3			
		62	CO2	Obtain 2-dimensional and 3-dimensional points by applying transformations			2													3		
		63	CO3	Implement a simple real-time renderer using a rasterization API (e.g., OpenGL) using vertex buffers and shaders															2	3		
		64	CO4	Analyze the effectiveness of a given visualization for a particular task			2														3	
		65	CO5	Use standard APIs and tools to create visual displays of data, including animations, graphs, charts, tables, and histograms.															2	3		
15 CS 3113	Platform based development	66	CO1	Understand current and evolving Web languages for integrating media and user interaction in both					2											3		

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				front end and back end elements of a Web site														
		67	CO2	Understand Java-Script functions and CSS					2									3
		68	CO3	Understand game and industrial platforms					2									3
		69	CO4	Understand,analyze and build dynamic and interactive web sites,Design and implementation of modern SOA and SOA-specific methodologies, technologies and standards													3	3
		70	CO5	Install and manage server software and Mobile programming tools.													3	3
15 CS 3214	Languages & Compilers	71	CO1	Analyzing the design issues involved in various constructs of programming languages, Design top-down and bottom-up parsers					2									2
		72	CO2	Develop syntax directed translation schemes, Design and Implement LR parser					2									2
		73	CO3	Use formal grammars to specify the syntax of Languages					2									2
		74	CO4	Analyzing the methods and tools to define syntax and semantics of a languages													2	2

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		75	CO5	Analyzing the methods and tools to define syntax and semantics of a languages											2			
15 CS 3215	Parallel & Distributed Computing	76	CO1	Distinguish centralized computing and distributed computing detailing formal model of a distributed message passing system and the complexity measures of message passing between systems presenting important abstractions for designing distributed programs	2				2							3		
		77	CO2	Identify the leader by coordinating among processors, elaborating formal models for shared memory system and memory requirement for solving mutual exclusion problem.	2				2								3	
		78	CO3	Utilize DSM model for inter process communication showing relationship between various types of shared objects and Identify clock synchronization problem applying tight bounds to synchronize clocks.	2				2								3	

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		79	CO4	Examine the process of realizing reliable fault tolerance in distributed system reflecting the specific type of faulty behavior and illustrate simulation that makes Byzantine failures appear to be crash failures	2													3		
		80	CO5	Experiment with laboratory programs and develop a small project along with his/her team members.	2														3	
15 CS 4182	Discrete Event Simulation	81	CO1	Discrete-Event Simulation Framework for modeling and simulation to a range of problem areas	2														2	
		82	CO2	Understand Activity-Based Modeling and Simulation	2															2
		83	CO3	Understand Activity-Based Modeling and Simulation	2															2
		84	CO4	Understand event graph modeling for simulation														2		2
15 CS 3255	2D/3D Graphics	86	CO1	Contrast forward and backward rendering	2														3	

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		87	CO2	Construct CSG models from simple primitives, such as cubes and quadric surfaces.	2															3		
		88	CO3	Analyze affine and vector geometry	2																3	
		89	CO4	Understand Bezier and B-Spline Curves	2																3	
15 CS 4175	Multimedia Technologies	90	CO1	Describe the media communications and supporting devices commonly associated with multimedia information and systems	2																3	
		91	CO2	Demonstrate the use of content-based information analysis in a multimedia information system.	2																	3
		92	CO3	Critique multimedia presentations in terms of their appropriate use of audio, video, graphics, color, and other information presentation concepts with Quality of Service In Network Multimedia Systems	2																	3

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		93	CO4	Implement a multimedia application using an authoring system and Middleware for Multimedia												2						3			
15 CS 4176	Game Graphics Programming	94	CO1	Discuss the concepts of Game design and development.			2																3		
		95	CO2	Design the processes, and use mechanics for game development, Create interactive Games.			2																	3	
		96	CO3	Explain the Core architectures of Game Programming.	2																				3
		97	CO4	Use Game programming platforms, frame works and engines	2																				3
15 CS 4177	Animation & Visualization	98	CO1	Understand interpolation & Describe several approaches to using a computer as a means for interacting with and processing data	2																			3	
		99	CO2	Explain kinematic linkages and motion capture	2																			3	

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		100	CO3	Understand modeling and animating human figures	2															3			
		101	CO4	Apply facial animation, behavioral animation									2								3		
15 CS 4178	Cross Platform Mobile Development	102	CO1	Design and implement a mobile application using OPENGL ES2.0,Phonegap HTML 5 and JS	2																3		
		103	CO2	Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.			2															3	
		104	CO3	Discuss the constraints that mobile platforms put on developers.	2																	3	
		105	CO4	Discuss the performance vs. power tradeoff			2																3
		106	CO1	Understand issues related to R Representation	2																		2
15 CS 4183	Big Data & Optimization	107	CO2	Understand issues related to R Representation					2													2	
		108	CO3	Apply population based search					2														2

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				and develop query processing strategies															
		109	CO4	Understand applications like Travelling Salesman Problem	2													2	
15 CS 4184	Advanced Databases	110	CO1	Understand issues related to object relational , multimedia database design	2													3	
		111	CO2	Understand issues related to Distributed database Design.	2													3	
		112	CO3	Apply Partitioning techniques to databases, Design and develop query processing strategies.											2				3
		113	CO4	Understand transaction processing and concurrency control in distributed databases.	2														3
15 CS 4185	Information Visualization & Graph Analytics	114	CO1	Understand Geographic Visualization	2													2	
		115	CO2	Apply Extracting Salient Structures for data cleansing					2										2

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		116	CO3	Analyze and evaluate Stats and Layout	2													2	
		117	CO4	Analyze Point-and-Click: Graph Tools like NodeXL, Gephi, Cytoscape					2									2	
15 CS 4186	Data Science & Big Data Analytics	118	CO1	Understand big data challenges in different domains including social media, transportation, finance and medicine	2													3	
		119	CO2	Analyze scalability and performance of relational model, SQL and emergent systems. Apply the statistical analysis methods.										2				3	
		120	CO3	Comprehend machine learning and algorithms for data analytics.	2														3
		121	CO4	Analyze Map-Reduce programming model for better optimization											2				3
15 CS 3257	Data Warehousing and Mining	122	CO1	Student should be able to Understand the necessity of data preprocessing in construction of data warehouse.	1													3	

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		123	CO2	Student should be able to Analyze multidimensional data using OLAP tools to facilitate effective data mining.	2	2														3		
		124	CO3	Student should be able to Apply the concepts of data analysis and clustering to postulate accurate classification model for a given problem.		2	2														3	
		125	CO4	Student should be able to Recommend a methodology forming complex data types and detection of anomaly for the given Application.	3		3														3	
15 CS 3251	TCP/IP Protocol Suite	126	CO1	Design and analyze the existing routing protocols using NS	2																2	
		127	CO2	Identify solution for each functionality at each layer	2																	2
		128	CO3	Identify solution for each functionality at each layer	2																	2
		129	CO4	Case Study: Simulation Of Network Protocols Using NS																2		2
15 CS 4159	Network Architecture and Design	130	CO1	Discuss methodologies for analyzing networks of	2																3	

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				different fields.																
		131	CO2	strate knowledge of recent research in the area and exhibit technical writing and presentation skills.					2										3	
		132	CO3	Explain the key concepts and algorithms in complex network analysis.	2															3
		133	CO4	Apply a range of techniques for characterizing network structure.					2											3
15 CS 4160	Network Security	134	CO1	Analysis and design of algorithms to implement secure protocols.		2													2	
		135	CO2	Discuss security properties and limitations of wired networks											2				2	
		136	CO3	Describe the architecture for public and private key cryptography and how public key infrastructure (PKI)		2														2

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				supports network security															
		137	CO4	Describe common types of vulnerabilities and attacks in web applications, and defenses against them										2				2	
15 CS 4161	Wireless communications and Networks	138	CO1	Understand algorithm/protocols, environments and communication systems in mobile computing.	2													2	
		139	CO2	Evaluate the efficiency of modulation schemes and multiple access techniques.										2				2	
		140	CO3	Analyze the performance of MAC,TCP protocols used for wired network and wireless networks.										2					2
		141	CO4	Design and analyze the existing routing protocols for multi-hop wireless networks.	2														2
15 CS 4162	Computer Forensics	142	CO1	Discuss the security issues network layer and transport	2													2	

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				Layer															
		143	CO2	Apply security principles in the application layer			2												2
		144	CO3	Apply their theoretical and practical knowledge in forensic computing, into the future and emerging technology			2												2
		145	CO4	Use forensics tools ,Analyze and validate forensics data	2														2
15 CS 3252	Software Metrics and Measurements	146	CO1	Determine the software measurement attributes and process metrics													2		2
		147	CO2	Plan and evaluate metrics for object oriented software projects	2														2
		148	CO3	Understand project monitoring and control Techniques													2		2
		149	CO4	Describe several process	2														2

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				metrics for assessing and controlling a project. Assess the quality of a proposed metric.														
15 CS 4163	Software Verification and Validation	150	CO1	Design test cases suitable for a software development for different domains.	2												2	
		151	CO2	Identify suitable tests to be carried out. Conduct an inspection or review of software source code for a small or medium sized software project.			2										2	
		152	CO3	Prepare test planning based on the document using automatic testing tools.	2													2
		153	CO4	Document test plans and test cases designed			2											2
15 CS 4164	Software Architecture and Design Patterns	154	CO1	Analyze and combine design patterns to work together in software design											2		2	

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		155	CO2	Refactor an existing software implementation to improve some aspect of its design			2									2	
		156	CO3	Discuss and select appropriate software architecture for a simple system suitable for a given scenario									2				2
		157	CO4	Implement the design patterns in an object oriented language.			2										2
15 CS 4165	Software Project Management	158	CO1	Understand Requirements Specification & Management, Scope Management, Project Initiation Management	2												2
		159	CO2	Apply Software Project Effort and Cost Estimation										2			2
		160	CO3	Apply the basic principles of risk management, Time Management, and Configuration Management in a variety of simple scenarios including a security situation.											2		2

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		161	CO4	Apply the basic principles of risk management, Time Management, and Configuration Management in a variety of simple scenarios including a security situation.	2															2		
15 CS 4166	Fault Tolerant Computing	162	CO1	Discuss the process by which a fault eventually causes a system failure. Understand the link between fault model and the corresponding dependability mechanisms.	A																2	
		163	CO2	Calculate reliability of a system. Use of tools for reliability modeling. Design of dependable HW.						2												2
		164	CO3	Understand critical functions such as clock synchronisation, consensus, FDIR protocols, etc.  Understand Byzantine failures and its impact on system complexity. Introduction to asynchronous message-passing distributed	2																	2

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				systems.																
		165	CO4	SW: Understand the various methods for SW fault tolerance. NVP, recovery blocks, run-time checks, problem of predicate detection.					2										2	
15 CS 3253	Enterprise Storage Systems	166	CO1	Understand storage systems	2														2	
		167	CO2	Understand Networking Technologies	2														2	
		168	CO3	Understand object based and unfied storage	2															2
		169	CO4	Apply security and management						2										2
15 CS 4167	Parallel Algorithms	170	CO1	Understand Algorithms and sorting networks	2														2	
		171	CO2	Ability to design and analyze parallel algorithms						2										2
		172	CO3	Apply graph and search algorithms on sorting networks						2										2
		173	CO4	Understand arithmetic and randomized computations	2															2

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15 CS 4168	Cloud Networking	174	CO1	Understand data center networking standards	2															2	
		175	CO2	Understand server virtualization , Switch Fabric Technology					2												2
		176	CO3	Cloud Data Center Networking Topologies	2																2
		177	CO4	Understand software defined networking					2												2
15 CS 4169	Cloud Computing	178	CO1	Identify the appropriate cloud services for a given Application					2											2	
		179	CO2	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.			2													2	
		180	CO3	Analyze authentication, confidentiality and privacy issues in Cloud computing environment.			2													2	
		181	CO4	Determine financial and technological implications for selecting cloud computing platforms					2											2	

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15 CS 4170	High Performance Computing	182	CO1	Analyze the performance of GPU memory hierarchy and MPI programming	2														2	
		183	CO2	Develop parallel programs using OpenCL library and understand FPGA-Based Supercomputer					2											2
		184	CO3	Develop mixed mode programs for Multicore, GPU and cluster optimization systems					2											2
		185	CO4	Generate parallel programs for matrix, graph and sorting problems using Cuda, OpenMP library	2															2
15 CS 3254	Soft Computing	186	CO1	Understand the working of neural networks to store and process information	2														2	
		187	CO2	Build optimal classifiers using genetic algorithms					2										2	
		188	CO3	Apply ANN, RNN models and various soft computing frame works.					2										2	
		189	CO4	Understand Fuzzy Logic Systems and develop Fuzzy logic controllers	2															2
15 CS 4171	Machine Learning	190	CO1	Explain the differences among the styles of learning: supervised, reinforcement, unsupervised, inductive and	2														2	

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				deductive															
		191	CO2	Comprehend probabilistic methods for learning					2									2	
		192	CO3	Understand Multivariate regression and Classification	2													2	
		193	CO4	Understand rule based knowledge and Analyze clustering	2													2	
15 CS 4172	Natural Language Processing	194	CO1	Analyze the natural language text.	2													2	
		195	CO2	Identify the challenges of representing meaning and Generate natural language.					2									2	
		196	CO3	Identify the challenges of representing meaning and Generate natural language.	2														2
		197	CO4	Simulate, apply, or implement classic and stochastic algorithms for parsing natural language.					2										2
15 CS 4173	Perception and Computer Vision	198	CO1	Understand Image representation and modeling	2													1	
		199	CO2	Apply Image transformation methods			2											1	

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		200	CO3	Implement image processing algorithms	2															1
		201	CO4	Design of face detection and recognition algorithms			2													1
15 CS 4174	Multi Agent Systems	202	CO1	Characterize and contrast the standard agent architectures.	2															1
		203	CO2	Create logical agents to do inference using first order logic.			2													1
		204	CO3	Demonstrate using appropriate examples how multi-agent systems support agent interaction	2															1
		205	CO4	Describe the primary paradigms used by learning agents			2													1
15 CS 3256	Modeling and Simulation for Sciences	206	CO1	Understand System dynamics models with interactions: competition, predator-prey models, spread of disease models	2															2
		207	CO2	Apply Cellular automaton diffusion simulations: spreading of fire, formation of biofilms					2											2

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		208	CO3	Understand Monte Carlo simulations	2														2	
		209	CO4	Determine system dynamics projects throughout, such as modeling falling and skydiving, enzyme kinetics, the carbon cycle, economics and fishing					2										2	
15 CS 4179	Scientific Computing and Visualization	210	CO1	Determine the convergence region for a finite difference method and Solve PDE.	2														2	
		211	CO2	Solve nonlinear differential equations by numerical methods.					2										2	
		212	CO3	To use iterative methods to solve systems of non-linear equations	2															2
		213	CO4	Understand volume Visualization, Optimization and Minimum Principles	2															2
15 CS 4180	Parallel Computing	214	CO1	Describe the levels of parallelism including task, data, and event parallelism	2														2	
		215	CO2	Understand Distributed Shared Memory Systems And	2														2	

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				Programming																
		216	CO3	Apply standard numerical algorithms to solve ODEs and PDEs. Use computing systems to solve systems of equations					2										2	
		217	CO4	Understand Mutex-Free Synchronization and The Transactional Memory Approach	2														2	
15 CS 4181	Optimization and Game Theory	218	CO1	Determine the optimum solution to constrained and unconstrained.	2														2	
		219	CO2	Determine average queue length and waiting times of queuing models.	2														2	
		220	CO3	Determine optimum solution to transportation problem Using PERT/CPM	2															2
		221	CO4	Determine the integer solutions to Linear Programming Problems.											2					2
15 CS 30A6	FUNDAMENTALS OF DBMS	222	CO1	Understand the fundamentals of database management systems including data models,		2													2	

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				database architectures, and database manipulations and be able to model ER-diagrams														
		223	CO2	Understand the theories and techniques in developing database applications and be able to write queries, functions and procedures with help of SQL				2										2
		224	CO3	Understand the theories and techniques in developing database applications and be able to write queries, functions and procedures with help of SQL		2												2
15 CS 30A7	FUNDAMENTALS OF SOFTWARE ENGINEERING	225	CO1	Comprehend software development life cycle and prepare SRS document		2												2
		226	CO2	Apply software design and development techniques, understand software process improvement				2										2
		227	CO3	Identify verification and validation methods in a		2												2

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				software engineering project													
15 CS 30A8	FUNDAMENTALS OF INFORMATION TECHNOLOGY	228	CO1	Understand the architectural design of a computer and various basic concepts of operating systems and programming fundamentals		2										2	
		229	CO2	Analyze various software development methodologies and gain capability to design databases.					2								2
		230	CO3	Analyze various software development methodologies and gain capability to design databases.					2								2

## K L University

### Department of Electronics and Communication Engineering

#### Academic Year 2016-17

#### Mapping of ECE Department Mission Statement with SOs, PSOs and PEOs

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## Student Outcomes

### Mission statement of K L University:

#### Vision:

To be a globally renowned university.

#### Mission

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

### Vision and Mission statement of ECE department

#### **VISION**

- To evolve into a globally recognized department in the frontier areas of Electronics & Communication Engineering (ECE).

#### **MISSION**

**M1-** To produce graduates having professional excellence.

**M2-** To carry out quality research having social & industrial relevance.

**M3-** To provide technical support to budding entrepreneurs and existing Industries.

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### **PROGRAM EDUCATIONAL OBJECTIVES (PEOS)**

- **PEO1:** Practice engineering in a broad range of industrial, societal and real world applications.
- **PEO2:** Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.
- **PEO3:** Conduct themselves in a responsible, professional, and ethical manner.
- **PEO4:** Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.

### **Student Outcomes**

a	Ability to apply knowledge of mathematics, science, and engineering
b	Ability to design and conduct experiments, as well as to analyze and interpret data
c	Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d	Ability to function on multidisciplinary teams
e	Ability to identify, formulate, and solve engineering problems
f	Understanding of professional and ethical responsibility
g	Ability to communicate effectively
h	Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i	Recognition of the need for, and an ability to engage in life-long learning

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j	Knowledge of contemporary issues
k	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PROGRAM SPECIFIC OBJECTIVES

PSO1	An ability <b>to Understand the theoretical and mathematical concepts to analyze real time problems.</b>
PSO2	An Ability <b>to Design and Analyze systems based on the theoretical and Practical Knowledge</b>

Mapping of Mission statements with program educational objectives

	M1	M2	M3
PEO1	✓	✓	✓
PEO2	✓	✓	✓
PEO3	✓		✓
PEO4	✓	✓	✓

Mapping of PEOs with SOs

	PEO1	PEO2	PEO3	PEO4
a	✓	✓		
b	✓	✓		
c	✓	✓		

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d	✓	✓		✓
e	✓	✓		
f			✓	✓
g	✓	✓		✓
h		✓	✓	✓
i	✓		✓	✓
j	✓			✓
k	✓	✓		
PSO1	✓	✓		
PSO2	✓	✓		

**DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING**  
**K L UNIVERSITY**  
**Green fields, Vaddeswaram, Guntur**

**MAPPING OF COURSES OUTCOMES WITH STUDENT OUTCOMES (2015 Regulations)**

Sl.No.	Course Code	Course Title	S NO	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2
1	15 EN 1101	Rudiments of Communication Skills	1	CO1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills.				1			2					2		
			2	CO2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar.				1				2						

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			3	CO3	Understand the types of texts and tone of the author.				1			2							
			4	CO4	Understand the importance of interpersonal skills				1			2							
2	15 EN 1202	Interpersonal Communication Skills	1	CO1	Understand the method of identifying the meaning of words from the context and form sentences using words.				1			2							
			2	CO2	Understand and analyze seven types of reading techniques and improve reading speed.				1			2				2			
			3	CO3	Understand and apply writing strategies for office/ formal communication.				1			2							
			4	CO4	Understand and analyze different cultures and the importance of empathy in cross-cultural communication.				1			2							
3	15 EN 2103	Professional Communication Skills	1	CO1	Understand the concept of Group Discussion and listen and speak effectively during the discussion.				1			2					2		

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			2	CO2	Understand and improve learners' competency in competitive English and apply the principles of grammar in real life contexts.				1		2							
			3	CO3	Understand skimming & scanning, and apply the types of reasoning in comprehending the information.				1		2					2		
			4	CO4	Understand the mechanics and application of presentation skills.				1		2							
4	15 EN 2204	Employability Skills	1	CO1	Analyze one's own strength as a speaker/ Communicator and use discretion while listening.						2		1			2		
			2	CO2	Apply and analyze various concepts of writing strategies in professional communication skills like, reports, resume and minutes of the meeting.						2		1					
			3	CO3	Understand the organization of the passage and also analyze the tone,							2		1				

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					attitude and style of the author.														
			4	CO4	Acquire knowledge of and apply people skills in various social organizational and corporate ambiances.						2		1			2			
5	15 EN 3105	Verbal and Quantitative Reasoning	1	CO1	Understand the method of identifying synonyms and antonyms and analyze the meaning of a word from the context.				1					1					
			2	CO2	Analyze issues and arguments in the process of critical reasoning and apply grammar rules to correct sentences.				1					1		2			
			3	CO3	Apply the Concepts of basic Algebra and their importance while solving the problems				1						1		2		
			4	CO4	Apply the short-cut methods on the concepts of different models in Calendars, Clocks, Blood relations and various types of arrangements.				1						1		2		

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6	15 EN 3206	Corporate Communication Skills	1	CO1	Understand and analyze the depth of a topic and use the advanced levels in creative speaking and debating.							2		1						
			2	CO2	Understand and analyze various strategies involved in writing an essay and apply various styles in writing.							2		1			2			
			3	CO3	Understand and analyze the given text critically and answer questions on critical reasoning based on the given information.							2		1						
			4	CO4	Acquire knowledge on various employability skills & analyze a situation and develop adaptability.								2		1					
			5	CO5	Apply the Concepts of basic geometry and their importance while solving the problems.								2		1				2	
7	15 GN 1001	Ecology and Environment	1	CO1	Understand the importance of Environmental education and							1				1				

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					conservation of natural resources.														
			2	CO2	Understand the importance of ecosystems and biodiversity.						1				1				
			3	CO3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.						1				1				
8	15 GN 1002	Human Values	1	CO1	Understand and identify the basic aspiration of human beings								1		1				
			2	CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.							1		1					
			3	CO3	Analyze the profession and his role in this existence.							1		1					
9	15 MT 1001	Single Variable Calculus and Matrix Algebra	1	CO1	Formulate physical laws and relations mathematically in the form of first order differential equations and identify a method for solving and interpreting the results.	2					1							1	

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			2	CO2	Formulate physical laws and relations mathematically in the form of second/higher order differential equations and identify a method for solving and interpreting the results.	2				1									1	
			3	CO3	Provide solutions for Fourier series of periodic/non-periodic phenomenon in models involving differential equations.	2				1									1	
			4	CO4	Apply numeric solution methods for a system of linear algebraic equations and application oriented matrix eigenvalue problems.	2				1							2		1	
			5	CO5	Verify the solution of problems through MATLAB.	2				1									1	
10	15 MT 1203	Multivariate Calculus	1	CO1	Determine the maximum and minimum values for the function involving two variables	2				1									1	
			2	CO2	Calculate the length of the arc, area, volume of the surface	2				1										1

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				of a solid revolution														
			3	CO3	Model the given phenomena as a partial differential equations of first and second orders	2				1						2	1	
			4	CO4	Solve the partial differential equations by analytical and finite difference methods	2				1							1	
			5	CO5	Verify the solution of problems through MATLAB.	2				1							1	
11	15 MT 2005	Probability and Stochastic Models	1	CO1	Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance	2				1						2	1	
			2	CO2	Predict the relationship between two variables and construct the linear and non-linear regression lines for the given data	2				1						2	1	

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			3	CO3	Model the Single and multi server markovian queuing models with finite and infinite capacity.	2				1							2	1	
			4	CO4	Verify and validate the simulation models.	2				1								1	
			5	CO5	Verify the solution of problems through MATLAB/MINITAB.	2				1								1	
12	15 ME 1001	Mechanics	1	CO1	Apply the concept of forces, governing static equations and analyze planer system of forces. Apply different analytical methods on spatial system of forces and analyzing them	2				1							2	1	
			2	CO2	Understanding the concepts of planar and non-planar system of parallel forces and analyzing them. estimate moment of inertia of lamina and material bodies	2				1							2	1	
			3	CO3	Analyzing the rigid bodies under translation and rotation with and without considering	2				1							2	1	

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					forces.														
			4	CO4	Understanding the engineering mechanics physical systems prepare and demonstrate the models with the help of mechanics concepts to solve the engineering problems	2				1								1	
			5	CO5	Apply the concepts of mechanics and carryout different experiments and analyze the results	2				1							2	1	
13	15 PH 1001	Engineering Materials	1	CO1	Understand the concepts of crystallography and crystalline imperfections in order to determine crystal structures and to identify defects in crystals	1											1	1	
			2	CO2	Understand electrical and optical properties of materials and apply them to know various mechanisms involved in electrical, electronic, optical,	1												1	1

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			optoelectronic devices.															
		3	CO3	Understand mechanical and thermal properties of materials and apprehend their importance in identification of materials for specific engineering applications	1									1				1
		4	CO4	Understand magnetic properties of materials and apply them to know various mechanisms involved in magnetic memory devices and transformers.	1									1				1
		5	CO5	Understand various properties of materials and apply the knowledge to execute the related experiments to get hands on experience and also to develop some inter disciplinary projects.	1									1				1

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14	15 CY 1001	Engineering Chemistry	1	CO1	Predict potential complications from combining various chemicals or metals in an engineering setting.	2	1											2	1				
			2	CO2	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena.	2	1																
			3	CO3	Examine water quality and select appropriate purification technique for intended problem.	2	1																
			4	CO4	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes.	2	1													2	1		
			5	CO5	An ability to analyze & generate experimental skills.	2	1													2	1		
15	15 BT 1001	Biology for Engineers	1	CO1	Acquire the Knowledge of basic biology	2																	
			2	CO2	Acquire the Knowledge of Human Biological Systems	2																	

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			3	CO3	Acquire Knowledge on Microorganisms and Biosensors	2									1				2					
16	15 EE 1201	Fields & Networks	1	CO1	Understand the circuit elements, kirchhoff's law and theorems to solve the networks	2												1		1				
			2	CO2	Apply the procedure to determine form factor and peak factor to different symmetrical & unsymmetrical waves.	2													1	2	1			
			3	CO3	Apply vector algebra to field fundamentals to analyze electric and magnetic field distributions	2														1	2	1		
			4	CO4	Apply Maxwell's equations for static and time varying fields	2														1		1		
			5	CO5	Test and Analyze the concepts learned in fields and networks by conducting experiments or by any simulation softwares	2															1	2	1	
			17	15 GN 1004	Introduction to Engineering	1	CO1	Understand the basic principles of engineering design				2		1									1	

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			2	CO2	Understand the aspects of critical thinking and problem solving in engineering				2	1							1	
			3	CO3	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such problems from engineering perspective				2	1						2	1	
			4	CO4	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.				2	1							1	
18	15 CS 1001	C Programming & Data Structures	1	CO1	Illustrate how problems are solved using computers and programming.		2									1	1	
			2	CO2	Interpret & Illustrate user defined C functions and different operations on list of data.		2								1	1		
			3	CO3	Implement Linear Data Structures and compare them.		2								1			

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			4	CO4	Implement Binary Trees.		2									1				
			5	CO5	Apply the knowledge obtained by the course to solve real world problems.		2									1	2	1		
19	15 ME 1002	Engineering Graphics	1	CO1	Draft orthographic Projections, Isometric views ,projection of planes, Manually and prepare Models in workshop by using drawings.					1						2				
			2	CO2	Draft orthographic projections ,isometric views , projection of planes using Autocad. Draft projection of solids Manually and by using AutoCAD and prepare Models in workshop by using different workshop trades					1						2				
			3	CO3	Draft Development of surfaces of solid and sections of solid Manually					1						2				
			4	CO4	Practicing house wiring through Auto Cad					1						2		1		
			5	CO5	Develop 2D & 3D components using					1						2				2

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					Auto Cad Software														
20	15 GN 1003	Measurements	1	CO1	Understand and apply the fundamentals of a measurement system, characteristics, and metrology using simulation and experimentation tools.	2				1								1	
			2	CO2	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.	2				1								1	
			3	CO3	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.	2				1									1
			4	CO4	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.	2				1									

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			5	CO5	Apply the theoretical concepts to measure different parameters		2				1							2	1				
21	15 CS 2002	Object Oriented Programming	1	CO1	Understand Basic Concepts of OOP, introduction to classes and objects through Java Language and apply.	2												1	2	1			
			2	CO2	Understand the concepts of constructors, Overloading, parameter passing, access control, Inheritance and apply.	2													1	2	1		
			3	CO3	Understand Packages, Interfaces, and Exception Handling and apply.	2														1	2	1	
			4	CO4	Understand I/O Streams & apply and understand Basic Concepts of Multi - Threading	2														1	2	1	
			5	CO5	Apply OOP concepts for developing an application	2														1	2	1	
			1	CO1	Demonstrate signals and their Spectra																2		1
22	15 EC 2002	Signal Analysis	2	CO2	Analyze discrete time systems													2	2	1			

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			3	CO3	Design filters to cater signal analysis needs					2					2			2		
			4	CO4	Analyze non stationary signals in time					2					2	2		1		
			5	CO5	Analyze non stationary signals in frequency domains					2					2	2		1		
23	15 CS 2003	Discrete Mathematics	1	CO1	Understand sets, relations, functions and discrete structures , Count discrete event occurrences		2				1							1		
			2	CO2	Apply Propositional logic and First order logic to solve problems		2					1					2	1		
			3	CO3	Formulate and solve recurrence relations, apply algebraic structures and lattices.		2						1						1	
			4	CO4	To identify the basic properties of graphs and trees and model simple applications		2													1
			5	CO5	Relate practical examples to the appropriate set,function or relation model and interpret the associated operations and terminology in		2											2		2

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					context																
24	15 EC 1101	Digital System Design	1	CO1	Understand numerical and character representations in digital logic, number system, data codes and the corresponding design of arithmetic circuitry.		2											1	1		
			2	CO2	Understanding Logic gates, Logic theorems, Boolean algebra and SOP/POS expressions.		2												1	1	
			3	CO3	Combinational and sequential systems design using standard gates and filp-flops and minimization methods		2													1	1
			4	CO4	Verilog HDL design for logic gates, combinational and sequential Logic Functions.		2													1	1
			5	CO5	Concepts of Programmable Logic devices.		2													1	

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25	15 EM 2001	Computer Organization and Architecture	1	CO1	Understand the functionality and design the CPU functional units - control unit, registers, the arithmetic and logic unit, the instruction execution unit, and the interconnections among these components.													2							1					1						
			2	CO2	Understand, analyze and design main, cache and virtual memory organizations.															2								1					1			
			3	CO3	Understand, analyze and design different types of I/O transfer techniques.															2									1					1		
			4	CO4	Understand the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.															2										1					1	
			5	CO5	Able to Design combinational and sequential circuits using LOGISIM															2									1		2				2	

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26	15 EC 2103	Analog Electronic Circuit Design	1	CO1	Understand the industrial processes and organizations connected with the profession and relate classroom learning with real life situation by taking into the consideration of various design concepts			2									3		1		
			2	CO2	Understanding the concepts of various diodes and their applications.			2										3		1	
			3	CO3	BJT concepts as operation, biasing and frequency response			2										3		1	
			4	CO4	FET concepts as operation, biasing and frequency response			2										3		1	
			5	CO5	Feedback concepts and their analysis			2									3	2	1		
			6	CO6	Concepts of various oscillators and applications.			2									3		1		
27	15 EM 2202	Processors and Controllers	1	CO1	Able to understand and analyze the architectural features of CISC type of General purpose processor Intel 8086			2								2		1			

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			Microprocessor.															
		2	CO2	Able to understand and analyze the architectural features of CISC type of microcontroller - Intel 8051 Microcontroller.			2							2				1
		3	CO3	Able to understand and analyze the architectural features of RISC type of microcontroller – PIC Microcontroller.			2							2				1
		4	CO4	Able to program 8086 microprocessor, 8051 and PIC microcontrollers in assembly language using TASM, KEIL, MPLAB and Proteus tools.			2							2	2			1
		5	CO5	Able to Develop a real time application using 8051 & PIC Microcontrollers through project based labs.			2							2	2			1

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28	15 EC 2204	Design with CPLD & FPGA	1	CO1	Study and design of combinational and sequential circuits using PLDs and state machines.				2									2		1			
			2	CO2	Understand Full-custom & Semi Custom design methodologies of for designing different PLD architectures.				2										2		1		
			3	CO3	To study PLD structures and design process				2											2		1	
			4	CO4	Study of different CPLD and FPGA architectures				2												2		1
			5	CO5	To understand different physical process.				2												2		
29	15 EC 2205	Communication Theory-1	1	CO1	have a good understanding of both time and frequency domain representations of signals;					2									2		1		
			2	CO2	have a good understanding of analog modulation and demodulation techniques;					2											2		1

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			3	CO3	have a good understanding of digital modulation and demodulation techniques; and					2						2			1		
			4	CO4	Understanding pulse modulation systems					2						2			1		
			5	CO5	Understand and be able to implement noise and error analysis of an analogue system.					2						2			1		
			6	CO6	Understand and be able to implement noise and error analysis of an analogue or digital telecommunication system.					2						2	2		1		
30	15 EC 2206	Signal Processing	1	CO1	Understand various signals and model physical process using them.					2						2			1		
			2	CO2	Acquaint with various a transformation methods and their potential for applicability in various signal analysis conditions												2			1	
			3	CO3	Demonstrate sampling and its potential applications in												2			1	

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					communications, discrete signal acquisition etc.,.													
			4	CO4	Evaluate discrete system behavior and its response to facilitate system design.				2					2			1	
			5	CO5	Design a low pass discrete time system to meet noise elimination like applications				2					2	2			2
			6	CO6	Analyze non stationary signals and analyze them in both time frequency domains.				2					2	2		1	
31	15 EE 2207	Control Systems	1	CO1	Students can be able to understand control system concepts such as open, closed loop systems, transfer function approach, mathematical modeling of physical systems and can understand analyze the similarities between synchros and ac generators				2					1			1	

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			2	CO2	Students can be able to Analyze the time domain and frequency response of physical systems					2						1		1	
			3	CO3	Students can be able to understand and analyze stability of given transfer functions in time and Frequency domain and can be able to analyze the process of Converting state space equations into transfer function for the given model.					2						1		1	
			4	CO4	Students can be able to design and analyze controllers and lead, lag, lead-lag compensators					2						1		1	
			5	CO5	Test and apply the knowledge obtained in the subject by Matlab or hardware.					2						1	2	1	
32	15 CS 2208	Computer Networks	1	CO1	Understand OSI and TCP/IP models					2						1		1	
			2	CO2	Analyze MAC layer protocols and LAN technologies						2					1	2	1	
			3	CO3	Implement routing and congestion						2					1		1	

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					control algorithms															
			4	CO4	Understand application layer concepts				2					1		1				
			5	CO5	Design applications using internet protocols				2					1	2	1				
33	15 EM 3103	Embedded Systems	1	CO1	Able to analyze embedded systems, analyze and program on chip peripherals for a single purpose controller			2					2				1			
			2	CO2	Able to interface and program different off chip peripherals and communication protocols used in embedded systems			2				2					1			
			3	CO3	Able to understand, evaluate and select appropriate software architectures			2				2						1		
			4	CO4	Able to analyze and design embedded systems using the features in real time operating systems.			2				2							1	
			5	CO5	Able to develop a prototype for a real time embedded application using			2				2				2				2

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					project based labs.																	
34	15 EC 3107	CMOS VLSI Design	1	CO1	To understand the VLSI fabrication process and to be able to interact with integrated circuit process engineers	2											2		1			
			2	CO2	To analysis the theory and CV characteristics of MOS transistor	2												2		1		
			3	CO3	To analysis MOS gate static and switching characteristics	2													2		1	
			4	CO4	To design and layout MOS logic circuits	2													2	2		2
			5	CO5	Circuit Characterization and Performance Estimation and scaling	2														2		1
			6	CO6	Logic and Fault Testing	2															2	
35	15 EC 3108	Communication Theory-2	1	CO1	Understand the principles behind microwave transmissions, impedance matching and waveguides													2		1		

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			2	CO2	Identify different antennas and their parameters					2						2		1			
			3	CO3	Analyze the antenna measurement techniques					2						2	2	1			
			4	CO4	Analyze the microwave components					2						2	2	1			
			5	CO5	Examine the microwave measurements using VNA and SA					2						2		1			
36	15 EC 3209	Communication Theory-3	1	CO1	Describe the types and advantages of spread spectrum modulation formats					2						2		1			
			2	CO2	Identify the radio signal propagation mechanism and different fading concepts						2						2		1		
			3	CO3	Illustrate the growth of communication satellites						2							2		1	
			4	CO4	Identify the different phases of cellular communication concepts						2							2		1	
			5	CO5	Understand the optical communication transmission media						2							2		1	

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					and principles of operation														
37	15 EC 4110	Digital Image Processing	1	CO1	Acquire the fundamental concepts of a digital image processing system				2		2					2	1		
			2	CO2	Identify and exploit analogies between the mathematical tools used for 1D and 2D signal analysis and processing by analysing 2D signals in the frequency domain through the Fourier transform				2		2						1		
			3	CO3	Design and implement with Matlab algorithms for digital image processing operations such as histogram equalization, enhancement				2		2						2		2
			4	CO4	Design and implement with Matlab algorithms such as restoration, filtering, and denoising which develops an appreciation for the				2		2						2		2

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					image processing issues.															
			5	CO5	New techniques and be able to apply these techniques to real world problems.					2		2							2	
38	15 EC 3251	Analog VLSI Design	1	CO1	Understand the functionality and Electrical Properties of MOS and BJT Devices			2		2									1	
			2	CO2	Analyze different passive MOS loads and frequency responses			2		2									1	
			3	CO3	Analyze different active MOS loads and frequency responses			2		2						2				1
			4	CO4	Study of the different amplifiers and feedback topologies			2		2										
39	15 EC 4154	Applications of MEMS Technology	1	CO1	Understand the basic concepts of MEMS technology and Micro system design							2		1					1	
			2	CO2	Analyze the fabrication process methods and micro system level								2		1		2			1

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					packaging																			
			3	CO3	Study of the switching devices for MEMS devices.							2		1				1						
			4	CO4	Study of the Actuation mechanisms for MEMS devices							2		1				1						
40	15 EC 4155	CAD for VLSI Design	1	CO1	Understand the VLSI design methodologies and design rules					2				2				1						
			2	CO2	Analyze the basic concept of floor planning, routing and simulation					2				2				1						
			3	CO3	Study of the modeling process					2					2				1					
			4	CO4	Study of the synthesis process					2					2				1					
41	15 EC 4156	Design for Testability	1	CO1	Understand the basic concept reliability and modeling of faults as a requisite for achieving manufacturing quality of semiconductor devices and then identifies difficulties in VLSI testing												2		2					1

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			2	CO2	Analyze the fault tolerant system can be viewed as a design moving through different abstraction levels, a historical view of the development of VLSI system					2					2			2	1		
			3	CO3	Study of the test pattern generation for BIST architectures					2					2				1		
			4	CO4	Study of the specific BIST architectures					2					2				1		
42	15 EC 4157	Design of Semi-conductor Memories	1	CO1	Understand the basic semiconductor memories and memory technologies					2					2				1		
			2	CO2	Analyze the fault modeling, testing of Ics, memory reliability and radiation effects					2					2			2	1		
			3	CO3	Study of the advanced Memory Technologies					2						2				1	
			4	CO4	Study of the High-Density Memory Packaging Technologies					2						2					1
43	15 EC 4158	Low Power VLSI	1	CO1	Understand the sources of Power and dissipation			2		2									1		

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					approaches to minimize the power dissipation															
			2	CO2	Analyze the functionality of Analog and Digital power analysis			2	2							2	1			
			3	CO3	Study of the low power system, clock distribution			2	2								1			
			4	CO4	Study of the different Algorithms & Architectural Level Methodologies			2	2								1			
44	15 EC 4159	Nanoelectronics	1	CO1	Understand the recent and past challenges of microelectronic devices							2	1				1			
			2	CO2	Analyze the Nano computer architectures and fabrication techniques						2	1					1			
			3	CO3	Study of the Ferro electric thin film properties and gas sensors						2	1						1		
			4	CO4	Study of the gas sensitive FETs						2	1							1	
45	15 EC 4160	VLSI Subsystem Design	1	CO1	Understand the sources of Power dissipation and approaches to minimize the power			2	2								1			

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				dissipation														
			2	CO2	Analyze the functionality of Analog and Digital power analysis			2	2							2	1	
			3	CO3	Study of the low power system, clock distribution			2	2								1	
			4	CO4	Study of the different Algorithms & Architectural Level Methodologies			2	2								1	
46	15 EC 4161	VLSI Technology	1	CO1	Understand the basic fabrication process and maintenance of Clean Rooms and Wafer Cleaning process			2	2								1	
			2	CO2	Analyze the techniques to deposit various films by using Chemical Vapor Deposition			2	2						2	1		
			3	CO3	Analyze the techniques to deposit various films by using Physical Vapor and Multilevel Metallization Techniques			2	2						2	1		

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			4	CO4	Study of the Rapid Thermal Processing Techniques and Etching Process			2		2									1		
47	15 EC 3252	RF System Design	1	CO1	Differentiate different RF components and transmission lines			2		2									1		
			2	CO2	Demonstrate the smith chart applications, multiport networks			2		2										1	
			3	CO3	Design different RF-Filters based on stability and gain			2		2						2				1	
			4	CO4	Develop different types of RF amplifiers			2		2						2					2
48	15 EC 4162	Radiation Systems	1	CO1	Demonstrate the radiation mechanism and antenna parameters	2								2					1		
			2	CO2	Distinguish different types of radiation from apertures	2								2					1		
			3	CO3	Select the antennas and arrays based on the specific application	2									2					1	
			4	CO4	Evaluate the antenna performance with measurement techniques	2									2					1	
49	15 EC 4163	Radar and Navigational Aids	1	CO1	Compare different types of radars and	2							2					1			

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					their limitations															
			2	CO2	Illustrate the operation of MTI Radar and types of tracking methods	2									2				1	
			3	CO3	Differentiate different radar transmitters and receivers	2									2				1	
			4	CO4	Compare different types of electronic counter measures	2									2				1	
50	15 EC 4164	Microwave and Millimeter Wave Circuits	1	CO1	Differentiate different Microwave components	2									2				1	
			2	CO2	Identify transformers and microwave resonators	2									2				1	
			3	CO3	Design different microwave filters	2										2	2			2
			4	CO4	Distinguish microwave and millimetric wave circuits	2											2			
51	15 EC 4165	EMI/EMC	1	CO1	Describe the EMI specifications and standards			2			2								1	
			2	CO2	Demonstrate the EMI control techniques and design guidelines			2			2								1	
			3	CO3	Distinguish different passive components for EMC			2			2								1	

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			4	CO4	Evaluate the EMI measurements using different techniques		2			2							1	
52	15 EC 4166	Cellular Communications	1	CO1	Demonstrate different wireless communication systems and radio propagation mechanism		2				2						1	
			2	CO2	Distinguish different equalizers and diversity techniques in propagation		2				2						1	
			3	CO3	Illustrate different wireless communication system standards		2				2						1	
			4	CO4	Select OFDM in the channel estimation and implimentation		2				2			2		1		
53	15 EC 4167	Satellite Communication	1	CO1	Demonstrate the basic concepts of satellite communication and orbital mechanics		2				2						1	
			2	CO2	Illustrate the satellite subsystems and link design		2				2					1		
			3	CO3	Interpret transmitters and receivers usage in tracking and error control mechanism		2				2					1		
			4	CO4	Develop the GPS based navigation		2				2			2		1		

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					system															
54	15 EC 4168	Optical Communications	1	CO1	Dramatize the importance of optical communication		2						2						1	
			2	CO2	Demonstrate the transmission characteristics of optical fibers, optical transmitters and detectors		2						2						1	
			3	CO3	Illustrate the advanced optical fiber systems		2						2							1
			4	CO4	Test the optical fiber transmission and reception mechanism		2						2							
55	15 EC 4169	Information Theory & Coding	1	CO1	Describe the basic terminology of information theory and coding			2	1										1	
			2	CO2	Demonstrate the encoding of the source output			2	1										1	
			3	CO3	Illustrate the importance of error control in coding			2	1											1
			4	CO4	Distinguish different binary cyclic codes and convolution codes			2	1											
56	15 EC 4170	Software Defined Radio	1	CO1	Demonstrate the concept of Software defined radio					2						2		1		

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			2	CO2	Describe the architecture of SDR					2					2			1	
			3	CO3	Illustrate the programming concept of SDR					2					2			1	
			4	CO4	Differentiate the segment design tradeoffs					2					2			1	
57	15 EC 4171	Fundamentals of Electronic Warfare	1	CO1	Distinguish different methods of warfare and target identification					2					2			1	
			2	CO2	Demonstrate the jamming techniques used in electronic warfare					2					2			1	
			3	CO3	Distinguish active jamming and passive jamming					2					2			1	
			4	CO4	Judge the false identification of targets and methods to overcome					2					2			1	
58	15 EC 4172	Electronic Navigation Systems	1	CO1	Differentiate different electronic navigational aids					2					2			1	
			2	CO2	Demonstrate the satellite navigation mechanism					2				2			1		
			3	CO3	Illustrate the working principle of GPS antenna system					2				2			1		

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			4	CO4	Discriminate ship master compass and automatic steering techniques						2							2					1				
59	15 EC 4173	Radar	1	CO1	Demonstrate different types of radars						2							2					1				
			2	CO2	Illustrate the working principle of MTI radar and its tracking mechanism							2							2					1			
			3	CO3	Discriminate radar transmitters and receivers								2							2					1		
			4	CO4	Demonstrate basic principles synthetic aperture radar								2							2					1		
60	15 EC 4174	Computational Electromagnetics	1	CO1	Distinguish different computational techniques			2		2														1			
			2	CO2	Illustration on FEM based methodology approach			2		2															1		
			3	CO3	Illustration on a one-dimensional introduction to the method of moments			2		2																1	
			4	CO4	Illustration on MOM based methodology approach			2		2																1	

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61	15 EC 3253	Intelligent Systems and Control	1	CO1	To establish the theory necessary to understand and use of Intelligence in system control and related constructions.			2		2											1				
			2	CO2	To establish the theory necessary to understand the Biological foundations to intelligent systems			2		2													1		
			3	CO3	To emphasize on efficient algorithms for ANN based systems.			2		2														1	
			4	CO4	To emphasize on efficient algorithms for Fuzzy based systems.			2		2														1	
62	15 EC 4175	Adaptive Signal Processing	1	CO1	To establish the theory necessary to understand and use of Adaptiveness in system control and related constructions.			2		2												1			
			2	CO2	To establish the theory necessary to understand the Wiener filter, search methods and the LMS algorithm			2		2													1		

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			3	CO3	To emphasize on efficient algorithms for adaptive systems.			2	2									1		
			4	CO4	To emphasize on Vector space framework for optimal filtering			2	2									1		
63	15 EC 4176	Statistical Signal Processing	1	CO1	To establish the theory necessary to understand and use Statistics and related constructions.			2	2									1		
			2	CO2	To emphasize construction of efficient algorithms for real time applications.			2	2									1		
			3	CO3	To study applications in signal processing, communications. The course has computer and research projects involving independent study.			2	2										1	
			4	CO4	To study applications in sensing where statistics and probability play an important role.			2	2											1
64	15 EC 4177	Speech Signal Processing	1	CO1	To establish the theory necessary to understand and use speech based systems			2	2									1		

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				and related constructions.														
			2	CO2	To emphasize on efficient algorithms for speech based systems.			2	2								1	
			3	CO3	To study applications in speech signal processing, speech based systems. The course has computer and research projects involving independent study.			2	2								1	
			4	CO4	To study applications in speech sensing software in mobile.			2	2						2		1	
65	15 EC 4178	Multimedia Signal Processing	1	CO1	To establish the theory necessary to understand and use of multimedia in system control and related constructions.			2	2								1	
			2	CO2	To establish the theory necessary to understand and use of Motion Estimation			2	2								1	
			3	CO3	To emphasize on efficient algorithms for multimedia based systems.			2	2								1	

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			4	CO4	To emphasize on Multimedia Content Representation and Retrieval			2	2							2	1		
66	15 EC 4179	Neural Networks and Fuzzy Control	1	CO1	To establish the theory necessary to understand and use of Intelligence in system control and related constructions.			2	1								1		
			2	CO2	To establish the theory necessary to understand and use of Back propogation networks in system control and related constructions.			2	1								1		
			3	CO3	To emphasize on efficient algorithms for ANN based systems.			2	1									1	
			4	CO4	To emphasize on efficient algorithms for Fuzzy based systems.			2	1									1	
67	15 EM 3251	Advanced Embedded Processor Architecture	1	CO1	Able to understand and analyze the 3 and 5 stage pipelines of ARM and able to program the ARM processor.			2						2			1		
			2	CO2	Able to program the on chip & off chip			2						2			1		

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					peripherals of ARM 7 controller.															
			3	CO3	Understand and analyze the AMBA bus architecture and different advanced ARM cores.			2						2					1	
			4	CO4	Able to analyze the different SOC applications using ARM cores.			2						2			2		1	
68	15 EM 4154	Embedded Linux	1	CO1	Able to understand embedded Linux development environment, understand and create Linux BSP for a hardware platform.			2						2					1	
			2	CO2	Able to program different embedded storage devices			2						2					1	
			3	CO3	Able to understand the Linux model for embedded storage, understand and write various embedded Linux drivers such as serial, I2C, and so on.			2							2					1
			4	CO4	Able to port applications to embedded Linux and write real – time applications in			2								2		2		

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					embedded Linux.															
69	15 EM 4155	Networking of Embedded Systems	1	CO1	Able to understand and develop applications using Rs-232C, RS-485 and SPI communication protocols.			2						2					1	
			2	CO2	Able to understand and develop applications using I2C, USB communication protocols.			2						2					1	
			3	CO3	Able to understand and develop applications using CAN communication protocols			2							2					1
			4	CO4	Able to understand and analyze different wireless communication protocols used in Embedded Systems.			2							2		2			1
70	15 EM 4156	System on Chip Architectures	1	CO1	Able to understand and analyze different Design and Validation methodologies for logic cores such as memories, analog devices and SoCs.			2					2					1		

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			2	CO2	Able to understand On chip Communication Architecture Standards			2					2				1	
			3	CO3	Able to analyze security issues of On chip Communication Architecture standards			2					2				1	
			4	CO4	Able to understand and analyze different topologies of Networks on Chip.			2					2				1	
71	15 EM 4157	Hardware Software Co Design	1	CO1	Understand and Analyze the co-design models like FSM, DFG and target architectures and use the tools required for designing the hardware and software models			2					2				1	
			2	CO2	Analyze Validation and Verification Techniques, design specification for embedded processor architectures			2					2			2	1	
			3	CO3	Analyze the compilation techniques and tools for embedded processor			2					2			2	1	

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				architectures														
			4	CO4	Understand the standard design methods like COSYMA system and LYCOS systems.			2				2						1

Professor inchargeHead of the department

**K L UNIVERSITY**

**DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE ENGINEERING**

**2015**

**UNIVERSITY**

**Vision**

To be a globally renowned university.

**Mission**

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To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

### DEPARTMENT

#### VISION

To promote innovation centric education and perform cutting edge research in interdisciplinary and multidisciplinary areas.

#### MISSION

To impart **value-based, state-of-art education** and motivate the students to become **socially committed professionals** for **overall development** of students

**M1:** Impart Value –Based Education

**M2:** Impart State of the art –education

**M3:** Motivate Students to become Socially Committed Professionals

**M4:** Overall Development of Students

#### PROGRAM EDUCATIONAL OBJECTIVES (PEOS) :

**PEO1:** Practice engineering in a broad range of industrial, societal and real world applications.

**PEO2:** Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.

**PEO3:** Conduct themselves in a responsible, professional, and ethical manner.

**PEO4:** Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.

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**PROGRAM OUTCOMES(PO's)**

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**PROGRAM SPECIFIC OUTCOMES(PSO's)**

PSO1	An ability to solve Electronics Engineering problems, using latest hardware and software tools, to arrive cost effective and appropriate solutions in the domain of
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	embedded systems.
PSO2	An ability to demonstrate basic knowledge of Web Technologies for development of web based applications.

### PEO'S VS MISSION MAPPING

	M1	M2	M3	M4
PEO1	√	√		√
PEO2		√		√
PEO3			√	√
PEO4			√	√

### STUDENT OUTCOMES (SO'S) VS PEO'S MAPPING

SO'S	PEO1	PEO2	PEO3	PEO4
a	√	√		
b	√	√		
c	√	√		
d		√		√
e	√	√		
f			√	√
g		√	√	√
h		√	√	√
i	√	√	√	
j	√	√	√	√
k	√	√	√	

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PSO1	√	√	√	
PSO2	√	√	√	

**COURSE VS SOS & PSO'S MAPPING**

Course Code	Course Title	S N O	C O N O	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k
					15 EM 3103	EMBEDDED SYSTEMS	1	C O 1	Able to analyze embedded systems, analyze and program on chip peripherals for a single purpose controller			2			
		2	C O 2	Able to interface and program different off chip peripherals and communication protocols used in embedded systems			2								3
		3	C O 3	Able to understand, evaluate and select appropriate software architectures			2								3
		4	C O 4	Able to analyze and design embedded systems using the features in real time operating systems.			2								3
		5	C O 5	Able to develop a prototype for a real time embedded application using project based labs.			2								3

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15 EM 2001	COMPUTER ORGANIZATION AND ARCHITECTURE	6	C O 1	Understand the functionality and design the CPU functional units - control unit, registers, the arithmetic and logic unit, the instruction execution unit, and the interconnections among these components.			2												3			
		7	C O 2	Understand, analyze and design main, cache and virtual memory organizations.			2													3		
		8	C O 3	Understand, analyze and design different types of I/O transfer techniques.			2														3	
		9	C O 4	Understand the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.			2														3	
		10	C O 5	Able to Design combinational and sequential circuits using LOGISIM			2														3	
15 EM 2202	PROCESSORS AND CONTROLLERS	11	C O 1	Able to understand and analyze the architectural features of CISC type of General purpose processor Intel 8086 Microprocessor.					2											2		
		12	C O 2	Able to understand and analyze the architectural features of CISC type of microcontroller - Intel 8051 Microcontroller.					2												2	
		13	C O 3	Able to understand and analyze the architectural features of RISC type of microcontroller – PIC Microcontroller.					2													2
		14	C O 4	Able to program 8086 microprocessor, 8051 and PIC microcontrollers in assembly language using TASM, KEIL, MPLAB and Proteus tools.					2													2
		15	C O 5	Able to Develop a real time application using 8051 & PIC Microcontrollers through project based labs.					2													2
15 EM 3104	COMMUNICATION SYSTEMS	16	C O 1	To Understand the basics of Modulation and demodulation techniques, Different types of filtering techniques and Radio Receiver characteristics.			2													2		

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		17	CO2	To Understand the sampling techniques and signal to noise ratio of different pulse modulation schemes.	2														2		
		18	CO3	To Design the Digital Modulation schemes, bandwidth estimation and clock recovery.	2														2		
		19	CO4	To Understand the source coding techniques and estimate the error detection and correction of different block codes	2														2		
		20	CO5	Able to design receivers used for Digital communication system using project based labs	2														2		
15 EM 3105	INTERNE T PROGRA MMING	21	CO1	Able to create Static Web pages using basic HTML & apply CSS					2										3		
		22	CO2	Able to apply javascript features for form validations and event handling					2											3	
		23	CO3	Able to create databases using MYSQL and apply JDBC concepts to connect to a database.					2												3
		24	CO4	Able to create dynamic web pages using servlets & JSP					2												3
		25	CO5	Must be able to design WEB site considering the user interface, navigation and interaction with database using project based LABS					2												3
15 EM 3206	VLSI DESIGN	26	CO1	To understand the VLSI fabrication process and to be able to interact with integrated circuit process engineers	2															3	
		27	CO2	Able to analyze Circuit Charactersation ,Performance Estimation and Fault Testing.	2																3

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		283	C O	Able to Understand Full-custom & Semi Custom design methodologies to design different PLD architectures.	2													3	
		294	C O	Analyze different CPLD and FPGA architectures	2													3	
		305	C O	Able to design and simulate digital circuits using Verilog HDL through project based LABs	2													3	
15 EM 3251	ADVANCED EMBEDDED PROCESSOR ARCHITECTURES	311	C O	Able to understand and analyze the 3 and 5 stage pipelines of ARM and able to program the ARM processor.									2					1	
		322	C O	Able to program the on chip & off chip peripherals of ARM 7 controller.										2				1	
		333	C O	Understand and analyze the AMBA bus architecture and different advanced ARM cores.										2				1	
		344	C O	Able to analyze the different SOC applications using ARM cores.										2				1	
15 EM 4157	HARDWARE SOFTWARE CO-DESIGN	351	C O	Understand and Analyze the co-design models like FSM, DFG and target architectures and use the tools required for designing the hardware and software models										2				1	
		362	C O	Analyze Validation and Verification Techniques, design specification for embedded processor architectures											2			1	
		373	C O	Analyze the compilation techniques and tools for embedded processor architectures												2			1
		384	C O	Understand the standard design methods like COSYMA system and LYCOS systems.												2			1

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15 EM 3252	SENSORS AND SENSING PRINCIPLES	391	C O 1	Able to understand and analyze the sensor fundamentals, principles and characteristics														2	2	
		402	C O 2	Understand the application of various physical and Chemical sensors															2	2
		413	C O 3	Understand the application of various optical sensors															2	2
		424	C O 4	Able to understand the different bio sensors and its limitations.															2	2
15 EM 4158	WIRELESS COMMUNICATIONS & NETWORKS	431	C O 1	Able to understand Transmission fundamentals and communications networks and application protocol architecture														2	2	
		442	C O 2	Able to understand and analyze signal encoding techniques, spectrum and different wireless networks														2	2	
		453	C O 3	Able to understand and analyze various principles of cellular wireless networks														2	2	
		464	C O 4	Able to understand wireless protocols and applications of IEEE802.11 architecture and standards															2	2
15 EM 4159	WIRELESS SENSOR NETWORKS	471	C O 1	Able to understand Cellular and adhoc networks in detail														2	2	
		482	C O 2	Able to understand wireless sensor networks data communications to other networks which involves its design and principles														2	2	
		493	C O 3	Able to understand various MAC protocols for sensor networks														2	2	

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		504	C O	Able to understand and analyze various routing techniques of wsn and ad hoc networks														2	2					
15 EM 4160	SENSOR NETWORKS PROGRAMMING	511	C O	Able to understand fundamentals of TinyOS and nesC in wsn environment.															2	1				
		522	C O	Able to understand real world programming of wireless sensor network in different scenarios.																2	1			
		533	C O	Able to understand the performance analysis of power-aware algorithms																	2	1		
		544	C O	Able to understand and develop energy efficient algorithms for wireless sensor networks thru simulation or real time experiments																	2	1		
15EM 4163	ENTERPRISE PROGRAMMING	551	C O	Must acquire theoretical knowledge related to enterprise architectures, development platforms, Application servers, EJB components, EJB query language.																2	2	1		
		562	C O	Must be hands-on developing EJB components using NETBEANS and deploy the components using JBOSS																	2	2	1	
		573	C O	Able to understand EJB QL & develop sample applications																		2	2	1
		584	C O	Must develop real life Enterprise wide application based on EJB and JBOSS and SQL server as DBMS engine																		2	2	1
15 GN 1001	ECOLOGY AND ENVIRONMENT	591	C O	Understand the importance of Environmental education and conservation of natural resources.																1	1			
		602	C O	Understand the importance of ecosystems and biodiversity.																	1	1		

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		6 1	C O 3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.														1 , 3		1							
15 GN 1002	HUMAN VALUES	6 2	C O 1	Understand and identify the basic aspiration of human beings														1 , 2									
		6 3	C O 2	Envisage the roadmap to fulfill the basic aspiration of human beings.															1 , 2								
		6 4	C O 3	Analyze the profession and his role in this existence.															1 , 2								
15 EN 1101	RUDIMEN TS OF COMMUN ICATION SKILLS	6 5	C O 1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills.															1								
		6 6	C O 2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar.																1							
		6 7	C O 3	Understand the types of texts and tone of the author.																	1						
		6 8	C O 4	Understand the importance of interpersonal skills																	1						
15 EN 1202	INTERPER SONAL COMMUN ICATION SKILLS	6 9	C O 1	Understand the method of identifying the meaning of words from the context and form sentences using words.																2							
		7 0	C O 2	Understand and analyze seven types of reading techniques and improve reading speed.																	2						
		7 1	C O 3	Understand and apply writing strategies for office/ formal communication.																	2						

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		7 2	C O 4	Understand and analyze different cultures and the importance of empathy in cross-cultural communication.							1				
15 EN 2103	PROFESSI ONAL COMMUN ICATION SKILLS	7 3	C O 1	Understand the concept of Group Discussion and listen and speak effectively during the discussion.								1			
		7 4	C O 2	Understand and improve learners' competency in competitive English and apply the principles of grammar in real life contexts.								2			
		7 5	C O 3	Understand skimming & scanning, and apply the types of reasoning in comprehending the information.									3		
		7 6	C O 4	Understand the mechanics and application of presentation skills.								1			
15 EN 2204	EMPLOYA BILITY SKILLS	7 7	C O 1	Analyze one's own strength as a speaker/ Communicator and use discretion while listening.								2			
		7 8	C O 2	Apply and analyze various concepts of writing strategies in professional communication skills like, reports, resume and minutes of the meeting.								3			
		7 9	C O 3	Understand the organization of the passage and also analyze the tone, attitude and style of the author.									2		
		8 0	C O 4	Acquire knowledge of and apply people skills in various social organizational and corporate ambiances.								2			
15 EN 3105	VERBAL AND QUANTIT ATIVE REASONI NG	8 1	C O 1	Understand the method of identifying synonyms and antonyms and analyze the meaning of a word from the context.										1	
		8 2	C O 2	Analyze issues and arguments in the process of critical reasoning and apply grammar rules to correct sentences.										1	

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		8 3	C O 3	Apply the Concepts of basic Algebra and their importance while solving the problems														1			
		8 4	C O 4	Apply the short-cut methods on the concepts of different models in Calendars, Clocks, Blood relations and various types of arrangements.														1			
15MT 2005	PROBABILITY AND STOCHASTIC MODELS	8 5	1	Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance					2												
		8 6	2	Predict the relationship between two variables and construct the linear and non-linear regression lines for the given data					2												
		8 7	3	Model the Single and multi server markovian queuing models with finite and infinite capacity.					2												
		8 8	4	Verify and validate the simulation models.																	2
		8 9	5	Verify the solution of problems through MATLAB/MINITAB.																	
15MT 1001	SINGLE VARIABLE CALCULUS AND MATRIX ALGEBRA	9 0	C O- 1	Formulate physical laws and relations mathematically in the form of first order differential equations and identify a method for solving and interpreting the results.					1												
		9 1	C O- 2	Formulate physical laws and relations mathematically in the form of second/higher order differential equations and identify a method for solving and interpreting the results.					1												
		9 2	C O- 3	Provide solutions for Fourier series of periodic/non-periodic phenomenon in models involving differential equations.					1												
		9 3	C O- 4	Apply numeric solution methods for a system of linear algebraic equations and application oriented matrix eigenvalue problems.					1												
		9 4	C O- 5	Verify the solution of problems through MATLAB.																	
15	MULTI	9	C	Determine the maximum and minimum values for the function					2												

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MT 1203	VARIATE CALCULU S	5	O 1	involving two variables															
		9 6	C O 2	Calculate the length of the arc, area, volume of the surface of a solid revolution					2										
		9 7	C O 3	Model the given phenomena as a partial differential equations of first and second orders															2
		9 8	C O 4	Solve the partial differential equations by analytical and finite difference methods					2										
		9 9	C O 5	Verify the solution of problems through MATLAB.															2
15 MT 2104	PROBABI LITY AND OPTIMIZA TION TECHNIQ UES	1 0 0	1	To apply the basic rules of theorems of probability theory to determine the probabilities that help to solve the problems of engineering problems and to determine the expectation and variance of a random variable from its distributions.	2				2										
		1 0 1	2	To appropriately choose, define and / or to derive probability distributions such as the Binomial, Poisson and normal etc. to model and solve engineering problems	2				2										
		1 0 2	3	To understand how regression analysis can be used to develop an equation that estimate how two variables are related and how the analysis of variance procedure can be used to determine it means of two population are equal	2				2										
		1 0 3	4	To have through knowledge on linear and non linear programming	2				2										
		1 0 4																	
15 ME	MECHANI CS	1 0	C O	Apply the concept of forces, governing static equations and analyze planer system of forces. Apply different analytical methods on	2														

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1001		5	1	spatial system of forces and analyzing them														
		1	C	Understanding the concepts of planar and non-planar system of parallel forces and analyzing them. estimate moment of inertia of lamina and material bodies	2													
		0	O															
		6	2															
		1	C	Analyzing the rigid bodies under translation and rotation with and without considering forces.														
0	O																	
7	3																	
1	C	Understanding the engineering mechanics physical systems prepare and demonstrate the models with the help of mechanics concepts to solve the engineering problems																
0	O																	
8	4																	
1	C	Apply the concepts of mechanics and carryout different experiments and analyze the results	2															
0	O																	
9	5																	
15 PH 1001	ENGINEER RING MATERIALS	1	C	Understand the concepts of crystallography and crystalline imperfections in order to determine crystal structures and to identify defects in crystals														
		1	O															
		0	1															
		1	C	Understand electrical and optical properties of materials and apply them to know various mechanisms involved in electrical, electronic, optical, optoelectronic devices.														
1	O																	
1	2																	
1	C	Understand mechanical and thermal properties of materials and apprehend their importance in identification of materials for specific engineering applications																
1	O																	
1	3																	
1	C	Understand magnetic properties of materials and apply them to know various mechanisms involved in magnetic memory devices and transformers.																
1	O																	
3	4																	
15CY 1001	ENGINEER RING CHEMISTRY	1	C	Predict potential complications from combining various chemicals or metals in an engineering setting.														
		1	O-															
		4	1															
1	C	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena.																
1	O-																	
5	2																	
1	C	Examine water quality and select appropriate purification technique																

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		1 6	O- 3	for intended problem.																		
		1 1 7	C O- 4	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes.																		
		1 1 8	C O- 5	An ability to analyze & generate experimental skills.																		
15BT 1001	BIOLOGY FOR ENGINEE RS	1 1 9	C O- 1	Acquire the Knowledge of basic biology																		
		1 2 0	C O- 2	Acquire the Knowledge of Human Biological Systems																		
		1 2 1	C O- 3	Acquire Knowledge on Microorganisms and Biosensors																		
15 EE 1201	FIELDS & NETWOR KS	1 2 2	1	Understand the circuit elements, kirchhoff's law and theorems to solve the networks																		
		1 2 3	2	Apply the procedure to determine form factor and peak factor to different symmetrical & unsymmetrical waves.																		
		1 2 4	3	Apply vector algebra to field fundamentals to analyze electric and magnetic field distributions																		
		1 2 5	4	Apply Maxwell's equations for static and time varying fields																		
		1 2 6	5	Test and Analyze the concepts learned in fields and networks by conducting experiments or by any simulation softwares																		
15GN	INTRODU	1	C	Understand the basic principles of engineering design																		

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1004	CTION TO ENGINEE RING	2 7	O- 1																	
		1 2 8	C O- 2	Understand the aspects of critical thinking and problem solving in engineering																2
		1 2 9	C O- 3	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such problems from engineering perspective																2
		1 3 0	C O- 4	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.																3
15CS 1001	C PROGRA MMING & DATA STRUCTU RES	1 3 1	C O- 1	Illustrate how problems are solved using computers and programming.															2	
		1 3 2	C O- 2	Interpret & Illustrate user defined C functions and different operations on list of data.															2	
		1 3 3	C O- 3	Implement Linear Data Structures and compare them.																2
		1 3 4	C O- 4	Implement Binary Trees.																2
		1 3 5	C O- 5	Apply the knowledge obtained by the course to solve real world problems.																2
15ME 1002	ENGINEE RING GRAPHIC S	1 3 6	C O- 1	Draft orthographic Projections, Isometric views ,projection of planes, Manually and prepare Models in workshop by using drawings.															2	
		1 3 7	C O- 2	Draft orthographic projections ,isometric views , projection of planes using Autocad. Draft projection of solids Manually and by using AutoCAD and prepare Models in workshop by using different workshop trades																2

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		1 3 8	C O- 3	Draft Development of surfaces of solid and sections of solid Manually															2	
		1 3 9	C O- 4	Practicing house wiring through Auto Cad															2	
		1 4 0	C O- 5	Develop 2D & 3D components using Auto Cad Software		2														
15GN 1003	MEASURE MENTS	1 4 1	C O- 1	Understand and apply the fundamentals of a measurement system, characteristics, and metrology using simulation and experimentation tools.	2	2														
		1 4 2	C O- 2	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.	2	2														
		1 4 3	C O- 3	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.	2	2														
		1 4 4	C O- 4	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.	2	2														
		1 4 5	C O- 5	Apply the theoretical concepts to measure different parameters		2														
15 CS 2002	OBJECT ORIENTE D PROGRA MMING	1 4 6	C O 1	Understand Basic Concepts of OOP, introduction to classes and objects through Java Language and apply.					2											
		1 4 7	C O 2	Understand the concepts of constructors, Overloading, parameter passing, access control, Inheritance and apply.					2											
		1 4 8	C O 3	Understand Packages, Interfaces, and Exception Handling and apply.					2											

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		149	C	Understand I/O Streams & apply and understand Basic Concepts of Multi -Threading																	3		
		150	C	Apply OOP concepts for developing an application																		3	
15 EC 2002	SIGNAL ANALYSIS	151	C	Demonstrate signals and their Spectra																		2	
		152	C	Analyze discrete time systems																			2
		153	C	Design filters to cater signal analysis needs																			2
		154	C	Analyze non stationary signals in time																			2
		155	C	Analyze non stationary signals in frequency domains																		2	
15 CS 2003	DISCRETE MATHEMATICS	156	C	Understand sets, relations, functions and discrete structures , Count discrete event occurrences																		2	
		157	C	Apply Propositional logic and First order logic to solve problems																			2
		158	C	Formulate and solve recurrence relations, apply algebraic structures and lattices.																			2
		159	C	To identify the basic properties of graphs and trees and model simple applications																			2

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		1 6 0	C O 5	Relate practical examples to the appropriate set,function or relation model and interpret the associated operations and terminology in context												2
15 CS 2206	OPERATI NG SYSTEMS	1 6 1	C O 1	Develop algorithms for subsystem components						2						
		1 6 2	C O 2	Understand process and memory virtualization						2						
		1 6 3	C O 3	understand persistence concepts						2						
		1 6 4	C O 4	Design and solve synchronization problems , and multi threading libraries												3
		1 6 5	C O 5	Develop application programs using UNIX system calls												3
15 CS 2208	COMPUTE R NETWOR KS	1 6 6	C O 1	Understand OSI and TCP/IP models											2	
		1 6 7	C O 2	Analyze MAC layer protocols and LAN technologies						2						
		1 6 8	C O 3	Implement routing and congestion control algorithms						2					2	
		1 6 9	C O 4	Understand application layer concepts						2						
		1 7 0	C O 5	Design applications using internet protocols											2	

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15 EC 2206	SIGNAL PROCESSI NG	1 7 1	C O 1	Understand various signals and model physical process using them.														2								
		1 7 2	C O 2	Acquaint with various a transformation methods and their potential for applicability in various signal analysis conditions															2							
		1 7 3	C O 3	Demonstrate sampling and its potential applications in communications, discrete signal acquisition etc.,.															2							
		1 7 4	C O 4	Evaluate discrete system behavior and its response to facilitate system design.															2							
		1 7 5	C O 5	Design a low pass discrete time system to meet noise elimination like applications															2							3
		1 7 6	C O 6	Analyze non stationary signals and analyze them in both time frequency domains.															2							
15 EM 30B1	LINUX PROGRA MMING	1 7 7	C O 1	Describe and understand the fundamental LINUX operating system and utilities	2													2								
		1 7 8	C O 2	apply shell scripts in order to perform basic shell Programming and analyze the Linux file system																						2
		1 7 9	C O 3	Analyze the process concepts and create applications using and signal concepts IPC mechanisms															3							
15 EM 30B2	E- COMMER CE	1 8 0	C O 1	Analyze various E-Commerce Business Models and Infrastructure																						2
		1 8 1	C O 2	Understand the Ethical, Social and Political issues in E-Commerce															1							

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		1 8 2	C O 3	Analyze Marketing communications and Internet resources for E-Commerce																2
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**K L UNIVERSITY  
DEPARTMENT OF MECHANICAL ENGINEERING  
PROGRAM DEVELOPMENT DOCUMENT  
B.Tech in Electrical and Electronics Engineering  
2016**

**Vision of the University**

To be a globally renowned university.

**Mission of the university:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

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### **VISION of the Department**

To Produce globally renowned leader in education, extension activities and Carrying out research and technology development in frontier areas of electronics and electrical engineering and allied fields

### **MISSION of the Department**

To produce quality electrical and electronics engineers having strong theoretical foundation, innovative, good design experience , exposure to research and development and responsible for social needs.

### **Program Educational Objectives**

1. Apply their immense knowledge acquired in Electrical and Electronics Engineering with modern computational tools to serve the needs of ongoing research and industry
2. Apply their immense knowledge acquired in Electrical and Electronics Engineering with modern computational tools to pursue Higher Education.
3. Employ Leadership Qualities with professional and ethical values in effectively dealing with Societal Challenges.
4. Inculcate in students, Self and Lifelong Learning, effective interpersonal communication skills when working with multidisciplinary teams

<b>S.No.</b>	<b>Program Objectives(POs)</b>
<b>a</b>	An ability to apply knowledge of mathematics, science, and engineering
<b>b</b>	An ability to design and conduct experiments, as well as to analyze and interpret data
<b>c</b>	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
<b>d</b>	An ability to function on multidisciplinary teams
<b>e</b>	An ability to identify, formulate, and solve engineering problems
<b>f</b>	An understanding of professional and ethical responsibility
<b>g</b>	An ability to communicate effectively

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<b>h</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
<b>i</b>	A recognition of the need for, and an ability to engage in life-long learning
<b>j</b>	A knowledge of contemporary issues
<b>k</b>	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
<b>l</b>	Project management and finance
PSO 1	An ability to demonstrate the knowledge, skill to analyze the cause and effects on Electrical system, processes and systems.
PSO2	An ability to apply the acquired Electrical Engineering knowledge for the advancement of society and self.

#### MAPPING OF POs/PSOs with PEOs:

S.No.	Program Educational Objectives(PEOs)	M1	M2	M3	M4
1	Apply their immense knowledge acquired in Electrical and Electronics Engineering with modern computational tools to serve the needs of ongoing research and industry.		√	√	√
2	Apply their immense knowledge acquired in Electrical and Electronics Engineering with modern computational tools to pursue Higher Education.		√	√	√
3	Employ Leadership Qualities with professional and ethical values in effectively dealing with Societal Challenges.	√	√	√	
4	Inculcate in students, Self and Lifelong Learning, effective interpersonal communication skills when working with multidisciplinary teams.	√	√	√	

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**MAPPING OF POs/PSOs with PEOs:**

S.No.	Program Objectives(POs)	Program Educational Objectives(PEOs)			
		1	2	3	4
<b>a</b>	An ability to apply knowledge of mathematics, science, and engineering	√	√		
<b>b</b>	An ability to design and conduct experiments, as well as to analyze and interpret data	√	√		
<b>c</b>	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	√	√	√	
<b>d</b>	An ability to function on multidisciplinary teams				√
<b>e</b>	An ability to identify, formulate, and solve engineering problems	√	√		
<b>f</b>	An understanding of professional and ethical responsibility			√	
<b>g</b>	An ability to communicate effectively				√
<b>h</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	√	√	√	
<b>i</b>	A recognition of the need for, and an ability to engage in life-long learning				√
<b>j</b>	A knowledge of contemporary issues	√	√		
<b>k</b>	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√	√		
<b>l</b>	Project management and finance			√	
PSO 1	An ability to demonstrate the knowledge, skill to analyze the cause and effects on Electrical system, processes and systems.	√	√	√	√
PSO2	An ability to apply the acquired Electrical Engineering knowledge for the advancement of society and self.	√	√	√	√

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**K L UNIVERSITY**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**2016 Course Outcomes**

**Course Articulation Matrix**

Course Code	Course Title	S NO	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	
15GN1001	ECOLOGY AND ENVIRONMENT	1	CO1	Understand the importance of Environmental education and conservation of natural resources								1				
			CO2	Understand the importance of ecosystems and biodiversity.										1		
			CO3	Understand the knowledge on solid waste management, disaster management and EIA process												1
15GN1002	HUMAN VALUES	2	CO1	realize and understand the basic aspiration, harmony in the human being.						1						
			CO2	envisage the roadmap to fulfill the basic aspiration of human beings.						2						
			CO3	analyze the profession and his role in this existence.						2						
15EN1101	RUDIMENTS OF COMMUNICATION SKILLS	3	CO1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills							2					
			CO2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar							2					
			CO3	Understand the types of texts and tone of the author.							2					
			CO4	Understand the importance of interpersonal skills						2						
15EN1202	INTER PERSONAL COMMUNICATION SKILLS	4	CO1	Understand the method of identifying the meaning of words and apply them in contexts.							2					
			CO2	Understand and analyze different cultures and the importance of empathy in cross-cultural communication.						2						
			CO3	Understand and analyze seven techniques of reading and improve reading speed.							2					
			CO4	Understand and apply writing strategies in office/ formal communication							2					
15 EN 2103P	PROFESSIONAL COMMUNICATION SKILLS	5	CO1	Apply the various strategies of presentation Skills.							1					
			CO2	Analyze the given topics and situations and applying the strategies of group discussion.								2				

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			CO3	Analyze the basic concepts of critical and analytical reading skills.													3										
			CO4	Apply the strategies of sentence formation and sentence completion.													1										
15 EN 2204	EMPLOYABILITY SKILLS	6	CO1	Analyze one's own strength as a speaker/communicator and use discretion while listening													2										
			CO2	Apply and analyze various concepts of writing strategies in professional communication skills like, reports, resume and minutes of the meeting															3								
			CO3	Understand the organisation of the passage and also analyze the tone, attitude and style of the author																2							
			CO4	Acquire knowledge of and apply people skills in various social organizational and corporate ambience															2								
			CO4	Acquire knowledge of and apply people skills in various social organizational and corporate ambience																2							
15 EN 3105	VERBAL AND QUANTITATIVE REASONING	7	CO1	Understand the method of identifying synonyms and antonyms and analyze the meaning of a word from the context																1							
			CO2	Analyze issues and arguments in the process of critical reasoning and apply grammar rules to correct sentences																		1					
			CO3	Apply the concepts of basic algebra and their importance while solving the problems																			1				
			CO4	Apply the short cut methods on the concepts of different models in calendars, clocks, blood relations and various types of arrangements																				1			
15 EN 3206	CORPORATE COMMUNICATION SKILLS	8	CO1	Understand and analyze the depth of a topic and use the advanced levels in creative speaking and debating.																	1						
			CO2	Understand and analyze various strategies involved in writing an essay and apply various styles in writing																				2			
			CO3	understand and analyze the given text critically and answer questions on critical reasoning based on the given information																					3		
			CO4	Acquire knowledge on various employability skills & analyze a situation and develop adaptability															3	3							
			CO5	Apply the concepts of basic geometry and their importance while solving the problems																					2		
15MT1001	SINGLE VARIABLE CALCULUS AND MATRIX ALGEBRA	9	CO1	Model physical laws and relations mathematically as a first order differential equations, solve by an appropriate method and interpret the solution.	2																						
			CO2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by an appropriate method and interpret the solution.	2																						
			CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve differential equations.	2																						
			CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values	2																						

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			CO5	Verify the solution of problems through MATLAB.																2			
15ME1001	MECHANICS	10	CO1	Understand the concept of forces and apply the static equilibrium equations.	1							2											
			CO2	Analyze co-planar and non co-planar system of forces.	2								2										
			CO3	Apply the concept of centroid & centre of gravity to determine moment of inertia.	2									2									
			CO4	Analyze the rigid bodies under translation and rotation with and without considering forces.	2									2									
			CO5	Understand the engineering systems to prepare and demonstrate the models with the help of mechanics concept to solve the engineering problems.	1										2								
15PH1001	ENGINEERING MATERIALS	11	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.	1																		
			CO2	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.	1																		
			CO3	Understands role of molecular vibrations in determining thermal properties of materials and deformation of materials in response to action of load, for identification of materials having specific engineering applications.	1																		
			CO4	Understands spin and orbital motion of electrons in determining magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.	1																		
			CO5	Apply the knowledge on structure and properties of materials while executing related experiments and develop some inter disciplinary projects.			2																
15CY1001	ENGINEERING CHEMISTRY	12	CO1	Examine water quality and select appropriate purification technique for intended problem			2	2															
			CO2	Predict potential complications from combining various chemicals or metals in an engineering setting			2	2															
			CO3	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena			2	2															

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			CO4	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes			2														
			CO5	An ability to analyze & generate experimental skills		2	2														
15BT1001	BIOLOGY FOR ENGINEERS	13	CO1	Understand the basis of Life, Living organisms and human body systems									1					1			
			CO2	Understand the importance of Diet and Nutrition											1				1		
			CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors											1				1		
15 EE 1201	FIELDS & NETWORKS	14	CO1	Understand the circuit elements, kirchoff's law and theorems to solve the networks	1														1		
			CO2	Apply the procedure to determine form factor and peak factor to different symmetrical & unsymmetrical waves	2																
			CO3	Apply vector algebra to fields fundamental to analyze electric and magnetic field distributions	2																
			CO4	Apply Maxwell's equations for static and time varying fields	2																
15MT1203	MULTIVARIATE CALCULUS	15	CO1	Determine extreme values for functions of several variables	2																
			CO2	Determine area, volume through multiples integrals	2																
			CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length, areas of surfaces and volume of solids in practical problems	2																
			CO4	Obtain analytical and numerical solutions of Heat and wave equations	2																
			CO5	Verify the solution of problems through MATLAB																	1
15CS1001	C PROGRAMMING AND DATA STRUCTURES	16	CO1	Illustrate how problems are solved using computers and programming.	2								2								
			CO2	Interpret & Illustrate user defined C functions and different operations on list of data.	2										2						

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			CO3	Implement Linear Data Structures and compare them.		2																
			CO4	Implement Binary Trees.		2																
			CO5	Apply the knowledge obtained by the course to solve real world problems.	2	2			2													
15ME1002	ENGINEERING GRAPHICS	17	CO1	Draft Orthographic views, projections of planes and , solidsmanually and by using CAD software Tool (AutoCAD)					2													
			CO2	Drafting Sectional views , Isometric views ,development of surfaces and perspectives views manually and by using AutoCAD						2												
			CO3	Project based workshop to prepare different models with the aid of workshop trades i.e., Carpentry, Tin smithy, House wiring and Fitting																	2	
15GN1003	MEASURMENTS	18	CO1	Understand and apply the fundamentals of a measurement system, characteristics, transducers and metrology using simulation and experimentation tools.	2	2													2			
			CO2	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.	2	2														2		
			CO3	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.	2	2															2	
			CO4	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.	2	2																2
15ME1003	THERMODYNAMICS	19	CO1	Understand the fundamentals of thermodynamic systems and processes	2																	
			CO2	Apply laws of the thermodynamics and principle of entropy to engineering devices.	2																	
			CO3	Analyze various air standard cycles and their performance.	2																	
			CO4	Evaluate the performance of fuels and combustion to various engines.																		1

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			CO5	Apply the theoretical concepts to conduct various experiments of thermodynamics practically and analyze the data.	2															
15GN1004	INTRODUCTION TO ENGINEERING	20	CO1	Understand the basic principles of engineering design										1						
			CO2	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.						3										
			CO3	Understand the aspects of critical thinking and problem solving in engineering											2					
			CO4	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such problems from engineering perspective											2					
15 CS 2002	OBJECT ORIENTED PROGRAMMING	21	CO1	Understand basic concepts of OOP, introduction to classes and objects through java language and apply								2								
			CO2	Understand the concepts of constructors, overloading, parameter passing, access control, inheritance and apply									2							
			CO3	Understand packages, interfaces and exception handling and apply									2							
			CO4	Understand I/O streams & apply and understand basic concepts of multi threading															3	
15EC1101	DIGITAL SYSTEM DESIGN	22	CO1	Understand numerical and character representations in digital logic, number system, data codes and the corresponding design of arithmetic circuitry								2								
			CO2	Understanding logic gates, logic theorems, boolean algebra and SOP/POS expressions									2							
			CO3	Combinational and sequential systems design using standard gates and flip flops and minimization methods									2						2	
			CO4	Verilog HDL design for logic gates, combinational and sequential logic functions									2							2
			CO5	Concepts of programmable logic devices									2							2
15EM2001	COMPUTER ORGANIZATION AND ARCHITECTURE	23	CO1	Understand the functionality and design the CPU functional units-control unit, registers, the arithmetic and logic unit, the instruction execution unit, and the interconnections using these components								2						2		
			CO2	Understand, analyze and design main, cache and virtual memory organizations.									2						2	
			CO3	Understand, analyze and design different types of I/O transfer techniques									2							2
			CO4	Understand the design issues of RISC and CISC CPU's and the design issues of pipeline architectures.									2							2
			CO5	Able to design combinational and sequential circuits using LOGISIM									2							2

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15 EE2103	ELECTRICAL CIRCUITS	24	CO1	Understand the concept of mutual inductance, series and parallel resonance, network topology to solve complex networks and 3- phase circuits' voltage and current relations.			1													<input type="checkbox"/>				
			CO2	Analyze the magnetic circuits, transient response for AC and DC excitation and two port network parameters			2															<input type="checkbox"/>		
			CO3	Evaluate one port networks using Foster and caur forms			3															<input type="checkbox"/>	3	
			CO4	Design the prototype low and high pass filters.			3															<input type="checkbox"/>	3	
			CO5	Test and Evaluate the concepts learnt using any simulation tool or hardware																		<input type="checkbox"/>	2	
15EC2103	ANALOG ELECTRONIC CIRCUIT DESIGN	25	CO1	Understand the industrial processes and organizations connected with the profession and relate classroom learning with real life situation by taking into the consideration of various design concepts.			3																	
			CO2	Understand the concepts of various diodes and their applications.			3																	
			CO3	BJT concepts as operation, biasing and frequency response.			3																	3
			CO4	FET concepts as operation, biasing and frequency response			3																	3
			CO5	Feedback concepts and their analysis			3																	3
			CO6	Concepts of various oscillators and applications			3																	3
15 EE 2104	DC MACHINES & TRANSFORMERS	26	CO1	Apply the basic principles of electromechanical energy conversion to electrical machines		<input type="checkbox"/>	<input type="checkbox"/>				2													
			CO2	Analyze operating characteristics of various types of DC generators.		<input type="checkbox"/>	<input type="checkbox"/>				2													
			CO3	Identify various speed control methods of DC motor and evaluate this performance		<input type="checkbox"/>	<input type="checkbox"/>				2													2
			CO4	Evaluate the performance of a transformers and selecting it for particular application.		<input type="checkbox"/>	<input type="checkbox"/>				2													2
			CO5	Test the DC machines and transformers to evaluate their performance		<input type="checkbox"/>	2																	
15EM2202	PROCESSORS AND CONTROLLERS	27	CO1	Able to understand and analyze the architectual features of CISC type of general purpose processor Intel 8086 microprocessor							2											3		
			CO2	Able to understand and analyze the architectual features of CISC type of microcontroller-Intel 8051 microcontroller								2												3

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			CO3	Able to understand and analyze the architectural features of RISC type of microcontroller-PIC microcontroller					2								3
			CO4	Able to program 8086 microprocessor, 8051 and PIC microcontrollers in assembly language using TASM,KEIL,MPLAB and proteus tools.					2								3
			CO5	Able to develop a real time application using 8051, & PIC microcontrollers through project based labs					2								3
15 EE 2205	AC MACHINES	28	CO1	Select from all commercially available 3- $\phi$ IM for given application	<input type="checkbox"/>	2											
			CO2	To understand the construction, operation and armature reaction of a 3- $\phi$ synchronous generator and identify the requirements for parallel operation.	<input type="checkbox"/>				3								
			CO3	Understand and analyze the performance of synchronous motor by varying excitation and varying load.		1											1
			CO4	Evaluate the performance of a single phase motor and selecting it for particular application.		2											2
			CO5	Test the induction machine and synchronous machine to evaluate their performance		2											2
15EC2206	SIGNAL PROCESSING	29	CO1	Understand various signals and model physical process using them.					2								
			CO2	Acquaint with various transformation methods and their potential for applicability in various signal analysis conditions.					2								
			CO3	Demonstrate sampling and its potential applications in communications, discrete signal acquisition etc.,					2								
			CO4	Evaluate discrete system behaviour and its response to facilitate system design.					2								
			CO5	Design a low pass discrete time system to meet noise elimination like applications					2								2
			CO6	Analyze non stationary signals and analyze them in both time frequency domains					2								2
15 EE 2206	GENERATION, TRANSMISSION & DISTRIBUTION	30	CO1	Understand various generating stations.	<input type="checkbox"/>	<input type="checkbox"/>	2										
			CO2	Understand the concepts of transmission line parameters, Corona, Mechanical Sag and Insulators					2								
			CO3	Analyze the performance of overhead transmission lines and underground cables.													2
			CO4	Analyze substation layouts and their design considerations					2								
			CO5	Test and apply knowledge obtained from Generation, transmission & distribution using any software tool or hardware													2

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15 EE 2207	CONTROL SYSTEMS	31	CO1	Students can be able to understand control system concepts such as open, closed loop systems, transfer function approach, mathematical modeling of physical systems and can understand analyze the similarities between synchros and ac generators						1										
			CO2	Students can be able to Analyze the time domain and frequency response of physical systems						2										
			CO3	Students can be able to understand and analyze stability of given transfer functions in time and Frequency domain and can be able to analyze the process of Converting state space equations into transfer function for the given model.						2										
			CO4	Students can be able to design and analyze controllers and lead, lag, lead-lag compensators																2
			CO5	Test and apply the knowledge obtained in the subject by Matlab or hardware.																2
15 EE 3108	POWER SYSTEM ANALYSIS	32	CO1	To analyze the short circuit faults in a power system						2										
			CO2	To apply numerical methods for the solution of load flow problem						2									2	
			CO3	To Select the best generators to have Economic Dispatch & to Evaluate the performance of Load Frequency Control							2									2
			CO4	To Understand and analyze rotor angle stability							2									2
			CO5	Test and Analyze various short circuit faults, load flows, economic dispatch problems, rotor angle stability problems using MATLAB							2									2
15 EE 3109	POWER ELECTRONICS	33	CO1	Select appropriate switch for a given power converter						1										
			CO2	Evaluate the steady state performance of Basic DC-DC converters						3										
			CO3	Evaluate the performance of Basic Switch-Mode PWM Inverter							3									
			CO4	Understand and analyze the operation of Basic Phase controlled converters																2

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			CO5	Test and evaluate basic power electronic converters by using Matlab software or hardware.															2			
15 EE 3210	POWER SYSTEM PROTECTION	34	CO1	To apply per unit system and to draw the reactance diagrams					1													
			CO2	To analyze the short circuit faults in a power system					2													
			CO3	To Evaluate the performance of different protective relays & Circuit breakers					2													
			CO4	To understand the concepts of lightning arresters and the neutral grounding					2													
			CO5	Test and Analyze various power system protection concepts using MATLAB					2												2	
15 EE 3211	ELECTRIC DRIVES	35	CO1	Understand the concept of fundamental torque equations, Modes of operations, equivalent values of drive parameters, converters, DC motors and AC Motors.					1													
			CO2	Analyze the speed torque characteristics of DC Drives , Induction motor Drive and Synchronous motor Drive					2													
			CO3	Analyze various control techniques of DC drives and AC drives					2													
			CO4	Design a DC drive and simulate those circuits with design parameters and observe the output waveforms.					2													2
			CO5	Design an AC drive and simulate those circuits with design parameters and observe the output waveforms.					2													2
15 EE 3251	DISTRIBUTION SYSTEM PLANNING AND AUTOMATION	36	CO1	Understand the methods to find load forecasting and various tariffs and meters	1				1													
			CO2	Understand the optimal locations of substation , capacitors and importance of protection and coordination of different protective devices	1				1													
			CO3	Understanding the SCADA and required components and its function	1				1													
15 EE 4155	RESTRUCTURED POWER SYSTEMS	37	CO1	Students are able to understand the concept of deregulation market structure, market architecture and power system old vs new					1													
			CO2	Students can be able to understand electricity sector structures different structure models , bilateral and pool markets and LMP based markets					1												1	

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			CO3	Students can be able to understand and analyze transmission pricing methods, congestion management methods and effect of congestion on LMPs							2					
			CO4	Students can be able to understand ancillary services system security in deregulation							1					1
15 EE 4156	HVDC & FACTS	38	CO1	Evaluating various HVDC transmission systems converter circuits and its control scheme	2											
			CO2	Analyzing FACTS devices for improving system stability		2										
			1	Analyzing the knowledge for improving stability and understanding the concepts of harmonics and designing of filters		2										
15 EE 4157	POWER QUALITY	39	CO1	Understand various power quality issues.							1					
			CO2	Analyze various power quality issues and its causes.							2				2	
			CO3	Analyze the different mitigating techniques for voltage sag and swells.								1				
			CO4	Design and analyze voltage sag and swell using simulation tools.									3			
15 EE 4158	SMART GRID TECHNOLOGIES	40	CO1	To understand the functioning of various devices in Smart Grids							1					1
			CO2	To understand communication channels in Smart Grid.								1				1
			CO3	To apply knowledge in Smart Metering									3			3
15 EE 3252	ADVANCED POWER ELECTRONICS	41	CO1	Understand various advanced inverter topologies and Analyze various PWM techniques to control them							1					
			CO2	Analyze the performance of various DC-DC converters		2						2				
			CO3	Understand the working of various resonant converter topologies		1										
15 EE 4159	ADVANCED ELECTRICAL DRIVES	42	CO1	Understand the Mathematical Modeling of Synchronous and Asynchronous machines							1					
			CO2	Analyze various advanced electric drive control techniques for Synchronous and Asynchronous machines		2										

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			CO3	Analyze various advanced electric drive control techniques for special machines		2														
15 EE 4160	HVDC & FACTS	43	CO1	Evaluating various HVDC transmission systems converter circuits and its control scheme	2	2														
			CO2	Analyzing FACTS devices for improving system stability		2														
			CO3	Analyzing the knowledge for improving stability and understanding the concepts of harmonics and designing of filters																
15 EE 4161	POWER QUALITY	44	CO1	Understand various power quality issues.								1								
			CO2	Analyze various power quality issues and its causes.									2						2	
			CO3	Analyze the different mitigating techniques for voltage sag and swells.										1						
			CO4	Design and analyze voltage sag and swell using simulation tools.										3						3
15 EE 4162	HYBRID ELECTRIC VEHICLES	45	CO1	Understand the vehicle mechanics and working of Internal combustion engines used for HEV	1							1								
			CO2	Analyze the battery and Electric Drive performance for HEV	2		2													
			CO3	Understand the control strategies for HEV	1															
15 EE 3253	STATE ESTIMATION & ADAPTIVE CONTROL	46	CO1	Understanding the importance of probability in state estimation	1															
			CO2	Understanding and analyzing the adaptive control techniques									2							
			CO3	Evaluating the stability performance of adaptive controllers										2						
15 EE 4163	DIGITAL CONTROL SYSTEMS	47	CO1	Understanding the importance of Z-Transform in Discrete time systems								1								
			CO2	Evaluating the stability performance and compensating techniques for Digital control systems			2													
			CO3	Designing of State feedback controllers and observers										3						
15 EE 4164	NON LINEAR CONTROL SYSTEMS	48	CO1	Understanding and analyzing the nonlinearities in the control system	1															
			CO2	Evaluating the stability performance of Nonlinear systems	3															
			CO3	Understanding and evaluating the performance of Fuzzy controllers for non linear control systems										3						

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15 EE 4165	OPTIMAL CONTROL SYSTEMS	49	CO1	Formulate first order optimality condition for calculus of variation and optimal control problem					1											
			CO2	Develop the optimal LTIV system by solving Riccati equations	2															
			CO3	Understand and estimate the operation of optimal control techniques						2										
15 EE 4166	ADAPTIVE CONTROL SYSTEMS	50	CO1	Modelling and analysis of systems by identification approaches					1											
			CO2	Understand and analyze the operation of adaptive control techniques		2														
			CO3	Evaluate the stability performance of adaptive control system for mitigating the parameter variations.						2										
15 EE 3254	ENERGY CONSERVATION & AUDIT	51	CO1	Understand the need for energy conservation and various tariffs	1	1														
			CO2	Understand the auditing methods and their practice by case studies.	1	1														
			CO3	Apply the energy conservation techniques to motors, transformers, lighting systems.	2	2														
15 EE 4167	UTILIZATION OF ELECTRICAL ENERGY	52	CO1	Understand the motor ratings for different applications					1											
			CO2	Analyze the characteristics and intensity of lightning systems for different types of lamps.			2		2											
			CO3	Analyze the characteristics and control strategies of locomotives for track electrification.			2		2											
15 EE 4168	SOLAR AND FUEL CELL ENERGY SYSTEMS	53	CO1	Understand and analyze basic concepts of the solar photovoltaic energy conversion system	1															
			CO2	Analyze the different applications of solar thermal energy			2													
			CO3	Understand and analyze the fuel cell characteristics, working principle and comparison of different types of fuel cells	2															
15 EE 4169	WIND AND BIOMASS ENERGY SYSTEMS	54	CO1	Understand and analyze basic concepts of the wind energy conversion system	1															

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			CO2	Analyze the different types of wind mills, control systems and design parameters	2	2												
			CO3	Apply the basic concepts of the bio energy conversion into different forms of energy	2													
15 EE 4170	NUCLEAR, GEOTHERMAL AND TIDAL ENERGY SYSTEMS	55	CO1	Understand the basic concepts of nuclear energy conversion system	1													
			CO2	Analyze the geothermal energy conversion systems	2	2												
			CO3	Analyze the tidal characteristics and different types of tidal power generation systems	2													
15 EE 3255	COMPUTER ARCHITECTURE	56	CO1	Understand the evolutionary steps of computer, complex instructions and microprogramming			1											1
			CO2	Understand, analyze and design main, cache and virtual memory organizations.			2											
			CO3	Understand the design issues of complex pipeline architectures and also microprocessor evolution 4004 to 4			2											2
			CO4	Understand synchronization and sequential consistency and VLIW/EPIC			1											
15 EE 4171	PLDs AND FPGAs	57	CO1	Understand Full-custom & Semi Custom design methodologies of for designing different PLD architectures.			1											
			CO2	Study and design of combinational and sequential circuits using PLEs.			2											2
			CO3	Study and analysis of different CPLD and FPGA architectures			2											
			CO4	Study of New generation Architectures of Programmable Logic Devices			1											
15 EE 4172	VLSI DESIGN	58	CO1	To understand the VLSI fabrication process and to be able to interact with integrated circuit process engineers		1												
			CO2	To analysis the theory and CV characteristics of MOS transistor		2												
			CO3	To analysis MOS gate static and switching characteristics		3												
			CO4	To design and layout MOS logic circuits														3
			CO5	Circuit Characterization and Performance Estimation and scaling														2
			CO6	Analyzing CMOS fault models and test principles		2												2

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15 EE4173	EMBEDDED SYSTEM DESIGN	59	CO1	Able to analyze embedded systems, its design cycle, modeling, layers of embedded systems			2											2			
			CO2	Able to understand Processor and Memory Organization and I/O Devices and Networks			1													1	
			CO3	Able to understand, evaluate and select appropriate software architecture and analyze the features real time operating systems.			3														3
			CO4	Understand various embedded system design methodologies and be able to develop and demonstrate a small embedded system for a real time application.			3														3
15 EE 4174	DSP PROCESSORS	60	CO1	Understand and analyze the basic concepts of Digital Signal Processing by MATLAB and number systems	2		2											2			
			CO2	Understand and analyze various architectures for programmable DSP devices	2		2												2		
			CO3	Programming of TMS320F28335/F2812 Digital Signal Processor	2		2													2	
15 IE 3250	Term Paper						2			3	3						3	2			
15 IE 4049	Minor Project						3										3				
15 IE 4050	Major Project						3		3								3	3	3		
15 IE 4048	Industrial Practice School																				
	Industrial Training (Summer Break in II/IV year)																				

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**K L UNIVERSITY**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**PROGRAM DEVELOPMENT DOCUMENT**  
**B.Tech in Mechanical Engineering**  
**2016**

**Vision of University:**

To be a globally renowned university.

**Mission of University:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**Vision of Department:**

To be a globally renowned leader in education, research and extension activities in emerging areas of mechanical engineering and allied fields.

**Mission of Department:**

Training the leaders, innovators and outstanding career professionals of tomorrow and conducting fundamental research to address major technological roadblocks.

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## **Program Educational Objectives**

1. Practice Engineering in a broad range of industrial, societal and real world applications.
2. Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.
3. Conduct themselves in a responsible, professional, and ethical manner.
4. Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.

## **Program Outcome's**

1. An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization for the solution of complex engineering problems in Mechanical engineering
2. An ability to identify, formulate, research literature, analyze complex engineering problems in mechanical engineering using first principles of mathematics, natural sciences and engineering sciences
3. An ability to design solutions for complex engineering problems and system component or processes that meet the specified needs considering public health & safety and cultural, societal & environment
4. An ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to obtain solutions to Mechanical engineering problems

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5. Ability to create, select and apply appropriate techniques, resources and modern engineering activities, with an understanding of the limitations
6. Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7. Ability to demonstrate the knowledge of engineering solutions, contemporary issues understanding their impacts on societal and environmental contexts, leading towards sustainable development
8. An ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice
9. An ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings
10. Ability to communicate effectively oral, written reports and graphical forms on complex engineering activities
11. Ability to demonstrate knowledge and understanding of the engineering and management principles and apply those one's own work, as a member and leader in team, to manage projects and in multi-disciplinary environments
12. An ability to recognize the need for and having the preparation and ability to engage independent and life-long learning in broadest context of technological change.

**MAPPING OF PEOs with MISSION OF THE DEPARTMENT:**

S.No	Description of PEOs	Key Components of Mission			
		M 1	M 2	M 3	M 4
		Training the leaders of tomorrow	Training the innovators of tomorrow	Training the outstanding career professionals of tomorrow	Conducting fundamental research

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PEO 1	Practice Engineering in a broad range of industrial, societal and real world applications	.	. ✓	. ✓	
PEO 2	Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers		✓		✓
PEO 3	Conduct themselves in a responsible, professional, and ethical manner	✓			
PEO 4	Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world	✓		✓	✓

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**MAPPING OF POs/PSOs with PEOs:**

S No.	Key Components of POs and PSOs	Description of PEO			
		Practice Engineering in a broad range of industrial, societal and real world applications	Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.	Conduct themselves in a responsible, professional, and ethical manner.	Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.
		PEO 1	PEO 2	PEO 3	PEO 4
PO1	Engineering knowledge	✓	✓		✓
PO2	Problem analysis	✓	✓		✓
PO3	Design/ development of solutions	✓	✓		✓
PO4	Conduct investigations of complex problems	✓	✓		✓
PO5	Modern tool usage	✓	✓		✓
PO6	The engineer and society	✓	✓	✓	✓
PO7	Environment and sustainability	✓	✓	✓	✓
PO8	Ethics	✓	✓	✓	✓
PO9	Individual and team work	✓	✓	✓	✓

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PO10	Communication	✓	✓	✓	✓
PO11	Project management and finance				✓
PO12	Lifelong learning	✓	✓	✓	✓
PSO1	Demonstrate the knowledge, skill to analyze the cause and effects on machine elements, processes and systems.	✓	✓		✓
PSO2	Apply the acquired Mechanical Engineering knowledge for the advancement of society and self	✓	✓		✓

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# K L UNIVERSITY

## DEPARTMENT OF MECHANICAL ENGINEERING

### 2016-2020 BATCH Course Outcomes vs Program Outcomes

#### Course Articulation Matrix

S No	Course Code	Course Title	Credits	CO NO	Description of the Course Outcome	Program Outcomes												PSOs				
						1	2	3	4	5	6	7	8	9	10	11	12	1	2			
1	15MT1001	SINGLE VARIABLE MATRIX ALGEBRA	4	CO1	Model the physical laws and relations mathematically as a first order differential equations, solve by analytical and numerical methods also interpret the solution.	2																
				CO2	Model physical laws and relations mathematically as second/higher order differential equations, solve by analytical method and interpret the solution.	2																
				CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve ordinary differential equations.	2																
				CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values.	2																
				CO5	Verify the solution of problems through MATLAB.				2													

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2	15 PH 1001	ENGINEERING MATERIALS	4	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.	1													1	1			
				CO2	Understands magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.	1															1	1	
				CO3	Understands thermal and mechanical properties of materials, heat treatment methods for changing the microstructure of materials and responses of materials subjected to load.	1																1	1
				CO4	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.	1																1	1
				CO5	Apply the knowledge on structure and properties of materials while executing experiments and develop inter disciplinary projects.				2													1	1
3	15CS1001	C PROGRAMMING AND DATA STRUCTURES-I	5	CO1	Illustrate how problems are solved using computers and programming.	2	2																
				CO2	Interpret & Illustrate user defined C functions and different operations on list of data.	2	2																
				CO3	Implement Linear Data Structures and compare them.	2	2																

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				CO4	Implement Binary Trees.	2	2														
				CO5	Apply the knowledge obtained by the course to solve real world problems.				2												
4	15GN1004	INTRODUCTION TO ENGINEERING	3	CO1	Understand the basic principles of engineering design					2	2										
				CO2	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.					2	2										
				CO3	Understand the aspects of critical thinking and problem solving in engineering					2	2										
				CO4	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such problems from engineering perspective					2	2										
5	15ME1001	MECHANICS	4	CO1	Understand the concept of forces and apply the static equilibrium equations.	2	1											1	1		
				CO2	Analyze co-planar and non-co-planar system of forces.	2	1												1	1	
				CO3	Apply the concept of centroid & centre of gravity to determine moment of inertia.	2	1													1	1
				CO4	Analyze the rigid bodies under translation and rotation with and without considering forces.	2	1														1

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				CO5	Understand the engineering systems to prepare and demonstrate the models with the help of mechanics concept to solve the engineering problems.	2	1											1	1			
6	15MT1203	MULTIVARIATE CALCULUS	4	CO1	Determine extreme values for functions of several variables		2			2												
				CO2	Determine area, volume through multiples integrals		2			2												
				CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length, areas of surfaces and volume of solids in practical problems		2			2												
				CO4	Obtain analytical and numerical solutions of Heat and wave equations		2			2												
				CO5	Verify the solution of problems through MATLAB		2			2												
7	15ME1002	ENGINEERING GRAPHICS	3	CO1	Draft Orthographic views, projections of planes and solids manually and by using CAD software Tool (AutoCAD)					2								2	1	1		
				CO2	Drafting Sectional views, Isometric views, development of surfaces and perspectives views manually and by using AutoCAD					2										2	1	1
				CO3	Project based workshop to prepare different models with the aid of workshop trades i.e., Carpentry, Tin smithy, House wiring and Fitting					2										2	1	1

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8	15CY1001	ENGINEERING CHEMISTRY	4	CO1	Examine water quality and select appropriate purification technique for intended problem			1	1									1	1		
				CO2	Predict potential complications from combining various chemicals or metals in an engineering setting			1	1												
				CO3	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena			1	1												
				CO4	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes			1	1												
				CO5	An ability to analyze & generate experimental skills			1	1												
9	15GN1003	MEASUREMENTS	2	CO1	Understand and apply the fundamentals of a measurement system, characteristics, transducers and metrology using simulation and experimentation tools.	2			2												
				CO2	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.	2			2												
				CO3	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.	2			2												

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				CO4	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.	2		2													
10	16 MT 1204	LOGIC AND REASONING	2	CO1	Apply the fundamental principle of counting and use them to measure the uncertainty in random experiments.	2															
				CO2	Apply Venn diagrams to find the conclusion of statements, solve puzzles using binary logic and problems relating to cubes.	2															
				CO3	Apply the available models for Data sufficiency & redundancy and interpret it , when given, in tabular and graphical forms.	2															
				CO4	Apply the Reasoning techniques to solve problems on arrangements, series, analogies, coding and decoding.	2															
11	16ME2105	METALLURGY	4	CO1	Understand the significance of cooling curves and phase diagrams.	1												1	1		
				CO2	Ability to understand various heat treatment processes.				1										1	1	
				CO3	Identify fuels and furnaces used in metallurgical industries and to Understand the mineral processing basic principles.	1														1	1
				CO4	Acquires knowledge on extraction of metals, production of components	1														1	1

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					using powder metallurgy technique.															
				CO5	Identify and differentiate various types of materials and understand various heat treatment method.	1													1	1
12	16MT2104	PROBABILITY AND NUMERICAL METHODS	4	CO1	Apply the conditional probability and discrete distributions to suitable real- world situations.	1														
				CO2	Apply continuous distributions to suitable real- world situations and also analyze bivariate data using correlation and regression analysis.	1														
				CO3	Test for means-single and two sample means	1														
				CO4	Identify different mathematical problems and reformulate them in a way that is appropriate for numerical treatment .	1														
13	16ME1003	THERMODYNAMICS	4	CO1	Understand the fundamentals of thermodynamic systems and processes.	1													1	1
				CO2	Apply first law of thermodynamics to various flow and non-flow processes.	2	2												2	2
				CO3	Apply second law of thermodynamics and principle of entropy to Engineering Devices.	1													2	2
				CO4	Apply principles of combustion for gravimetric and volumetric analysis of fuels.	2	2												2	2

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				CO5	Plan and conduct simple experiments to demonstrate thermodynamic principles.				2										2	2			
14	16ME2106	STRENGTH OF MATERIALS	4	CO1	Analyze stresses in members with 1D axial loading or torsion				2										2	2			
				CO2	Analyze shear force and bending moment diagrams					2											2	2	
				CO3	Analyze deflections and stresses in beams		2															2	2
				CO4	Design columns and pressure vessels		2															2	2
				CO5	Apply the theoretical concepts to conduct various experiments of strength of materials practically and analyze the data						2											2	2
15	16ME2108	MANUFACTURING TECHNOLOGY	4	CO1	Understand and appreciate the breadth and depth of the field of manufacturing technology.		1												1	1			
				CO2	Understand various casting procedures and melting practices used for producing different products.		1														1	1	
				CO3	Understand various special casting approaches used for producing precision components.		1															1	1
				CO4	Understand various welding methods for joining metals and alloys.		1															1	1
				CO5	Gain hands on experience in converting a given raw material into desired shape and size by applying						2											1	1

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					suitable casting and welding processes.																				
16	16ME2104	FLUID MECHANICS & HYDRAULIC MACHINES	4	CO1	Understand physical laws related to fluid statics and buoyancy.	1	1											1	1						
				CO2	Apply continuity, Euler's and Bernoulli's equations in various fluid flow situations.	2	2													2	2				
				CO3	Understand and apply momentum equation and boundary layer concepts to flow through pipes and to impact of jets.	2	2															1	1		
				CO4	Apply fluid dynamical principles to hydraulic machines.	2	2																2	2	
				CO5	Conduct experiments on various hydraulic machines like turbines and pumps						2												2	2	
17	16ME 2210	KINEMATICS OF MACHINES	4	CO1	Identify various possible 4 link mechanisms and their inversions and applicability	1	1													1	1				
				CO2	Analyze mechanisms kinematically using velocity and acceleration diagrams	2	2															2	2		
				CO3	Analyze cam profiles and the motion of their followers	2	2																2	2	
				CO4	Analyze gears and gear trains kinematically	2	2																	2	2
				CO5	Apply the theoretical concepts to conduct various experiments to Analyze Mechanism , gear trains and draw Cam Profile.						2													2	2

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18	17 MT 2002	COMPLEX VARIABLES AND TRANSFORMS	3	CO1	Apply Cauchy-Riemann equations to test the analyticity of a complex function and Compute the complex integrals, using Cauchy theorem and Cauchy Integral formulae.	1																	
				CO2	Represent analytic functions as Taylor, Maclaurine and Laurent series expansions and compute real and complex integrals using the Residue theorem. Also transform complex functions using bilinear transformation.	1																	
				CO3	Apply Laplace transform techniques to solve differential equations	1																	
				CO4	Compute Fourier transforms using integrals and solve differential equations	1																	
19	16ME 2211	METAL CUTTING AND METAL FORMING	3	CO1	Understand the theoretical background of metal cutting.		1												1	1			
				CO2	Understand and estimate the economics of machining various processes.		1														1	1	
				CO3	Understand the theory of metal forming in shaping of components.		1															1	1
				CO4	Understand and estimate the loads in various metal forming processes.		1															1	1
20	16ME 2212	VAPOUR POWER SYSTEMS	4	CO1	Understand the properties of pure substance and evaluate the Rankine cycle efficiency for regenerative and binary vapor power cycles.	1		1											1	1			

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				CO2	Understand the working principles of steam generators and steam nozzles.		2		2										1	1		
				CO3	Evaluate the performance of steam turbines and condensers.		2		2										1	1		
				CO4	Understand the principles of refrigeration and psychrometry.	1	1												1	1		
				CO5	Experimental verification of various vapour power devices.				2										1	1		
21	16ME2207	MACHINE DRAWING	2	CO1	Understand different types of fasteners and draft various types of joints, locking arrangements.	2				2									1	1		
				CO2	Understand and draft various types of couplings and their arrangements and model the same using Solid works	2					2									1	1	
				CO3	Prepare the assembly drawing of engine parts, machine Components both in conventional form and then by using software.	2					2										1	1
				CO4	Generate detail drawings of individual parts of an assembled machine Component both in conventional form and then by using software.	2					2										1	1
22	15EE2202	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	4	CO1	Understand basics of DC circuit analysis, fundamentals of AC and introduction three phase circuits	1	2															
				CO2	Understand construction & working principle of DC Machines	1	2															

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				CO3	Understand construction & working principle of Transformer, three phase and single phase induction motor.	1	2													
				CO4	Understand number systems and their conversions, characteristics of PN junction diode	1	2													
				CO5	Conduct an experiment to analyze the performance of various electrical and electronic devices and draw their char characteristics.	2	2													
23	15 EN 2103	PROFESSIONAL COMMUNICATION SKILLS	2	CO1	Apply the various strategies of presentation Skills.							1		3						
				CO2	Analyze the given topics and situations and applying the strategies of group discussion.							1		3						
				CO3	Analyze the basic concepts of critical and analytical reading skills.									1		3				
				CO4	Apply the strategies of sentence formation and sentence completion.									1		3				
24	15EN3206	CORPORATE COMMUNICATION SKILLS	2	CO1	Analyse the method of identifying synonyms and antonyms and analyze the meaning of a word from the context.								3		3					
				CO2	Analyze various strategies involved in writing an essay and apply various styles in writing.									3		3				
				CO3	Analyse the organization of the passage and also analyze the tone, attitude and style of the author.									3		3				

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				CO4	Acquire knowledge on various employability skills & analyze a situation and develop adaptability.														3		3												
25	16ME 3114	GAS POWER SYSTEMS	4	CO1	Understand thermodynamic relations to ideal and real gas problems.	2	2																				1	1					
				CO2	Understand the working principles of reciprocating air compressors and evaluate their performance.	2	2																							1	1		
				CO3	Understand the working principle of rotary compressors and evaluate their performance.	2	2																									1	1
				CO4	Understand the operating principles of gas turbine and jet propulsion and evaluate their performance.	2	2																									1	1
				CO5	Conduct experiments on reciprocating and rotary machines.						2																				1	1	
26	16ME 3115	DYNAMICS OF MACHINES	4	CO1	Analyze the static and dynamic forces of planar mechanisms and flywheels	2	2																					2	2				
				CO2	Analyze the static and dynamic balancing of rotating as well as reciprocating masses due to unbalanced forces	2	2																								2	2	
				CO3	Understand the free and forced vibrations of single degree freedom systems	2	2																									1	1
				CO4	Analyze the gyroscope and governor mechanisms for controlling the moving vehicles	2	2																									2	2

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				CO5	Apply the theoretical concepts to mechanisms by using the simulation software and analyzing the data				2	2								2	2			
27	16ME 3116	MACHINE TOOLS AND METROLOGY	4	CO1	Understand the working of standard machine tools such as lathe, milling, drilling, grinding, and allied machines.		1											1	1			
				CO2	Understand and principles and design considerations of jigs and fixtures used in various machining operations.		1													1	1	
				CO3	Understand the procedures to measure the geometrical details of various mechanical elements and assemblies using linear and angular measuring instruments.		1														1	1
				CO4	Understand the procedures to measure the surface roughness and roundness of given mechanical components.		1														1	1
				CO5	Gain hands on experience on usage of various machining processes to convert a given raw material into desired shape and size and to measure the geometrical and surface quality of the mechanical components.																1	1
				CO5	Gain hands on experience on usage of various machining processes to convert a given raw material into desired shape and size and to measure the geometrical and surface quality of the mechanical components.																2	
28	16ME 3117	INTERNAL COMBUSTION ENGINES	4	CO1	Analyze various air standard cycles and their performance	2	2											1	1			
				CO2	Understand the working principles of 2-stroke and 4-stroke engines, SI and CI Engines.	1														1	1	

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				CO3	Understand fuel supply system and combustion phenomenon in SI and CI Engines.	1													1	1			
				CO4	Analyze and evaluate performance of SI and CI Engines.		2		2										2	2			
				CO5	Conduct experiments on SI and CI Engines, analyze and interpret the experimental data and observations.				2										2	2			
29	16ME 3118	OPERATIONS RESEARCH	4	CO1	Identify Optimum solutions for various single objective problems using Linear Programming models.		1											1	1	1			
				CO2	Identify Optimum Solutions through Transportation and Assignment models		1												1	1	1		
				CO3	Identify Optimum Solutions through Game theory, DPP, Queuing theory & Simulation models		1													1	1	1	
				CO4	Solve project management problems using CPM, PERT and Crashing		2														2	2	2
				CO5	Solve Various Linear Programming, Transportation, Assignment, Game Theory and Simulation models through POM Software					2											2	2	2
30	16ME 3219	ROBOTICS	3	CO1	Understand the concept of robotics with respect to their anatomy, classification end effectors.	1													1	1			
				CO2	Analyze a suitable sensors for robotic system design with respect to their applications.			2													2	2	

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				CO3	Ability to solve the kinematics for robot manipulator			2											2	2			
31	16ME 3220	HEAT TRANSFER	4	CO1	Understand laws of heat transfer and apply Fourier law of conduction for one dimensional heat conduction to engineering problems.	2	2												1	1			
				CO2	Analyze steady state conduction problems involving internal heat generation and extended surfaces and one dimensional unsteady state heat conduction problems.	2	2														2	2	
				CO3	Apply principles of convection, boiling and condensation and evaluate convective heat transfer coefficient for different flow situations.	2	2															2	2
				CO4	Design of heat exchangers; Understand principles of radiation and evaluate radiative heat transfer between two bodies.	2	2															2	2
				CO5	Conduct experiments and demonstrate heat transfer phenomena involving conduction, convection and radiation.					2												2	2
				CO1	Understand the basics concepts, analyze the different stresses and apply design principles for static and fatigue strength of machine elements	2																	1
32	16ME 3221	DESIGN OF MACHINE ELEMENTS	4	CO2	Design the appropriate fastening technique			3											2	2			

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				CO3	Design the power transmission elements such as keys, shafts and couplings														2	2			
				CO4	Design the appropriate springs such as helical or leaf springs														2	2			
				CO5	Analyze machine elements using ANSYS software						2	2							2	2			
33	16ME 3222	COMPUTER INTEGRATED MANUFACTURING	4	CO1	Understand the basic fundamentals of computer aided design and manufacturing.														1	1			
				CO2	Explain the basic concepts of NC and CNC programming in machining.																1	1	
				CO3	Learn the basic concepts of group technology and flexible manufacturing systems.																	1	1
				CO4	Learn the basic concepts of computer aided process planning.																	1	1
				CO5	Gain hands on experience in converting a given raw material into desired shape and size by applying suitable casting and welding processes.																		1
34	16ME 3223	PRODUCTION AND OPERATION MANAGEMENT	4	CO1	Apply various work-study techniques to determine the standard time and efficiency.														2	2			
				CO2	Analyze various quality control techniques for bringing out the best quality output.																2	2	
				CO3	Apply various production scheduling techniques to optimize																2	2	

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					productivity & Forecast the future demand for the product																	
				CO4	Apply various strategies to optimize the Inventory cost	2								2		2	2					
				CO5	Validate the theoretical concepts by doing the experiments in the laboratory			2						2		2	2					
35	17 MB 4057	ECONOMICS FOR ENGINEERS	2	CO1	Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio									2								
				CO2	Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions									2								
				CO3	Compute the depreciation of an asset using standard depreciation techniques to assess its impact on present or future value											2						
				CO4	Apply all mathematical approach models covered in solving engineering economics problems											2						
36	16ME 4124	MECHATRONICS	4	CO1	Understand the role of sensors and transducers for control systems	2												1	1			
				CO2	Apply the concepts of control systems in the field of automation.				2										2	2		
				CO3	Acquire ability to analyze and simulate response of a control systems				2											2	2	

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				CO4	Apply the principles of PLCs in the design of control systems to achieve desired performance characteristics		2										2	2
				CO5	Modelling of different systems with the help of control systems concepts and controllers to solve the engineering problems.	2											2	2
37	16ME 4125	DESIGN OF TRANSMISSION ELEMENTS	4	CO1	Design and selection of various belt and chain drives		3										2	2
				CO2	Design and Selection of the suitable bearing for the given loading condition		3										2	2
				CO3	Analyze kinematic and dynamic aspects in design of brakes, clutches and IC engine components		3										2	2
				CO4	Design and analysis of different types of gear drives		3										2	2
				CO5	Analyze machine elements using analysis software				2								2	2
38	17GN1001	ECOLOGY AND ENVIRONMENT	2	CO1	Understand the importance of Environmental education and conservation of natural resources.					1								
				CO2	Understand the importance of ecosystems and biodiversity.											1		
				CO3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.					2								
39	15GN1002	HUMAN VALUES	2	CO1	realize and understand the basic aspiration, harmony in the human being.							1						

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				CO2	envisage the roadmap to fulfill the basic aspiration of human beings.									2							
				CO3	analyze the profession and his role in this existence.									2							
40	16ME 4051	ADVANCED STRENGTH OF MATERIALS	3	CO1	Analyze Statically Indeterminate Beams	2	2											2	2		
				CO2	Analyze Curved Beams and Beams subjected to Unsymmetrical bending	2	2												2	2	
				CO3	Apply Energy methods to find deflections in simple Structures	2	2													2	2
				CO4	Analyze Stresses in Rotating members and Thick cylinders	2	2													2	2
41	16ME 4052	FINITE ELEMENT METHOD	3	CO1	Analyze 3D stresses & strains for general loading and solving complex engineering problems using approximate methods	2	2												2	2	
				CO2	Analyze 1D structural problems using FEM	2	2			2									2	2	
				CO3	Analyze 2D problems including axi-symmetric solids subjected to axi-symmetric loading using FEM	2	2			2										2	2
				CO4	Analyze thermal problems structural dynamic problems using FEM	2	2			2										2	2
42	16ME 4053	ADVANCED VIBRATIONS AND NOISE CONTROL	3	CO1	Understand the concepts of acoustics and vibrations	2	2												1	1	
				CO2	Determine the sources of vibrations	2	2													1	1

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				CO3	Measure the level of vibration and control the vibrations	2	2												1	1
				CO4	Measure and control the noise observed from vehicles.	2	2												1	1
43	16ME 4054	COMPUTER AIDED DESIGN	3	CO1	Understand the Fundamentals of CAD and display devices	1				1									1	1
				CO2	Apply the concept of geometric modeling	2				2									2	2
				CO3	Able to apply concept of Surface and solid modeling	2				2									2	2
				CO4	Application of various Geometric transformations	2				2									1	1
44	16ME 4055	CONDITION MONITORING	3	CO1	Understand the types of Maintenance Techniques	1													1	1
				CO2	Diagnose fault through Vibration Monitoring	2													1	1
				CO3	Interpret the Faults through Thermal Monitoring or Lubricant Analysis	2													1	1
				CO4	Apply sensors for condition monitoring	2													1	1
45	16ME 4056	CREEP FATIGUE AND FRACTURE MECHANICS	3	CO1	Assess the failure of unflawed structural components		2		2										1	1
				CO2	Assess the fatigue life of structural components under the specified load spectrum		2		2										1	1
				CO3	Evaluate the fracture toughness and assess the life of flawed structural components		2		2										2	2

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				CO4	Assess the life of structural components under creep		2		2										1	1					
46	16ME 4057	THEORY OF ELASTICITY AND PLASTICITY	3	CO1	Analyze stresses and strains in planes in elastic or plastic region	2	2												2	2					
				CO2	Solve 2-D problems in rectangular Components	2	2														1	1			
				CO3	Analyze stresses and strains in 3-D problems	2	2															2	2		
				CO4	Analyze Beams and frames in plasticity applications	2	2																2	2	
47	16ME 4058	MECHANICS OF COMPOSITE MATERIALS	3	CO1	Know the composite materials and manufacturing methods	1														1	1				
				CO2	Understand the behaviour of composite Lamina	1																1	1		
				CO3	Know the properties of various types composite materials	1																	1	1	
				CO4	Apply Failure theories to calculate stresses in composite materials	2																		2	2
48	16ME 4061	MODREN MANUFACTURING PROCESSES	3	CO1	To classify and understand the need of Non-Traditional Manufacturing Processes.		1														1	1			
				CO2	To understand the working principle, mechanism of metal removal and the effect of various process parameters on its performance of various Non-Traditional Machining Processes.		1																	1	1
				CO3	To understand the working principle and the effect of various process parameters on its performance of		1																		1

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					various Non-Traditional Welding Processes.																		
				CO4	To understand the working principle of various Non-Traditional Forming Processes.	1													1	1			
49	16ME 4062	ADVANCED MATERIALS	3	CO1	Ability to identify different types of optimization problems	1													1	1			
				CO2	Understand basic concepts in solving nonlinear optimization problems	1															1	1	
				CO3	Understand optimality conditions for unconstrained and constrained optimization problems and be able to apply them in verifying the optimality of a solution	1																1	1
				CO4	Understand basics of choosing and implementing optimization methods	1																1	1
50	16ME 4063	ADDITIVE MANUFACTURING	3	CO1	To be able to properly distinguish between the hype and realities of additive manufacturing	1													1	1			
				CO2	To understand the basic AM processes, and the limitations and advantages of each.	1															1	1	
				CO3	To understand the differences between traditional processes and additive manufacturing production, including the differences in design methodology.	1																1	1
				CO4	To use AM terminology properly and understand the role and importance of standards in the	1																1	1

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					additive manufacturing industry.																			
51	16ME 4064	AUTOMATION IN MANUFACTURING	3	CO1	Understand the strategies and components of automation in productions.			1										1	1					
				CO2	Analyze the automated flow lines in production systems.			1												2	2			
				CO3	Analyze and design the assembly lines and materials handling systems of production systems.			1													2	2		
				CO4	Develop the adoptive system for a machine cell.			1													2	2		
52	16ME 4065	TOOL ENGINEERING AND DESIGN	3	CO1	Develop the ability to design cutting tools for given single component.		2												1	1				
				CO2	Design and development of various die configurations.		2														2	2		
				CO3	Design and development of jigs for given component.		2															2	2	
				CO4	Design and development of fixtures for given component.		2																2	2
53	16ME 4066	FLEXIBLE MANUFACTURING SYSTEMS	3	CO1	Analyze various production schedules and plant layouts.		1													2	2			
				CO2	Apply the concept of group technology to the development of FMS.		1															2	2	
				CO3	Identify hardware and software components of FMS.		1																1	1
				CO4	Analyze materials handling and storage system in FMS.		1																	2

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54	16ME 4067	SMART MATERIALS	3	CO1	Understand the behavior and applicability of Piezoelectric materials in designing smart structures and materials.			1										1	1				
				CO2	Understand the behavior and applicability of Shape memory alloys in designing smart structures and materials.				1												1	1	
					Understand the behavior and applicability of Electro active polymers in designing smart structures and materials.			1														1	1
				CO3	Understand the behavior and applicability of Magnetostrictive materials in designing smart structures and materials.			1														1	1
55	16ME 4068	MACHINE TOOL DESIGN	3	CO1	Understand basic motions involved in a machine tool.			1											1	1			
				CO2	Design machine tool structures.				1												2	2	
				CO3	Design and analyze systems for specified speeds and feeds.			1														2	2
				CO4	Select subsystems for achieving high accuracy in machining.			1														1	1
56	16ME 4071	REFRIGERATION & AIR-CONDITIONING	3	CO1	Analyze COP of different refrigeration cycles with different methods of refrigeration using different refrigerants.	2	2												2	2			
				CO2	Analyze the performance of Vapor Compression Refrigeration with modification of cycle and its	2	2														2	2	

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					components.																
				CO3	Understanding the working of Cascade systems for low temperature Production and of VAR system.	1												1	1		
				CO4	Analyze cooling load for comfort and industrial air conditioning on basis of processes on psychometric charts and its components.	2	2											2	2		
57	16ME 4072	NON-CONVENTIONAL ENERGY SOURCES	3	CO1	Understand and analyze various solar thermal applications.	2	2											1	1		
				CO2	Analyze the performance of tidal, wave and Ocean thermal energy conversion (OTEC) systems		2		2										2	2	
				CO3	Understand and analyze the operation of wind, geothermal, biomass and bio-gas power generation.	2	2													1	1
				CO4	Understand and analyze the operation of solar photovoltaic cells fuel cells and the phenomenon of fusion.	2	2														1
58	16ME 4073	POWER PLANT ENGINEERING	3	CO1	Understand the working of system and subsystems of Hydro Electric and Diesel power plants.	2	2											1	1		
				CO2	Understand the working of system and subsystems of Thermal and nuclear power plants and to draw their layout diagrams	1	1													1	1

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				CO3	Calculate the various factors of power plant economics and understand power generation through Non-conventional energy sources.	2	2												2	2			
				CO4	Understand various direct energy conversion systems, pollution and methods to control pollution.	1													1	1			
59	16ME 4074	AUTOMOBILE ENGINEERING	3	CO1	Understand different types of chassis, engine components, fuel systems and its working principles	1	1												1	1			
				CO2	Understand different components of transmission system, cooling and lubrication systems	1	1														1	1	
				CO3	Understand different components of suspension, steering and braking systems	1	1															1	1
				CO4	Understand different electric and electronic systems used in automobiles and pollution control techniques used in SI and CI engines.	1	1															1	1
60	16ME 4075	ADVANCED THERMODYNAMICS	3	CO1	Understanding the concepts of exergy, thermodynamic potential and calculation of exergy of a system	1													1	1			
				CO2	Understanding kinetic theory of gases and intermolecular forces		1														1	1	
				CO3	Understanding various methods of statistical distribution of particles	1															1	1	

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				CO4	Ability to construct figures for particle allocations depending on various probability distributions		2													1	1			
61	16ME 4076	RENEWABLE ENERGY TECHNOLOGY	3	CO1	Understand different types of Renewable Energy Sources and Analyzing the energy production.	2	2													1	1			
				CO2	Understand the principles of OTEC and wind energy and analyze wind speed effects in power generation.	2	2															1	1	
				CO3	Understand different conversion techniques of biomass to useful fuel or energy.	2	2																1	1
				CO4	Understand different conversion techniques of Geo-Thermal energy.	2	2																1	1
62	16ME 4077	COMPRESSIBLE FLUID FLOW	3	CO1	To understand and apply compressible flow theory in various propulsion devices.	1															1	1		
				CO2	To solve the gas dynamics design problems related to high speed aerodynamics, rocket and missile propulsion, steam and gas turbines, and high speed turbo-compressors.	2	2															1	1	
				CO3	To acquire knowledge on the measuring devices and techniques being used in compressible flows.	1																	1	1
				CO4	To understand various aspects of the wave phenomena including the normal and oblique shock waves.	1																	1	1
63	16ME 4078	HEAT PIPE: THEORY, DESIGN & APPLICATIONS	3	CO1	Understand the working principle and operational characteristics of heat pipes	1	1													1	1			

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				CO2	Understand and interpret the heat pipe operating limits while modeling heat pipes for practical applications	2	2												1	1		
				CO3	Understand design and manufacturing considerations of heat pipes for a given industrial application	2	2												1	1		
				CO4	Develop Designs for different applications including thermal management of electronic devices, space applications, power plant heat exchangers and HVAC equipment	3	3												2	2		
64	16ME 4081	AUTOMOTIVE SENSOR AND APPLICATIONS	3	CO1	Learn the sensor classification and sensor product selection guide.	1													1	1		
				CO2	Analyze the measurement of engine parameter using sensor.				2											2	2	
				CO3	Apply required sensors and actuators for automotive applications			2													2	2
				CO4	Analyze the sensors for intelligent transport systems			2													2	2
65	16ME 4082	AUTOTRONICS	3	CO1	Understand the automotive electronics for engine management system	1													1	1		
				CO2	Analyze required sensors and actuators for an automotive application			2												2	2	
				CO3	Apply the suitability of a control system for automotive application			2												2	2	

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				CO4	Ability to analyze of electronic system for automotive applications		2												1	1			
66	16ME 4083	ELECTRONIC ENGINE MANAGEMENT SYSTEM	3	CO1	Understand the automotive instruments and automotive sensors	1													1	1			
				CO2	Learn the measurement of engine parameter by using sensor.				1												1	1	
				CO3	Acquire ability to analyze the electronic fuel injection system				2													1	1
				CO4	Apply the principles of digital control techniques and the application of on board diagnosis			2														2	2
67	16ME 4084	INSTRUMENTATION IN AUTOMOTIVE INDUSTRIES	3	CO1	Understand the knowledge of various Measuring Instruments to design a simple Instrumentation system	1														1	1		
				CO2	Analyze the various instruments and use them in various fields			2													2	2	
				CO3	Learn and apply the measuring instruments in various industries application			2														1	1
				CO4	Analyze suitable instrument for a given application			2														2	2
68	16ME 4085	MECHATRONICS SYSTEM DESIGN	3	CO1	Understand the approach used for mechatronic system design and relevant considerations	1														1	1		
				CO2	Apply the suitable sensors and actuators used in a Mechatronic system			2														2	2
				CO3	Analyze signal conditioning interface in a Mechatronic system			2														2	2

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					and implementation of control systems														
				CO4	Modeling and Simulation for the Mechatronic System design perspective			2											1 1
69	16ME 4091	ARTIFICIAL INTELLIGENCE FOR ROBOTICS	3	CO1	Understand the concepts of AI	1													1 1
				CO2	Apply basic principles of AI in solutions that require problem solving and planning.			2											2 2
				CO3	Apply basic principles of AI in solutions that require problem solving, planning, reasoning and learning			2											2 2
				CO4	Analyze AI in Robotics			2											2 2
70	16ME 4092	AUTOMATION SYSTEM DESIGN	3	CO1	Understand the design principles of automation and its application in an automated manufacturing system	1													1 1
				CO2	Analyze pneumatic sub-systems of an automated manufacturing system in terms of design, operation and control aspects			2											2 2
				CO3	Analyze hydraulic sub-systems of an automated manufacturing system in terms of design, operation and control aspects			2											2 2
				CO4	Understand programmable automation with regard to the computer integrated manufacturing system		2												1 1

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71	16ME 4093	INDUSTRIAL AUTOMATION AND CONTROL	3	CO1	Understand the concepts industrial automation and measurement systems	1													1	1			
				CO2	Apply the controllers in automation			2													2	2	
				CO3	Analyze and select a suitable PLC system for the given application					2												2	2
				CO4	Apply the concepts of control systems for industrial automation			2														2	2
72	16ME 4094	INDUSTRIAL HYDRAULIC AND PNEUMATIC SYSTEMS	3	CO1	Learn the concepts hydraulic or pneumatic actuation system	1													1	1			
				CO2	Analyze diagnose maintenance problems of hydraulic and pneumatic system					2											2	2	
				CO3	Analyze required components to develop an automation system using pneumatics and hydraulic system			2														2	2
				CO4	Develop circuits for controlling hydraulic and pneumatic using PLC		2															1	1
73	16ME 4095	INDUSTRIAL ROBOTICS AND MATERIAL HANDLING SYSTEMS	3	CO1	Understand the concepts of robot,sensors and their applications in robots	1													1	1			
				CO2	Learn material handling equipment used both in automated and non-automated systems	1															1	1	
				CO3	Analyze and select a suitable material handling system for the given application					2												2	2
				CO4	Apply the various applications of robots in material handling			2														2	2

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74	16ME 40A1	AIRCRAFT SYSTEMS DESIGN	3	CO1	Understand the Design process of Aircraft	1												1	1				
				CO2	Determine the forces in Aircraft structures	2	2													1	1		
				CO3	Select the aircraft materials for manufacturing processes	2															1	1	
				CO4	Analyze stresses in Aircraft structures	2	2														2	2	
75	16ME 40A2	PRODUCT DESIGN AND DEVELOPMENT	3	CO1	Understand the principles of creativity in Design	1													1	1			
				CO2	Analyze Economics in Design	2														2	2		
				CO3	Apply Modelling techniques for a product	2															2	2	
				CO4	Determine the cost of product and know the significance to product design	2																1	1
76	16ME 40A3	BIOMECHANICS OF TISSUES AND JOINTS	3	CO1	Understand the concepts of Biomechanics	1														1	1		
				CO2	Apply biomechanics to analyse Tissues and structural systems	2															2	2	
				CO3	Analyze joints using Biomechanics theory	2																2	2
				CO4	Apply kinematic mechanisms to human motion	2																	2
77	16ME 40A4	MECHATRONICS	3	CO1	Identify appropriate sensors and actuation system for a given application.			1												1	1		

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				CO2	Identify appropriate microcontroller for a given application and to build a mathematical Model of system for evaluating open loop system performance and behavior.	1													1	1
				CO3	Suggest an appropriate closed loop control strategy to attain the desired system behavior.	2													1	1
				CO4	Suggest a Mechatronic product design for a given application and evaluate its performance.							2							1	1
78	16ME 40A5	ROBOTICS	3	CO1	Understand the concept of robotics with respect to their anatomy, classification end effectors.	1													1	1
				CO2	Analyze a suitable sensor for robotic system design with respect to their applications.	2													2	2
				CO3	Analyze control system for robot control			2											2	2
				CO4	Ability to select the robot configuration for robot applications				2										1	1
79	16ME 40A6	CONDITION MONITORING	3	CO1	Understand the types of Maintenance Techniques	1													1	1
				CO2	Diagnose fault through Vibration Monitoring	2													1	1
				CO3	Interpret the Faults through Thermal Monitoring or Lubricant Analysis	2													1	1
				CO4	Apply sensors for condition monitoring	2													2	2

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80	16ME 5001	ADVANCED HEAT & MASS TRANSFER	3	CO1	Understand 1-D steady state conduction heat transfer	1	1											1	1			
				CO2	Apply principles of Heat Transfer to develop Mathematical model for ducts and plates	2	2													2	2	
				CO3	Analyze free and forced convection problems	2	2														2	2
				CO4	Apply concepts of radiation heat transfer for enclosure analysis	1	1														2	2
81	16ME 5003	INCOMPRESSIBLE AND COMPRESSIBLE FLOWS	3	CO1	Understand the fundamental concepts of continuum mechanics and shock wave theory	1												1	1			
				CO2	Apply techniques for analyzing inviscid incompressible flow problem		2													2	2	
				CO3	Apply techniques for analysis of laminar and turbulent boundary layer flows		2														2	2
				CO4	Apply techniques for analysis of unsteady compressible flows.		2														2	2
82	16ME 5002	COMPUTATIONAL FLUID DYNAMICS	3	CO1	Understand Fundamentals of CFD and Derive the governing equations	2	2											1	1			
				CO2	Apply different CFD techniques to diffusion	2	2													2	2	
				CO3	Application of time integration methods for convection diffusion	2	2														1	1
				CO4	Solving N-S equations and Modeling of turbulence	2	2														1	1
83	16ME 5004	MECHANISMS DESIGN AND	3	CO1	Understand Kinematic principles and Structures	1	1										1	1				

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		SIMULATION		CO2	Analyze mechanisms in linkages Robotic manipulator	2	2													2	2		
				CO3	Draw Inflection circle for coupler curves	1	1														1	1	
				CO4	Synthesize curve based mechanism and Cam mechanisms	2	2														1	1	
84	16ME 5005	ADVANCED MECHANICS OF SOLIDS	3	CO1	Analyze Stress, strain in a deformable bodies	2	2														2	2	
				CO2	Apply Energy Methods to calculate deflections in members	1	1															2	2
				CO3	Analyze Stresses, deflections in Straight and Curved beams	2	2															2	2
				CO4	Determine contact stresses and deflection of bodies in contact	1	1															1	1
85	16ME 3126	INDUSTRIAL ENGINEERING TECHNIQUES	3	CO1	Apply various work-study techniques to determine the standard time and efficiency.		2															2	2
				CO2	Analyze various quality control techniques for bringing out the best quality output.		2															2	2
				CO3	Apply various production scheduling techniques to optimize productivity & Forecast the future demand for the product		2															2	2
				CO4	Apply various strategies to optimize the Inventory cost		2															2	2
86	16ME 3118	OPERATIONS RESEARCH	3	CO1	Identify Optimum solutions for various single objective problems using Linear Programming models		2															1	1

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				CO2	Identify Optimum Solutions through Transportation and Assignment models	2													1	1
				CO3	Identify Optimum Solutions through Game theory, DPP, Queuing theory & Simulation models	2													1	1
				CO4	Solve project management problems using CPM, PERT and Crashing	2													2	2
87	16ME 3127	ENGINEERING MANAGEMENT	3	CO1	Apply various management concepts to solve real life problems	2													2	2
				CO2	Analyze various Economic Evaluation of alternatives and Depreciation methods	2													2	2
				CO3	Analyze various quality control techniques for bringing out the best quality output.	2													2	2
				CO4	Apply various strategies to optimize the Inventory cost	2													2	2
88	16ME 3128	WORK STUDY & ERGONOMICS	3	CO1	Calculate the basic work content of a specific job for employees of an organization. Thereby they will be able to calculate the production capacity of man power of an organization.	2													1	1
				CO2	Analyze the existing methods of working for a particular job and develop an improved method through questioning technique by using various recording techniques	2													2	2

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				CO3	Apply ergonomic principles in the workplace or other environment	2												2	2
				CO4	Apply various plant layout and production systems to optimize productivity.	2												2	2
89	16ME 3129	OPERATIONS MANAGEMENT	3	CO1	Calculate future demand for the product in the market by applying appropriate forecasting technique.	2												1	1
				CO2	Apply various plant layout and production scheduling techniques to optimize productivity.	2												2	2
				CO3	Apply various production scheduling techniques to improve productivity.	2												2	2
				CO4	Analyze various quality control techniques for bringing out the best quality output.	2												2	2

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**K L University**  
Department of Petroleum Engineering

**University Vision and Mission Statements**  
**2016 - 17**

**University Vision:**

To be a globally renowned university

**University Mission:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**University Vision and Mission Statements**

**2016 - 17**

**Department Vision:**

To educate and train Graduates who can undertake active research in Petroleum Engineering besides providing quality professional service to oil and gas industry while protecting the environment.

**Department Mission:**

- To Provide student centric quality learning environment that empowers the student to complete globally for careers in government PSU sector, industry, R&D and high studies.
- Establish and maintain persistent relationships with Oil and gas, Chemical and Petro Chemical industries and universities of repute to have relevant contemporary curriculum design, collaborative research proposals and to cultivate opportunities for students and faculty.
- To build the department as a model research centre of international repute with excellent research environment for faculty and student.

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**K L University**  
Department of Petroleum Engineering

- To develop state of art consultancy centre solve industrial problem in the field of Petroleum refinery, Oil and gas, Chemical & Petro Chemical industries, Hazardous & Safety, Environmental pollution etc.

**PROGRAM EDUCATIONAL OBJECTIVES (PEO's)**  
**2016 – 17**

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

Three to six years after graduation, graduates who choose to practice in Petroleum engineering should be able to

- Have a successful diverse career path in the Petroleum Industry
- Continue professional development through participation and leadership in professional organizations (SPE, API, SPG).
- Pursue lifelong learning through continuing education or postgraduate education (professional meetings, short courses, graduate courses).
- Progress to professional registration so that some individuals graduate from an ABET-accredited degree plan, pass the Fundamentals of Engineering Exam, work in increasingly responsible engineering positions, and pass the Professional Exam.

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**K L University**  
 Department of Petroleum Engineering  
 PROGRAM OBJECTIVES (PO'S) / PROGRAM SPECIFIC OUTCOMES (PSO'S)  
 2016 – 2017

<b>PO No</b>	<b>Description</b>
a	an ability to apply knowledge of mathematics, science, and engineering
b	an ability to design and conduct experiments, as well as to analyze and interpret data
c	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d	an ability to function on multidisciplinary teams
e	an ability to identify, formulate, and solve engineering problems
f	an understanding of professional and ethical responsibility
g	an ability to communicate effectively
h	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i	a recognition of the need for, and an ability to engage in life-long learning
j	a knowledge of contemporary issues
k	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
<b>PSO No</b>	<b>Description</b>
1	An ability to understand the basic components of petroleum exploration and production operation
2	An ability to analyze and design solutions for petroleum engineering operations

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 MAPPING OF PEO's WITH THE MISSION OF THE DEPARTMENT  
 2016 – 17

		M 1	M 2	M 3	M 4
		<b>Key components From Department Mission</b>		student centric quality learning environment that empowers the student to complete globally for careers	Persistent relationships with Oil and gas, Chemical and Petro Chemical industries and universities of repute to have relevant contemporary curriculum design, collaborative research
PEO 1	Successful diverse career path in petroleum industry	✓			✓
PEO 2	Professional development through participation and leadership		✓	✓	✓
PEO 3	Lifelong learning though higher educations	✓	✓	✓	✓

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PEO 4	Progress to professional registration from a aggregated degree plan	✓		✓	✓
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**Department of Petroleum Engineering**  
**MAPPING OF PEO's WITH THE PO's OF THE DEPARTMENT**  
**2016 – 17**

Key components		PEO 1	PEO 2	PEO 3	PEO 4
		Successful diverse career path in petroleum industry	Professional development through participation and leadership	Lifelong learning through higher educations	Progress to professional registration from a aggregated degree plan
PO a	apply knowledge of mathematics, science, and engineering	✓			
PO b	Design and conduct experiments, as well as to analyze and interpret data			✓	✓
PO c	Design a system, component, or process to meet desired needs within realistic constraints	✓			✓
PO d	Function on multidisciplinary teams		✓		
PO e	Identify, formulate, and solve engineering problems	✓			✓
PO f	Understanding of professional and ethical responsibility		✓	✓	
PO g	Communicate effectively		✓		
PO h	Education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context			✓	
PO i	Recognition of the need for, and an ability to engage in life-long learning			✓	
PO j	Knowledge of contemporary issues		✓		
PO k	Use the techniques, skills, and modern engineering tools necessary for engineering practice	✓	✓	✓	✓
PSO 1	Understand the components of petroleum exploration and production operations	✓	✓	✓	✓
PSO 2	Analyze and design solutions for petroleum engineering operations	✓		✓	✓

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 MAPPING OF CO's WITH THE PO's OF THE DEPARTMENT  
 2016 – 17

**2016-2020 BATCH Course Outcomes**

**Course Articulation Matrix**

Course Code	Course Title	S NO	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	PSO 1	PSO 2		
15EN1101	RUDIMENTS OF COMMUNICATION SKILLS	1	CO1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills							1								
			CO2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar								1							
			CO3	Understand the types of texts and tone of the author.									1						
			CO4	Understand the importance of interpersonal skills									1						
15GN1002	HUMAN VALUES	2	CO1	realize and understand the basic aspiration, harmony in the human being.						2									
			CO2	envisage the roadmap to fulfill the basic aspiration of human beings.							2								
			CO3	analyze the profession and his role in this existence.							2								
15EN1202	INTER PERSONAL COMMUNICATION SKILLS	3	CO1	Understand the method of identifying the meaning of words and apply them in contexts.							2								
			CO2	Understand and analyze different cultures and the importance of empathy in cross-cultural communication.				1											

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	<b>ECOLOGY AND ENVIRONMENT</b>		CO3	Understand and analyze seven techniques of reading and improve reading speed.										2							
			CO4	Understand and apply writing strategies in office/ formal communication											2						
15GN1001	<b>ECOLOGY AND ENVIRONMENT</b>	4	CO1	Understand the importance of Environmental education and conservation of natural resources										2							
			CO2	Understand the importance of ecosystems and biodiversity.													1				
			CO3	Understand the knowledge on solid waste management, disaster management and EIA process														1			
15 EN 2103	<b>PROFESSIONAL COMMUNICATION SKILLS</b>	5	CO1	Apply the various strategies of presentation Skills.										2							
			CO2	Analyze the given topics and situations and applying the strategies of group discussion.											2						
			CO3	Analyze the basic concepts of critical and analytical reading skills.												2					
			CO4	Apply the strategies of sentence formation and sentence completion.												2					
15 EN 2204	<b>EMPLOYABILITY SKILLS</b>	6	CO1	Analyze one's own strength as a speaker / Communicator and use discretion while listening										3							
			CO2	Apply and analyze various concepts of writing strategies in professional communication skills like, reports, resume and minutes of the meeting.												3					

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			CO3	Understand the organization of the passage and also analyze the tone, attitude and style of the author							2	3						
			CO4	Acquire knowledge of and apply people skills in various social organizational and corporate ambiances							2							
15 EN 3105	VERBAL AND QUANTITATIVE REASONING	7	CO1	Understand the method of identifying synonyms and antonyms analyze the meaning of a word from the context									1					
			CO2	Analyze issues and arguments in the process of critical reasoning and apply grammar rules to correct sentences										1				
			CO3	Apply the Concepts of basic Algebra and their importance while solving the problems										1				
			CO4	Apply the short-cut methods on the concepts of different models in Calendars, Clocks, Blood relations and various types of arrangements										1				
15 EN 3206	CORPORATE COMMUNICATION SKILLS	8	CO1	Understand and analyze the depth of a topic and use the advanced levels in creative speaking and debating									2					
			CO2	Understand and analyze various strategies involved in writing an essay and apply various styles in writing										3				
			CO3	Understand and analyze the given text critically and answer questions on critical reasoning based on the given information									2					

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			CO4	Acquire knowledge on various employability skills & analyze a situation and develop adaptability													3					
			CO5	Apply the Concepts of basic geometry and their importance while solving the problems													3	3				
15MT100 1	SINGLE VARIABLE CALCULUS AND MATRIX ALGEBRA	9	CO1	Model physical laws and relations mathematically as a first order differential equations, solve by an appropriate method and interpret the solution.													1					
			CO2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by an appropriate method and interpret the solution.															1			
			CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve differential equations.																1		
			CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values																	1	
			CO5	Verify the solution of problems through MATLAB.																	1	
15PH1001	ENGINEERING MATERIALS	10	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.			1															

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			CO2	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.			1													
			CO3	Understands role of molecular vibrations in determining thermal properties of materials and deformation of materials in response to action of load, for identification of materials having specific engineering applications.			1													
			CO4	Understands spin and orbital motion of electrons in determining magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.			1													
			CO5	Apply the knowledge on structure and properties of materials while executing related experiments and develop some inter disciplinary projects.			1													
15MT120 3	MULTIVARIATE CALCULUS	11	CO1	Determine extreme values for functions of several variables				1												
			CO2	Determine area, volume through multiples integrals				2												
			CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length, areas of surfaces and volume of solids in practical problems										2						
			CO4	Obtain analytical and numerical solutions of Heat and wave					2											

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			equations																	
			CO5	Verify the solution of problems through MATLAB												2				
15CY1001	ENGINEERING CHEMISTRY	12	CO1	Examine water quality and select appropriate purification technique for intended problem			1													
			CO2	Predict potential complications from combining various chemicals or metals in an engineering setting			1													
			CO3	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena			1													
			CO4	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes			1													
			CO5	An ability to analyze & generate experimental skills			1													
15ME100 1	MECHANICS	13	CO1	Understand the concept of forces and apply the static equilibrium equations.	1															
			CO2	Analyze co-planar and non co-planar system of forces.	2															
			CO3	Apply the concept of centroid & centre of gravity to determine moment of inertia.					1											
			CO4	Analyze the rigid bodies under translation and rotation with and without considering forces.					1											

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			CO5	Understand the engineering systems to prepare and demonstrate the models with the help of mechanics concept to solve the engineering problems.	2														
15BT1001	BIOLOGY FOR ENGINEERS	14	CO1	Understand the basis of Life, Living organisms and human body systems								1		1					
			CO2	Understand the importance of Diet and Nutrition								1		2					
			CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors								1		2					
15CS1001	C PROGRAMMING AND DATA STRUCTURES	15	CO1	Illustrate how problems are solved using computers and programming.	2														
			CO2	Interpret & Illustrate user defined C functions and different operations on list of data.	2														
			CO3	Implement Linear Data Structures and compare them.					2										
			CO4	Implement Binary Trees.					2										
			CO5	Apply the knowledge obtained by the course to solve real world problems.													2		
15GN1004	INTRODUCTION TO ENGINEERING	16	CO1	Understand the basic principles of engineering design								1							
			CO2	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.									2						
			CO3	Understand the aspects of critical thinking and problem solving in engineering									2						

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			CO4	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such problems from engineering perspective														3						
15ME100 2	ENGINEERING GRAPHICS	17	CO1	Draft Orthographic views, projections of planes and , solidsmanually and by using CAD software Tool (AutoCAD)															1					
			CO2	Drafting Sectional views , Isometric views ,development of surfaces and perspectives views manually and by using AutoCAD																	2			
			CO3	Draft Development of surfaces of solid and sections of solid Manually																		2		
			CO4	Practicing house wiring through Auto Cad																		2		
			CO5	Develop 2D & 3D components using Auto Cad Software		2																		
15GN1003	MEASURMENTS	18	CO1	Understand and apply the fundamentals of a measurement system, characteristics, transducers and metrology using simulation and experimentation tools.	1	1																		
			CO2	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.	2	2																		

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			CO3	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.	2	2												
			CO4	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.	2	2												
			CO5	Apply the theoretical concepts to measure different parameters		2												
15 PE 1001	THERMODYNAMICS OF RESERVOIR FLUIDS	19	CO1															1
			CO2		2													
			CO3		2													1
			CO4		2													
15CS2002	OBJECT ORIENTED PROGRAMMING	20	CO1	Understand Basic Concepts of OOP, introduction to classes and objects through Java Language and apply					1									
			CO2	Understand the concepts of constructors, Overloading, parameter passing, access control, Inheritance and apply					2									
			CO3	Understand Packages, Interfaces, and Exception, Handling and apply					2									

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			CO4	Understand I/O Streams & apply and understand Basic Concepts of Multi –Threading													2				
			CO5	Apply OOP concepts for developing an application													3				
15PE2101	Momentum Transfer	21	CO1	Apply the concepts of fluid statics, kinematics and dynamics to analyze fluid flows					2									2	2		
			CO2	Learn and apply the momentum and energy conservation equations for flow of incompressible fluids					2										2		
			CO3	Understand the fluid flow through porous media					2												2
			CO4	Learn various techniques of transportation and metering of fluids by applying the energy conservation equation.					2											2	2
			CO5	Apply and analyze the theoretical concepts of fluid flow through experiments		2														2	2
15PE2102	Material & Energy Flow Computation	22	CO1	Understand the fundamental laws of conservation and apply the material balance equation for single unit non-reactive systems		1												1	1		
			CO2	Apply the material balance equation for multi-unit reactive as well as non-reactive systems		2			1										2	2	2
			CO3	Apply the energy balance equation for processes involving temperature effects and analyze various processes in which combined material and energy flow computations are applicable		2			2										2	2	2

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			CO4	Apply the Combined material and Energy balance of the industrial problems	2										2	2	2		
15PE2103	Geology Petroleum Engineers	23	CO1	understand origin, structure and composition of earth basics of minerals, major rock types and their formation, classification, description and structures, texture of sedimentary rocks and their significance	1												2		
			CO2	understand the mechanism of lithification and diagenesis of sedimentary rocks concepts of facies and their depositional environment	1													2	
			CO3	understand servoir rocks, their properties, composition of oil , gas and oil filed waters	2														2
			CO4	Understand origin and occurrence of petroleum, trapping mechanism of petroleum and gas, migaration and accumlation, petroliferous basins, geological history, resources of hydrocarbons	2														2
			CO5	Demonstrarte identification of rocks, their structures and textures	3														
15PE2104	Drilling Engineering	24	CO1	understand the role of drilling engineers, well planning, rotary drilling methods and apply the general calculation to rig selection	2												2		
			CO2	Ability to design the casing string and drill string	2												2	3	

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			CO3	understand the types of drilling fluids, its characteristics and its applications, determine the drilling fluid properties and design the rig hydraulics, apply the general calculations to cementing operations	2													2	3				
			CO4	Apply well control to stabilize the well and analyze the problems occurring during the and also apply the directional drilling techniques to drill a well	2														2	3			
			CO5	Design the drilling fluid for the wells with different conditions.		2																	
15PE2205	Petroleum Exploration Methods	25	CO1	Formation of hydrocarbons in subsurface of the earth, technology used for finding out their presences by using geological survey methods															1	1			
			CO2	Geochemical methods of exploration and magnetic methods to find out the structure deposits	1																2		
			CO3	Finding out the sedimentary rocks by using Gravity and seismic methods	1																	2	
			CO4	using advance technology of seismic like 3D, 4D finding out faults, production rate or flow rate etc.	2																	3	1
15PE2206	Reservoir Engineering	26	CO1	Understand the role of reservoir engineers, rock and fluid properties, Apply the PVT analysis to reservoir fluids. Estimate the rock and fluid properties	1														1				

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			CO2	Ability to apply the fluid flow equation to the porous media for different conditions	2												2	2			
			CO3	Ability to measure the reservoir potential through use of different tools such as volumetric and material balance methods in estimating reservoir performance with water influx	2													2	2		
			CO4	Ability to estimate the reservoir life through decline curve analysis and effects of foreign fluids on reservoir performance	3													3			
			CO5	Perform the experiments to estimate the reservoir rock and fluid properties.		2												3	2		
15PE3109	Petroleum Production Engineering - I	27	CO1	Able to identify the well head and understand completion techniques	3													3			
			CO2	Able to perforate and activate the well for allowing reservoir fluid to flow to the well bore	3														3		
			CO3	Able to stimulate well for improving the flow at well bore	3															3	1
			CO4	Able to identify well production problems and rectifying them through work over jobs	3																3
15PE2208	Heat & Mass Transfer	28	CO1	Understand and apply the principle of modes of heat transfer														1			
			CO2	Analyze various heat transfer equipment	1															3	2

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			CO3	Understand and apply the principle of Mass transfer	1														1			
			CO4	Analyze various Mass transfer equipment	1															2		
			CO5	Apply the theoretical concepts to conduct various experiments of heat transfer and Mass practically and analyse the data						2												
15 CE 2105	Surveying	29	CO1	Apply the knowledge of plane surveying for computation of angles in a traverse	1																	
			CO2	Calculate the differences in elevation using differential levelling techniques and preparation of contour plan	2																	
			CO3	Computation of areas of field and volume of earthwork	3																	1
			CO4	Apply the knowledge of theodolite and tacheometric survey, and total station for calculation of height of building																	2	2
			CO5	Able to perform field experiments and analyse the data making use of equipments	3																2	2
15 PE 2207	WELL COMPLETIONS AND TESTING	30	CO1	Understand the well completion techniques for different types of wells	1														1	1		
			CO2	Understand and apply the fluid flow equation in porous media to well test analysis, apply the principles of superposition, Horner's approximation	1																1	1

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			CO3	Ability to apply Pressure Transient Tests to determine the petro-physical properties. Ability to apply drill stem test for the well	2										2	2	3		
			CO4	Ability to apply type curves for well test analysis, understand and apply well testing to gas reservoirs	2										2	2	3		
15 PE 3110	NATURAL GAS ENGINEERING & PROCESSING	31	CO1	Understand the formation, origin and properties of natural gas and the importance of unconventional resources													1		
			CO2	Analyse the Gas compression system and flow measurement system of processing plants														3	
			CO3	Analyse processing principles and surface production operations of LPG, CNG system	3												1	3	
			CO4	Characterise the transportation and various storage operations of natural gas and conservation of Natural Gas	3												2	3	2
15 PE 3111	PETROLEUM FORMATION EVALUATION	32	CO1	Ability to apply of SP LOG, Caliper log, Gamma ray log, NSG log, resistivity log, Focused resistivity log, Micro resistivity log to the formation evaluation													1	2	
			CO2	Ability to apply the principles of Density log, Neutron log, sonic log, Cased hole logging, dip meter log , Image logging to the formation evaluation															2

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			CO3	Ability to apply the NMR logging, production logging techniques, Mud logging, coring to the formation evaluation	3													3	1		
			CO4	Ability to apply the interpretation techniques to identify the reservoir properties	3				2									3	1		
15 PE 3112	OIL AND GAS TRANSPORTATION AND STORAGE	33	CO1	Understand the modes of transportation. Ability to design pipeline under the consideration of fluid flow	2																
			CO2	Ability to design of pipeline under mechanical consideration. Understand Construction and Maintenance of pipelines																2	
			CO3	Design pigging system in a pipeline			2	3												2	1
			CO4	Design of offshore pipelines			2	3												2	1
15 PE 3113	PETROLEUM REFINING PROCESS AND TESTING	34	CO1	Analyze the formation, origin and pre-primary processing of petroleum refining	3														1		
			CO2	Design of distillation column and advanced treatment techniques of the petroleum fractions			1													2	
			CO3	Analyze the secondary processing of crude oil and advanced methods of extraction of petroleum fractions	3															2	
			CO4	Characterize the process of oil movement and storage operations			1														3
			CO5	Examine the properties of petroleum fractions by testing methods		2															2

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15 PE 3214	PETROLEUM PRODUCTION ENGINEERING-II	35	CO1	Understand production system, GGS, CTF, and GCS for on shore and off-shore production. And also understand the importance of metering equipment	2													1				
			CO2	Design of oil field processing separators																2	3	
			CO3	Design of oil field treatment equipment																2	3	
			CO4	Understand the off-shore sub-sea production operations																1		
15 PE 3215	PETROCHEMICAL TECHNOLOGY	36	CO1	Learn about the overall petrochemical industry, study and analyse the production of various petrochemicals from C1 compounds	3														1			
			CO2	Learn and analyze the key aspects of production of chemicals from C2 compounds, and their derivatives.																1		
			CO3	Learn analyze various methods of production of chemicals from C3 and C4 compounds, and their derivatives																	2	
			CO4	Learn analyze about the aromatic industry and the derivatives																	3	1
15 PE 3216	ENVIRONMENT HEALTH & SAFETY MANAGEMENT	37	CO1	Understand Health Hazards in Petroleum Production Refining and Utilization															3	2		
			CO2	Understand Safety System used in chemical and petroleum industry																3	2	
			CO3	Understand Environment concepts in petroleum industry																2		

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			CO4	Understand Offshore Environmental Considerations						3				1		2				
15 PE 3217	PETROLEUM ECONOMICS AND ASSET MANAGEMENT	38	CO1	Understand the global, Indian oil and gas industry.				2						2		1				
			CO2	Apply the Evaluation methods to the upstream project management									1				2			
			CO3	Apply the project parameters to evaluate the oil and gas industry	3										2				2	
			CO4	Understand the sources of uncertainty and risk management				3						2	1			1	2	
15 IE 3250	Term Paper	39				2	2	3						2	2		2			
15 IE 4049	Minor Project	40				2							2		2	2	2			
15 IE 4050	Major Project	41				3	3	3		1					3	3	3			
15 IE 4048	Industrial Practice School	42					3			3	3				3	3	3			
	Industrial Training (Summer Break in II to III year)	43						2			2			2		2	2			
15 PE 3251	ENHANCED OIL RECOVERY	44	CO1	Understand flood patterns, microscopic and macroscopic displacement of fluids, water flooding, gas flooding techniques	2													1		
			CO2	Understand and apply high pressure gas injection, LPG flooding, CO2 flooding for oil recovery, alcohol flooding						2										1
			CO3	Understand and apply, Microbial flooding, polymer flooding for oil recovery	2															2

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			CO4	Understand and apply thermal recovery process to reservoirs to increase recovery efficiency and Case Study	2														2		
15 PE 3252	REFINING PROCESS, MODELING & SIMULATION	45	CO1	Understand the process synthesis and flow sheeting					2												
			CO2	Analyze the Atmospheric distillation unit by modeling and simulation	2															2	
			CO3	Analyze the Vacuum distillation unit by modeling and simulation	2																2
			CO4	Evaluate various process by predictive modeling														2			3
15 PE 4153	RESERVOIR MODELLING AND SIMULATION	46	CO1	Understand modelling concepts, designing the reservoir models for different types of reservoirs											1				1		
			CO2	Ability to apply the reservoir rock and fluid properties to the modelling equations for different grid and time step sizes						3										1	
			CO3	Ability to apply the reservoir simulation techniques to well management, production performance							3										1
			CO4	Understanding the special simulation processes	2												1				3
15 PE 4154	CO <sub>2</sub> CAPTURE AND SEQUESTRATION	47	CO1	Understand the importance of CO <sub>2</sub> sequestration, properties, absorption, membrane separation											2				2		
			CO2	Understand the importance of CO <sub>2</sub> sequestration, Geological screening, reservoir characterization													2				2

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			CO3	Apply the production and injection aspects and Geological Modelling for CO <sub>2</sub> sequestration										2					2		
			CO4	Understand the economic evaluation of CO <sub>2</sub> sequestration	2									2				2			
15 PE 4155	UNCONVENTIONAL RESOURCES	48	CO1	Understand the CBM formation, coal thermodynamics, exploration and production of CBM											1			2			
			CO2	Understand the gas hydrate formation, properties of gas hydrates, phase behavior, kinetics of formation												1			2		
			CO3	Understand the gas hydrate reservoirs drilling and completions techniques, production techniques	3															2	
			CO4	Understand of shale gas extraction method and production methods												2				2	
15 PE 4156	OFFSHORE DRILLING AND PRODUCTION OPERATIONS	49	CO1	Understand the sea state, weather, Buoyancy and stability of the sea waves	2																
			CO2	Understanding of fixed and mobile units used in the offshore drilling and production							2								2		
			CO3	Apply the drilling, completion and production techniques in the Offshore								2							2	2	
			CO4	Understand the deep water technology and offshore safety regulation	2														2	2	
15 PE 4157	GEOTHERMAL RESERVOIR ENGINEERING	50	CO1	Understand Geothermal system and Quantitative models applied to the estimation of reservoirs	3									2							

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			CO2	Apply the Interpretation of downhole measurements for well design and Measurement during the drilling										2					2		
			CO3	Apply the well completion, Heating and Production Testing Methods to the Reservoirs										2					2		
			CO4	Apply well stimulation Techniques to the Geothermal Reservoirs.										2					3	2	
15 PE 4158	GAS TO LIQUID TECHNOLOGIES	51	CO1	Understand the development technologies in Gas to Liquid Technologies										1							
			CO2	Understand the GTL Technologies and GTL Projects	2														2	1	
			CO3	Understand the Economics of GTL Technologies							1										
			CO4	Understand the Potential Impacts of the GTL Technologies	3											1				3	
15 PE 4159	PROCESS EQUIPMENT DESIGN	52	CO1	Design of heat transfer equipment	2										3				2	3	
			CO2	Design of Re-boilers, vaporizers and evaporators	2												3			2	3
			CO3	Design of distillation column for single and multi-components	2												3			2	3
			CO4	Design of pressure vessels	2												3			2	3
15 PE 4160	MULTIPHASE FLOWS	53	CO1	Understand the importance of multiphase flows and their patterns	2															2	
			CO2	Apply the multiphase theory on homogenous and separated flow models													3			2	

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			CO3	Apply the separated model for the stratified and annular flows			3														
			CO4	Apply the hydrodynamic theory to the solid-liquid and gas liquid flow and understand the three phase flow mechanisms	2											2		3			
15 PE 4161	LNG TECHNOLOGIES	54	CO1	Understand the LNG characteristics, supply chain of LNG	2													1			
			CO2	Apply the natural gas liquefaction technique to the onshore and offshore terminals. And analysis of natural gas Liquefaction Cycles					2									1			
			CO3	Optimize the Natural Gas Liquefaction Cycle					2									2		2	
			CO4	Analyze the Regasification Terminal Operations for KNG recovery and also understand the environmental aspects of LNG Production	2													2		2	
15 PE 4162	COMPLETION AND WORKOVER FLUIDS	55	CO1	Understand the completion and workover operations					3									2			
			CO2	Understand the fluid selection criteria and completion reclamation	2													2			
			CO3	Apply the completion and workover fluids to control formation damage						3											3
			CO4	Understand the health, safety and environment aspects of completion and workover fluids	2		2												2		
15 PE 4163	ARTIFICIAL LIFT TECHNIQUES	56	CO1	Design of SRP for production improvement					2									1			
			CO2	Design of Gas Lift for production						2									1	2	

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		improvement															
	CO3	Design of ESP and Hydraulic pump systems for production improvement	2				2								1		2
	CO4	Design of Progressive Cavity Pumping, plunger lift and Hydraulic jet pumping for production improvement	2				2								1		3

**K L UNIVERSITY**  
**DEPARTMENT OF ARTS**  
**PROGRAM DEVELOPMENT DOCUMENT**  
**B.A**  
**2016**

**Vision of the University**

To be a globally renowned university.

**Mission of the university:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**VISION of the Department**

To be an excellent centre for promoting students towards Civil service Examinations in addition to Arts and Humanities

**MISSION of the Department**

To impart quality education for enriching the inherent qualities of students by implementing sufficient inputs and to make them competent to appear for Civil services and other competitive examinations

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**Program Educational Objectives (PEOs)**

1. Graduates of this programme shall be provided comprehensive competitive examination oriented training which facilitates them succeed in UPSC Civil services and State public service examinations.
2. To increase inclination for higher studies and research in social sciences.
3. To inculcate leadership and administrative abilities for their future career.

**Program Objectives(POs)**

S.No.	Program Objectives(POs)
<b>a</b>	An ability to understand socio, cultural and economic aspects of Indian History
<b>b</b>	An ability to Acquire latest trends in Public Administration
<b>c</b>	Gain comprehensive knowledge in the respective domains.
<b>d</b>	Gain knowledge in General knowledge and current events
<b>e</b>	Equip skill in Quantitative aptitude and reasoning
<b>f</b>	Develop analytical thinking and Communication skills.
<b>g</b>	Act efficiently as a leader in the diverse areas of the profession.

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**MAPPING OF POs/PSOs with Mission:**

S.No.	Program Educational Objectives(PEOs)	M1	M2	M3
1	Graduates of this programme shall be provided comprehensive competitive examination oriented training which facilitates them succeed in UPSC Civil services and State public service examinations	√		√
2	To increase inclination for higher studies and research in social sciences.	√	√	
3	To inculcate leadership and administrative abilities for their future career.		√	

**MAPPING OF POs/PSOs with PEOs:**

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S.No.	Program Objectives(POs)	Program Educational Objectives(PEOs)		
		1	2	3
<b>a</b>	An ability to understand socio, cultural and economic aspects of Indian History	√	√	
<b>b</b>	An ability to Acquire latest trends in Public Administration	√	√	√
<b>c</b>	Gain comprehensive knowledge in the respective domains.	√	√	
<b>d</b>	Gain knowledge in General knowledge and current events	√		
	Equip skill in Quantitative aptitude and reasoning			
<b>e</b>	Develop analytical thinking and Communication skills.	√		
<b>f</b>	Act efficiently as a leader in the diverse areas of the profession.	√	√	
<b>g</b>	An ability to understand socio, cultural and economic aspects of Indian History	√		√

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**DEPARTMENT OF ARTS**  
**Course Outcomes 2016**  
**Course Articulation Matrix**

Course Code	Course Title	S NO	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g
15EN1101	RUDIMENTS OF COMMUNICATION SKILLS	1	CO1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills						2	
			CO2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar						2	
			CO3	Understand the types of texts and tone of the author.					1		
			CO4	Understand the importance of interpersonal skills						2	
16GN11T1	Telugu-1	2	CO1	To acquire knowledge of prescribed texts in ancient Telugu poetry			1			2	
			CO2	To acquire knowledge of prescribed texts in modern Telugu poetry			1			2	
			CO3	To acquire skills of Grammer in Telugu language						1	
16GN11H1	Hindi-1	3	CO1	To acquire knowledge of prescribed texts in modern prose in Hindi language			1			2	
			CO2	To acquire knowledge of prescribed texts of short stories in Hindi language			1			2	

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			CO3	To acquire skills of Grammer in Hindi language								1	
16BA1101	Ancient Indian History	4	CO1	To gain knowledge in Pre-historical aspects from early civilizations to religious movements of sixth century BC	2							1	
			CO2	To acquire knowledge of socio political conditions of Magadha and Mourya Period	2							1	
			CO3	To acquire knowledge of socio political conditions of post Mouryan Period in north India	2							1	
			CO4	To gain knowledge of socio political conditions of South India during Medieval period	2							1	
16BA1102	Micro Economics	5	CO1	Understand different methodologies used in Economics and Demand Elasticity analysis.			2						
			CO2	Understand cost structures and production functions			2						
			CO3	Understand different market structures and market competitions.			2						
			CO4	Understand different production factors with their pricing theories.			2						
16BA1103	Public Administration	6	CO1	Understand the basic concepts of Public Administration	2								
			CO2	Gain basic knowledge in the Principles of Administration and Public relations	2						2	1	
			CO3	Gain Knowledge in the concept of Governance	2								
			CO4	Acquire Knowledge in the Modern Public Administration.	2								

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16BA1104	Physical Geography	7	CO1	Acquire Knowledge of I, II and III order of landforms			2			
			CO2	Gain knowledge in basic concepts of Geomorphology			2			
			CO3	Acquire Knowledge of basic concepts of Oceanography			2			
			CO4	Understands basic concepts of Human and Eco Geography			2			
15EN1202	INTER PERSONAL COMMUNICATION SKILLS	8	CO1	Understand the method of identifying the meaning of words and apply them in contexts.						2
			CO2	Understand and analyze different cultures and the importance of empathy in cross-cultural communication.						2
			CO3	Understand and analyze seven techniques of reading and improve reading speed.						2
			CO4	Understand and apply writing strategies in office/ formal communication						2
16GN12T2	Telugu-2	9	CO1	To acquire knowledge of prescribed texts in ancient Telugu poetry			1			2
			CO2	To acquire knowledge of prescribed texts in modern Telugu poetry			1			2
			CO3	To acquire skills of Grammer in Telugu language						1
16GN12H2	Hindi-2	10	CO1	To acquire knowledge of prescribed texts in modern prose in Hindi language			1			2
			CO2	To acquire knowledge of prescribed texts of short stories in Hindi language			1			2

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			CO3	To acquire skills of Grammer in Hindi language								1	
16BA1201	Medieval Indian History	11	CO1	To acquire knowledge of socio political conditions of early medieval history of India	2								
			CO2	To gain knowledge of socio political conditions of sultanate Period	2								
			CO3	To acquire knowledge of socio political conditions of Moghal Period	2								
			CO4	To gain knowledge of socio religious movements in India	2								
16BA1202	Macro Economics		CO1	Understand concepts related to National Income and Employment.			2						
			CO2	Understand concepts of consumption and Investment functions			2						
			CO3	Understand concepts of money and Banking in India			2						
			CO4	Understand concept of trade cycles-cause, effect, measures.			2						
16BA1203	Administrative Theory	13	CO1	Understand the basic concepts of Classical and Scientific management approaches		2							
			CO2	Understand the basic concepts of Bureaucratic and human relation theories		2						1	

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			CO3	Gain Knowledge in the concept of Administrative Behavior.	2				1	
			CO4	Acquire Knowledge in the concepts of Motivation and Leadership.	2				1	2
16BA1204	Human Geography	14	CO1	Gain Knowledge of Human Geography, Areal differentiation, man versus environment relations.			2			
			CO2	Acquire Knowledge about the agricultural typologies, food and nutrition problems			2			
			CO3	Understand the causes of growth, over, under and optimum population environmental issues, problems of urbanization etc.			2			
			CO4	Understand the region –types, regional imbalances, environment issues, development strategies etc.			2			

HOD

Dept of Arts

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**KL University Vision**

To be a globally renowned university.

**K L University Mission :**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

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Deemed to be University, Estd. u/s 3 of UGC Act, 1956  
Accredited by **NAAC** as 'A' Grade University ❖ Approved by **AICTE** ❖ **ISO 9001-2008 Certified**  
**Campus:** Greenfields, Vaddeswaram - 522 502, Guntur District, Andhra Pradesh, INDIA.  
Phones: +91-8645-246948, 246615 Fax: +91-8645-247249.  
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**KLUBS BUSINESS SCHOOL**

**KLUBS VISION**

To be a Centre of excellence for value based management education.

**KLUBS MISSION**

1. To attain leadership in management education, research and consultancy.
2. To nurture the students industry ready and
- 3.To make them responsible citizens of nation.

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**OBJECTIVES**

- a. To nurture young students to be effective managers capable of contributing value to organizations.
- b. To contribute to the body of knowledge through research and publications.
- c. To provide consultancy to industry for value creation by applying contemporary management concepts, theories and practices.
- d. To be a socially responsible business management and commerce education provider.

**KLUBS VISION & MISSION MAPPING**

KL University Vision	KLUBS Vision	
	To be a Centre of excellence	To impart value based management education
To be a globally renowned university	✓	✓

KL University Mission	KLUBS MISSION				
	To attain leadership in management education	To attain leadership in Research	To attain leadership in Consultancy	To nurture the students industry ready	To make the students as a responsible citizen of nation.

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To impart quality higher education	✓				
To undertake research and extension with emphasis on application and innovation		✓			
To cater the emerging societal needs through all-round development of students of all sections			✓	✓	
To enable students to be globally competitive and socially responsible citizens with intrinsic values					✓

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**K L University**  
Department of Petroleum Engineering  
**KLU BUSINESS SCHOOL**  
**BBA PROGRAM**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOS)**

To be a globally renowned university, as per our vision, we need to produce quality products (graduates) into the market who have potential strengths to meet all the professional and personal challenges prevailing at global levels and who can serve in all the possible positions of their respective job domains and contribute towards holistic growth of their respective employment providers as well as the nation, world. The graduates must also possess cutting edge R&D skills in their domain areas.

This, is exactly what has been framed into the University's Mission and thereby the Mission has converged into the following **Program Educational Objectives (PEOs)** which are best suited to Undergraduate Management program, and are those that compliment the university vision, mission.

**PROGRAM EDUCATIONAL OBJECTIVES**

- A. To educate the business graduates to respond effectively in meeting the competitive business needs of the society.
- B. To nurture the spirit of Entrepreneurship among the students that propagates the business world.
- C. To train the students in emerging as efficient managers equipped with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.

These PEOs are designed to be attained by all the graduates within 3 years of their graduation.

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**PROGRAM OUTCOMES (POs):**

<b>PO</b>	<b>Description</b>
<b>a. Core Business Knowledge</b>	Demonstrate competency in the underlying concepts, theory and tools taught in the core undergraduate curriculum.
<b>b. Critical Thinking skills</b>	Able to define, analyze and devise solutions for multifunctional business problems and issues in the areas like Marketing, Finance, Human Resources and Production.
<b>c. Global Perspective</b>	Identify and analyze relevant global factors that influences decision making in International Business Perspective
<b>d. Investigation of complex problems</b>	An ability to use research-based knowledge and research methods including design of innovative processes, analysis and interpretation of data and synthesis of the information to obtain solutions to organizational problems
<b>e. Application of Statistical and Analytical tools</b>	Ability to create, select and apply appropriate analytical tools, techniques and methods in the modern management activities.
<b>f. The Manager and society</b>	Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional management practices.
<b>g. Legal Environment and sustainability</b>	Ability to demonstrate the knowledge of contemporary issues in legal aspects, understanding and reporting their impact on societal and environmental contexts, leading towards sustainable organizational development through entrepreneurial orientation.
<b>h. Ethics &amp; Corporate Social Responsibility</b>	An ability to apply ethical principles and commit to professional ethics and responsibilities and norms of management practice. Identify and analyze ethical conflicts and social responsibility issues involving different stakeholders.

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<b>PO</b>	<b>Description</b>
<b>i. Individual and Team Work</b>	An ability to perform different roles effectively as an individual and a member or leader in diverse teams and in multi-disciplinary streams with entrepreneurial edge.
<b>j. Communication</b>	Ability to communicate effectively oral, written reports and graphical forms on complex managerial and administrative activities.
<b>k. Project Management and Finance</b>	Ability to demonstrate knowledge and understanding of the business and operational activities and having sound knowledge in the financial aspects and applying those concepts to manage projects in multi-disciplinary environments.
<b>l. Lifelong Learning</b>	An ability to recognize the need for and having the preparation and ability to engage independent and life-long learning in global context of technological and organizational change.

**PROGRAM SPECIFIC OUTCOMES –BBA PROGRAM**

1. Graduates will develop a goal-oriented sense of business purpose.
2. Graduates will be able to excel in their chosen career by experiential learning, critical and analytical thinking.

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**MISSION - PEO MAPPING**

**BBA PROGRAM**

<b>PEO</b>	<b>MISSION</b>				
	To attain leadership in management education	To attain leadership in Research	To attain leadership in Consultancy	To nurture the students industry ready	To make the students as a responsible citizen of nation.
To educate the business graduates to respond effectively in meeting the competitive business needs of the society.	✓	✓		✓	✓
To nurture the spirit of Entrepreneurship among the students that propagates the business world.	✓			✓	

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To train the students in emerging as efficient managers	✓	✓	✓	✓	✓
To equip with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.	✓	✓	✓	✓	✓

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**K L University**  
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**K L U BUSINESS SCHOOL**  
**BBA PEO – PO MATRIX**

PO	PEO		
	To educate the business graduates to respond effectively in meeting the competitive business needs of the society	To nurture the spirit of Entrepreneurship among the students that propagates the business world.	To train the students in emerging as efficient managers equipped with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.
<b>a. Core Business Knowledge</b>	✓		
<b>b. Critical Thinking skills</b>			✓
<b>c. Global Perspective</b>		✓	✓
<b>d. Investigation of complex problems</b>			✓
<b>e. Application of Statistical and Analytical tools</b>	✓		✓
<b>f. The Manager and society</b>		✓	
<b>g. Legal Environment and sustainability</b>	✓	✓	
<b>h. Ethics &amp; Corporate Social Responsibility</b>	✓		
<b>i. Individual and team work</b>			✓

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<b>j. Communication</b>			✓
<b>k. Project management and finance</b>	✓	✓	
<b>l. Lifelong learning</b>	✓	✓	✓

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**KLU BUSINESS SCHOOL**

**BBA-MBA INTEGRATED PROGRAM**

**CO-PO ARTICULATION MATRIX AY 2016-17**

S. No.	Course code	Course Name	L-T-P	Cr	Course Outcomes	PO											PSO			
						a	b	c	d	e	f	g	h	i	j	k	l	1	2	
I																				
1	15HS109	English Language Skills I	2-2-0	3	Write effective drafts for self improvement														3	
					Speak effectively that help individual development														3	
					Develop professional behaviors' in work contexts.														3	
					Improve their personality and accommodate himself/herself in different contexts														3	
2	15BS114	Business Mathematics	3-2-0	4	Functions, different types of functions and limit of a function	3				1										
					Differentiate the functions using standard derivatives and rules of differentiation and determine the points of maxima		2													

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					and minima														
					Use matrices and matrix operations various business and economics related problems such as resource allocation, input-output analysis.		2												
					Use simple and compound interest to do business calculations such as value of money, present and future value and be able to differentiate which method should be used for different problems.		3												
3	15ES119	Introduction to IT	1-0-4	3	Understand the basic use of computer hardware and software, networks, and the Internet in the workplace and apply the acquired skills and concepts in the professional assignments.							3							
					Apply the knowledge of networks for effective business operations expansions.							3							
					Analyze business communication with effective use of Word and Excel.							3							
					Create business databases and dashboards using MS-Excel and MS-Access applications							3							
4	15HS110	Human Skills	3-0-0	3	Enhanced use of basic abilities in organizational scenarios and self-analysis									2	3	1			
					Appropriate use of Written and Oral Communication in Business world										3				
					Appropriate use of Written and Oral Communication in Business world									2		1			

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					Development of interpersonal skills to succeed in the modern business world													1				
5	15BB11C4	Perspectives of Management	3-0-0	3	Apply the key management concepts along with an insight into skills and functions of managers	3																
					Implement various tools and processes used in planning	3																
					Develop hands on in-depth knowledge and insight into organization and staffing related Issues	3																
					Analyze the link between planning and controlling, and the various means of directing, controlling thereby developing the ability to resolve managerial issues and problems.	3																
6	15BB11K5	Business Communication	2-2-0	3	Write effective drafts for self improvement																	
					Prepare effective reports and proposals that help individual development.																	
					Develop professional behaviours in work contexts.																	
					Perceive organizational culture and accommodate himself/ herself in different cultural contexts																	

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1	15HS111	English Language Skills II	2-2-0	3	Write effective drafts for self improvement														3				
					Speak effectively for individual development														3				
					Develop professional behaviours in work contexts.														3				
					Improve their personality and accommodate himself / herself in different contexts														3				
2	15BB12C1	Introduction to Financial Accounting	3-4-0	5	Understand and apply different methods of depreciation to find out the net value of assets	3														2			
					Understand and apply various methods of marinating accounts of branches	3																	
					Understand and Apply various bases of allocation of common expenses and incomes while preparing departmental accounts																2		
					Analyze final statements of a company																2		
3	15BS115	Business Statistics	3-4-0	5	Capable to calculate and interpret basic descriptive statistics	3																	
					Calculate probabilities for simple events from a variety of random experiments or surveys and describe basic probability distributions	3																	

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					Understand and be able to perform statistical inference in the form of confidence intervals and hypothesis tests	3					1								
					Identify the appropriate trends in the evaluation, analysis and prediction in business decisions						1								
4	15BB12C3	Indian Business Environment	3-0-0	3	Understand different business environments in which various organizations operate.	3					2	1							
					Identify different factors affecting the day-to-day operations of the Business.						2								
					Develop decision-making ability in real time business situations.							1							
					Develop operational and analytical skills to tackle business problems in different sectors.						2	1							
5	15BB12C4	Managerial Economics	3-0-0	3	Measure the responsiveness of consumers' demand to changes in the price of a good or service, the price of other goods and services, and income.	3						1							
					Understand the different costs of production and how they affect short and long run decisions	3						1							

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					Categorize any real world market as being competitive, oligopolistic, or monopolistically competitive and to describe to a non-economist how that market structure affects firm decisions.	<b>3</b>													
					Analyze different types of competition that exist in external environment.							1							
6	15HS112	Environment Science	3-0-0	2	Understand the natural environment and its relationships with human activities.							1	3						
					Understand the principles of ecology and environmental issues that apply to air, land, and water issues							1	3						
					Demonstrate an understanding of current environmental challenges.								3						
					Analyze the social, economic, and political and policy dynamics involved in both the emergence and the resolution of environmental problems and restoration of degraded environments														
												1	3						
1	15BB21C0	Macro Economics	3-0-0	3	Analyze the macro economy using national income and aggregate demand and aggregate supply analysis	<b>3</b>							<b>1</b>						

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				Understand the causes and effects of inflation and unemployment.	3													
				Analyze monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run.						1								
				Understand how comparative advantage provides the basis for gains through trade						1								
2	15BB21C1	Financial Accounting	4-2-0	5	Understand and apply different methods of depreciation to find out the net value of assets	3										2		
					Understand and apply various methods for maintaining accounts of branches.	3												
					Understand and Apply various bases of allocation of common expenses and incomes while preparing departmental accounts											2		
					Analyze financial statements of a company	3										2		
3	15BB21C2	Business Law	3-0-0	3	The students will be able to understand and apply the law relating to formation, performance and discharge of contracts and special contracts.	1					3							
					The students will be able to acquire legal knowledge relating to transactions involving Sale of Goods and also apply appropriate remedies available under the Act						3							
					The students will be able to comprehend the use of negotiable instruments ie. Promissory Notes, Bills of Exchange and Cheques. The students will also be able to create new instruments, discharge their liabilities and avail	1												

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					their rights under the instruments effectively.														
					The students will be able to understand the nature of partnership and also appreciate the law governing relationship between the partners and working of partnership														
4	15BB21K3	Foreign Language	2-1-0	3	Learn vocabulary, pronunciation and different accents														
					Understand grammar														
					Understand and create different kinds of messages in French in various experiential situations for a variety of purposes.														
					Students will apply knowledge of the French language for specific communication needs.														
5	15BB21C4	Statistical Data Analysis	1-0-4	3	Understand the basic terminology and environment in SPSS														
					Understand different levels of measurement and Permissible statistics in SPSS														
					Apply the ability to build the databases in SPSS														
					Analyze the data through Descriptive and inferential statistics for various levels of measurement in SPSS. Verifying through Lab														
6	15BB21C5	International Business	3-0-0	3	Analyze international factors that affect business decisions														

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		Environment																	
					Practice regional economic integration and political integration.														
					Analyse issues involved in managing International finance and HR.														
					Evaluate Cognitive knowledge of global issues, to internationalise business.														
1	15BB22C0	Company Law	3-0-0	3	Understand the Procedure Relating to Convening and Proceedings of meeting in a company prescribed by companies act of 2013.	1													
					Analyze different sources of the capital and the role and responsibilities of various parties involved in it.														
					Analyze the procedures involved in Reconstruction, rehabilitation and amalgamation under various modes.	1													
2	15BB22C1	Financial Management	4-2-0	5	Understand on basics of management of business finance	3												2	1
					Evaluate the long term and short term investment decisions	3													

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					Evaluate the financial and divided decisions by using different techniques of valuation	3											2			
					Determine the working capital requirements in order to maintain optimum level of working capital in the organization												2	1		
3	15BB22C2	Business Report Writing	2-2-0	3	The students will be able to understand the basics of verbal communication, non-verbal communication, developing professional telephonic skills, Improving Informal communication, making formal presentation and working with customers												3	1		
					The students will be able to understand e-mail messages and memos, uncovering the secrets of clear writing, develop reports and proposals, write professional letters and for employment.												3			
					The students will be able to understand how reports enable the authorities to take timely decisions and may be used for further analysis.														1	
					The students will be able to understand the importance of Reading, listening skills, oral presentations, note making, barriers to effective listening.												3			
4	15BB22C3	Taxation	3-4-0	5	Understand the fundamental principles of Income tax	1											3			
					Find various incomes which are exempted from Income tax												3			
					Calculate Residential status and incidence of tax.	1														

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					Gain Knowledge to compute Income under five heads									3							
5	15BB22C4	Business Research Methods	4-2-0	5	Understand and independently apply the research process to business problems.							3	2								
					Evaluate different statistical methods that are applicable to specific research problems.							3									
					Take data driven business decisions								2								
					Analyze organizational data using software packages							3									
6	15HS115	Soft Skills I	2-0-2	3	understand the importance of business conversation, Verbal and non verbal cues in conversation, stress full conversation.													3			
					understand the importance of general awareness, how to build up the confidence, how he should be adaptable, personal grooming.													3			
					understand the importance of effective listening skills, Concept of motivation, different types of motivational theories, positive and negative attitude, social dilemmas faced in general.													3			
					understand the Importance of Group discussion, handling emotions, problem solving ability, develop the persuasive skills in order to realize their dreams.													3			

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1	15BB31CO	Management Accounting	4-2-0	5	Understand the concept of management accounting and financial statement analysis.	3											2			
					Analyze the ratios, funds flow and cash flows and applying those techniques for the analysis of financial health of the organisation.	3														
					Design, evaluate, and submit budget reports to the top management for proper financial decisions												2			
					Execution and evaluation of company financial reports with the help of Management Accounting.	3											2			
2	15HS116	Soft Skills 2	1-0-4	3	The students will be able to use the effective language to convey clear business message to achieve a predetermined purpose, develop self discipline and should have a dressing sense in different occasions.												3			
					The students will be able to understand the importance of telephone, email, dining, office manners so that they can able to succeed in careers and in business.												3			
					The students will be able to analyze the importance of all types of communication like Intra,												3			

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					interpersonal communication, team building, ability to talk in a group.														
					The students will be able to understand the importance of cross cultural communication, power of negotiation, assertiveness, becoming professional in all spears of life.														3
3	15BB31C2	Organization al Behaviour	3-0-0	3	Ability to manage people with an understanding of Individual behavior.	1								2	3				
					Ability to manage groups with an understanding of the Group behavior and leadership.										3				
					Ability to motivate in competitive business environment									2					
					Ability to perceive organizational culture and implement organization Change and Development interventions.	1								2					
4	15BB31C3	Marketing Management	3-0-0	3	Explain the key terms, definitions, and concepts used in the study of Marketing Management.	3	1												
					Apply the knowledge of marketing concepts to analyze changing marketing environment and factors influencing success in the market	3													

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					Evaluate the effectiveness of marketing decisions and their applicability in a given environment		1												
					Create better marketing programs and strategies basing on the knowledge of Marketing concepts	3	1												
5	15BB31C4	Business Case studies	2-4-0	4	The students is able to demonstrate problem solving skills to evaluate corporate and unit strategies in the organization by the end of the semester.		3		2										
					Analyze various types of organizations and evaluation of various plans in the organization		3												
					Design, evaluate, recommend, and submit budget reports to the top management in order to take complex decisions.				2										
					Coping with ambiguities		3												
6	15BB31C5	Project Management	3-2-0	4	Apply knowledge and skills to manage the project scope, project time and work flow, project cost and budgets, project resources, project quality, project human resource requirements, project communication (reports, meetings, correspondence, etc.) project changes and project risk													3	

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					management.														
					Problem solving skills														3
					Usage of analytical tools which enhance their quantitative skills.														3
					The role of a Decision maker in complex situations														3
1	15BB32C0	Operations Management	3-2-0	4	Illustrate the general concepts of overall plant and production management using appropriate analysis tools	3			2										1
					Establish methods for maximizing productivity and understand the purpose of setting and attaining high levels of throughput, quality, and customer service	3													1
					Optimize the use of resources which include: people, plant, equipment, tools, inventory, premises and information systems				2										1
					Make the best use of computers to achieve maximum efficiency, especially in the planning and control of operations	3													

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2	15BB32C1	Human Resource Management	3-0-0	3	Integrated perspective on role of HRM in modern business	3								2				
					Ability to plan human resources and implement techniques of job design	3												
					Competency to recruit, train, and appraise the performance of employees									2				
					Rational design of compensation and salary administration and ability to handle employee issues									2				
3	15BB32C2	Management Information Systems	3-0-0	3	Understand the information needs of an organization and a business function.					3								
					Evaluate effectiveness of decision making process and identify it's tools.					3								
					Apply DSS techniques for effective decisions					3								
					Design parameters for MIS application, for data analysis uses.					3								
4	15BB32C3	Innovation & Entrepreneurship	3-0-0	3	Explain and apply the key terms, definitions, and concepts used in the study of Innovation and Entrepreneurship Development					3					2			

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				Demonstrate how as an entrepreneur he can use the concepts of Innovation, to create new product , services and business processes				3										
				Construct a well structured business plan by including all the necessary elements of the business plan														2
				Demonstrate how as an entrepreneur he can use the concepts of Entrepreneurship, to develop a new entrepreneurial organization				3										2
5	15BB32C4	Strategic Management	4-0-0	4 Articulate a vision that gives meaning to all the firm's stakeholders of the firm's objectives		3				2		1						
				Formulate a strategic plan that operationalizes the goals and objectives of the firm		3												
				Identify the resource endowments specific to the firm and those that are homogeneous to industry participants						2		1						
				Evaluate and revise programs and procedures in order to achieve organizational goals		3						1						
6	15BB32C7	Management of SME's	3-0-0	3 Develop analytical and critical thinking skills necessary to make sound financial decisions in business														3

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				and personal arenas.															
				Exhibit risk management skills necessary to succeed in challenging environment															3
				Apply sound business and economic principles to successfully launch and effectively manage SMEs.															3
				Design a well-presented business plan and model that is feasible for SME startup.															3

**UNIVERSITY VISION**

*To be a globally renowned university.*

**UNIVERSITY MISSION**

*To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.*

**COLLEGE OF LAW**

**VISION**

- To be a centre of excellence in legal education and research*

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2. *To be a catalyst in law reforms.*

**MISSION**

1. *To impart and disseminate knowledge of law and legal processes;*
2. *To develop among students and scholars of law a sense of social responsibility to serve the community in the field of law.*

Program – Bachelor of Business Administration and Law (BBA; LL.B)

Duration – Five Years

Started in Academic Year 2015-2016

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

1. Should be able to stimulate compassion and creativity in the field of legal profession.
2. Strengthen intellectual growth and the capacity to develop ingenious and conscientious solutions to unique and varying tribulations of society and business environment.
3. Acquire leadership capabilities necessary for the competent practice of law and lifelong learning in practice
4. Pursue advanced education, research and development, and other innovative and pioneering efforts in the field of law.

**PROGRAM OUTCOMES (POs)**

The BBA; LL.B program in KL University is designed to meet the Program Outcomes as identified by Bar Council of India. These constitute a superset of program outcomes identified by National Assessment and Accreditation Council.

- a) Ability to gain knowledge of law and the application of such knowledge in practice;
- b) Be proficient to use the fundamentals and vital principles in law;
- c) Identify and solve the social, economic and cultural issues in law;
- d) Ability to synthesis academic knowledge to legal problems and find solutions;
- e) Recognize the ethical and professional responsibilities and the norms of advocacy ;

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Department of Petroleum Engineering

- f) Ability to research, review, comprehend and utilize such knowledge for Law reform;
- g) Converse effectively and work in inter-disciplinary groups and legal institutions;
- h) To guide the trainee legal practitioners in the right direction;
- i) Ability to understand the real life situation in legal profession and practice;
- j) To make the student to learn aesthetically pleasing practice and make it socially relevant;

PSOs

- k) To equip skills required to deal with a fast changing business environment and legal arena (PSO1);
- l) To acquaint with technological developments and to make suitable changes in the field of law and legal profession(PSO2)

 <b>K L University</b> <small>U/3 of UGC Act, 1956 Koneru Lakshmaiah Education Foundation</small>		<b>College of law</b>
<b>Mission vs Program Educational Objectives</b>		
<b>PEO's</b>	<b>MISSION-1</b>	<b>MISSION-2</b>
<b>PEO 1</b>	✓	✓
<b>PEO 2</b>	✓	✓

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<b>PEO 3</b>	✓	✓	
<b>PEO 4</b>	✓	✓	

 <b>K L University</b> <small>U/A 3 of UGC Act, 1956 Koneru Lakshmaiah Education Foundation</small>	<b>College of law</b>			
<b>Program Educational Objectives vs Program Outcomes</b>				
	<u>PEO-1</u>	<u>PEO-2</u>	<u>PEO-3</u>	<u>PEO-4</u>
PO 1	✓	✓	✓	✓
PO 2	✓	✓		✓
PO 3	✓		✓	
PO 4			✓	✓
PO 5	✓	✓		✓
PO 6	✓		✓	
PO 7		✓	✓	✓
PO 8	✓	✓		✓
PO 9	✓		✓	
PO 10	✓		✓	✓

KLU COLLEGE OF LAW				PO-CO MAPPING												
S.No	CODE	TITLE	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	
1	15BL11C0	General English and Legal Language	CO1	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	
			CO2	✓	✓	✓		✓	✓		✓	✓	✓	☐	✓	
			CO3	✓		✓	✓		✓	✓	✓	✓			✓	
			CO4	☐	✓	✓	✓	✓		✓	☐	✓	✓		✓	✓
2	15BL11C1	Principles of Management	CO1	✓	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO2	✓	✓			☐		✓	☐		✓	☐		

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			CO3	✓	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	
			CO4	□	✓		✓	✓	✓	✓	✓		✓	✓	✓	
3	15BL11C2	Principles of Economics and Managerial Economics	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO2	✓	□	✓	✓	□	✓	□		✓	□	□	□	
			CO3	✓	✓	✓	□	✓	□	✓	✓	✓	✓	✓	✓	✓
			CO4	□	✓	✓	✓	□	✓	✓	□	✓	✓	✓	✓	□
4	15BL11C3	Law of Torts	CO1	✓	✓	✓	✓	✓	✓	✓	✓	□		□	✓	
			CO2	✓	✓	✓		✓	□		✓	✓	✓	✓	✓	
			CO3	□			✓		✓	✓	✓	✓	✓	✓	□	
			CO4	✓	✓		✓	✓	□	✓		□	✓	✓	✓	✓
5	15BL11C4	Law of Contracts – I	CO1	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
			CO2	✓		✓	✓		✓	✓	✓	✓		✓		
			CO3	□	✓	✓	✓	✓	□	✓	✓		✓	□	✓	
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	15BL11C5	Introduction to Law and Legal system	CO1	✓	✓		✓		✓	✓		✓	✓			
			CO2	✓	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	
			CO3	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	15ES119	Introduction to I.T	CO1	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
8	15BL12C0	Legal Professional Communication Skills (English – II)	CO1	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
			CO2	✓			✓		✓	✓	✓	✓	✓	✓		
			CO3	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	
			CO4	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
9	15BL12C1	Human Resource Management	CO1	✓		✓	✓		✓	✓	✓	✓		✓		
			CO2	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	

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			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO4	✓	✓		✓		✓	✓		✓	✓			
10	15BL12C2	Business Environment	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO2	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO4	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
11	15BL12C3	Corporate Law	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			CO4	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
12	15BL12C4	Law of Contracts – II	CO1	✓			✓		✓	✓	✓	✓	✓	✓		
			CO2	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	
			CO3	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
			CO4	✓		✓	✓		✓	✓	✓	✓		✓		
13	15BL12C5	Legal and Constitutional History	CO1	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO3	✓	✓		✓		✓	✓		✓	✓			
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
14	15BL12C6	Cyber Security	CO1	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO3	☐	✓	✓	✓	✓	✓	✓		✓	✓	☐	✓	
			CO4	✓	✓	☐	✓	✓	☐	✓	✓	✓	✓	✓	✓	✓
15	15BL21C0	Marketing Management	CO1	✓	✓	✓	✓	✓	✓	☐	✓	✓	✓	✓	✓	
			CO2	☐	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			CO3	✓	✓	✓		✓	✓		✓	✓	✓	☐	✓	
			CO4	✓			✓		✓	✓	✓	✓	✓	✓		
16	15BL21C1	Macro Economics	CO1	✓	✓		✓	✓	☐	✓		✓	✓	✓	✓	
			CO2	☐	✓	✓		✓	✓		✓	✓	✓	☐	✓	
			CO3	✓		✓	✓		✓	✓	✓	✓		✓		
			CO4	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	

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17	15BL21C2	Financial and Cost Accountancy	CO1	✓	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	
			CO2	□	✓		✓		✓	✓		✓	✓			
			CO3	✓	✓	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓
			CO4	✓	□		□	✓	□	✓	✓		□	✓	✓	
18	15BL21C3	Constitutional Law – I	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO2	□	✓	✓	✓	✓	✓	✓		✓	□	✓	✓	
			CO3	✓	✓	□	□	□	✓	□	□	✓	✓	□	□	
			CO4	✓	□	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	
19	15BL21C4	Law of Crimes – I	CO1	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
			CO2	□	✓	✓		✓	✓		□	✓	✓	✓	✓	
			CO3	✓			✓		✓	✓	✓	□	✓	□		
			CO4	✓	✓		✓	✓	□	✓		✓	✓	✓	✓	
20	15BL21C5	Family Law – I	CO1	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
			CO2	□		✓	✓		✓	✓	✓	✓		✓		
			CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
			CO4	✓	□	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	
21	15BL22C0	Dynamics of Social Change	CO1	✓	✓		✓		✓	✓		✓	✓			
			CO2	□	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO3	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
			CO4	✓	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	
22	15BL22C1	Financial Management	CO1	✓	□	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			CO2	□	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
23	15BL22C2	Management Information Systems	CO1	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
			CO2	✓			✓		□	✓	✓	✓	✓	✓		
			CO3	□	✓		✓	✓	✓	✓		✓	✓	✓	✓	
			CO4	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
24	15BL22C3	Constitutional Law – II	CO1	✓		✓	✓		□	✓	✓	✓		✓		

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			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO3	□	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO4	✓	✓		✓		✓	✓		✓		
25	15BL22C4	Administrative Law	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO2	✓	□		✓	✓	✓	✓		✓	✓	✓
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO4	□	✓	✓	✓	✓	✓		✓	✓	✓	✓
26	15BL22C5	Family Law – II	CO1	✓	✓	✓	✓	✓	□	✓	✓	✓	✓	✓
			CO2	✓	□	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
			CO4	✓	✓	✓		✓	✓		✓	✓	✓	✓
27	15BL31C0	Organizational behavior	CO1	□			✓		✓	✓	✓	✓	✓	
			CO2	✓	✓		✓	✓	□	✓		✓	✓	✓
			CO3	✓	✓	✓		✓	✓		✓	✓	✓	✓
			CO4	✓		✓	✓		✓	✓	✓		✓	
28	15BL31C1	Management accounting	CO1	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
			CO2	✓	✓	✓	✓	✓	□	✓	✓	✓	✓	✓
			CO3	✓	✓		✓		✓	✓		✓		
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	□	✓
29	15BL31C2	Labour law – i	CO1	□	✓		✓	✓	✓	✓		✓	✓	✓
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO3	✓	✓	✓	✓	✓	□	✓		✓	✓	✓
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	□	✓
30	15BL31C3	Jurisprudence	CO1	✓	✓	✓	✓	✓	✓	✓	□	✓	✓	✓
			CO2	□	✓	✓	✓	✓	□	✓	✓		✓	✓
			CO3	✓	✓	✓		✓	✓		✓	✓	✓	✓
			CO4	✓			✓		✓	✓	✓	□	✓	□
31	15BL31C4	Law of property	CO1	□	✓		✓	✓	□	✓		✓	✓	✓
			CO2	✓	✓	✓		✓	✓		✓	✓	✓	✓
			CO3	✓		✓	✓		✓	✓	✓		□	

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			CO4	<input type="checkbox"/>	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓		✓	✓	✓	
32	15BL31C5	Public international law	CO1	✓	✓	✓	✓	✓	✓	<input type="checkbox"/>	<input type="checkbox"/>	✓	✓	✓	✓	✓	
			CO2	✓	✓		✓		✓	✓		✓	<input type="checkbox"/>				
			CO3	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO4	✓	<input type="checkbox"/>		✓	✓	✓	✓	✓		<input type="checkbox"/>	✓	✓	✓	
33	15BL32C0	Quantitative methods	CO1	<input type="checkbox"/>	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	
			CO2	✓	✓	✓	<input type="checkbox"/>	<input type="checkbox"/>	✓	✓		✓	✓	<input type="checkbox"/>	<input type="checkbox"/>		
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO4	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
34	15BL32C1	Interpretation of statutes	CO1	<input type="checkbox"/>	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓		✓	✓	
			CO2	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		
			CO3	✓			✓		✓	✓	✓	✓	✓	<input type="checkbox"/>			
			CO4	<input type="checkbox"/>	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	
35	15BL32C2	Labour law – ii	CO1	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	
			CO2	✓		✓	✓		✓	✓	✓	✓		✓			
			CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		
			CO4	<input type="checkbox"/>	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	
36	15BL32C3	Law of Banking and N.I.Act	CO1	✓	<input type="checkbox"/>		✓		✓	✓		✓	✓				
			CO2	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓		
			CO3	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	
			CO4	<input type="checkbox"/>	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	
37	15BL32C4	Human rights law	CO1	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	✓		✓	✓	✓	✓	<input type="checkbox"/>	
			CO2	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO4	<input type="checkbox"/>	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓		✓	✓	✓	
38	15BL32C5	Moot Court training-I	CO1	✓	✓	✓		✓	✓		✓	✓	✓	<input type="checkbox"/>	✓		
			CO2	✓			✓		✓	✓	✓	✓	✓	✓			
			CO3	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓		
			CO4	<input type="checkbox"/>	✓	✓		✓	<input type="checkbox"/>		✓	✓	✓	✓	✓	✓	
39	15BL32C6	Mobile device threats &	CO1	✓		✓	✓		✓	✓	✓	✓		✓			

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		investigation	CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO3	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO4	✓	✓		✓		☐	✓		✓	✓	
40	15BL41C0	Intellectual Property Rights	CO1	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓	✓
			CO2	✓	✓		✓	✓	✓	✓		✓	✓	✓
			CO3	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO4	✓	✓	✓	✓	✓	☐	✓		✓	✓	✓
41	15BL41C1	Law of Taxation	CO1	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓	☐
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO3	☐	✓	✓	✓	✓	✓	✓	✓		✓	✓
			CO4	✓	✓	✓		✓	☐		✓	✓	✓	✓
42	15BL41C2	Law of Insurance	CO1	✓			✓		✓	✓	✓	✓	✓	
			CO2	✓	✓		✓	✓	✓	✓		✓	✓	☐
			CO3	✓	✓	✓		✓	☐		✓	✓	✓	✓
			CO4	☐		✓	✓		✓	✓	✓		✓	
43	15BL41C3	Environmental Law	CO1	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	☐	✓
			CO3	✓	✓		✓		☐	☐		✓	✓	
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
44	15BL41C4	Cyber Law	CO1	☐	✓		☐	✓	✓	✓	✓		☐	✓
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO3	✓	✓	✓	✓	☐	☐	✓		✓	✓	☐
			CO4	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓	☐
45	15BL41C5	Seminar – I (Electives)	CO1	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO2	✓	✓	✓	✓	✓	✓	✓	☐		✓	✓
			CO3	✓	✓	✓		✓	☐		✓	✓	✓	✓
			CO4	✓			✓		✓	✓	✓	✓	✓	
46	15BL42C0	Code of Civil Procedure and Law of Limitation	CO1	✓	✓		✓	✓	✓	✓		✓	✓	☐
			CO2	☐	✓	✓		✓	✓		✓	✓	✓	✓
			CO3	✓		✓	✓		☐	✓	✓	✓		✓

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			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
47	15BL42C1	Law of Crimes – II ( Cr.P.C )	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			CO2	✓	✓		✓		✓	✓		✓	✓		
			CO3	✓	☐	✓	☐	✓	☐	☐	✓	✓	☐	✓	✓
			CO4	☐	✓		✓	✓	✓	✓	✓		✓	✓	✓
48	15BL42C2	Law of Evidence	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO2	✓	✓	✓	✓	☐	✓	✓		✓	✓	☐	☐
			CO3	✓	☐	✓	☐	✓	☐	✓	✓	✓	✓	✓	✓
			CO4	☐	✓	✓	✓	✓	✓	✓	✓	☐	✓	✓	✓
49	15BL42C3	Theories of Justice	CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			CO2	☐	✓	✓		✓	✓		✓	✓	✓	✓	
			CO3	✓			✓		✓	✓	✓	✓	✓	☐	
			CO4	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓
50	15BL42C4	Media law & Right to Information Act	CO1	☐	✓	✓		✓	✓		✓	☐	✓	✓	✓
			CO2	✓		✓	✓		✓	✓	✓	✓		✓	
			CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
			CO4	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
51	15BL42C5	Moot Court Training – II	CO1	✓	✓		✓		✓	✓		✓	✓		
			CO2	✓	✓	✓	✓	✓	☐	☐	✓	✓	✓	✓	✓
			CO3	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
52	15BL51C0	Alternate Dispute Resolution	CO1	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
			CO2	✓	✓	✓	✓	✓	✓	☐	✓	✓	✓	☐	✓
			CO3	✓	✓	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓
			CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
53	15BL51C1	Drafting, Pleading and Conveyance	CO1	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
			CO2	✓			✓		✓	✓	✓	✓	✓	☐	
			CO3	✓	✓		✓	✓	☐	✓		✓	✓	✓	✓
			CO4	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓

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54	15BL51C2	Criminology, Penology and Victimology	CO1	✓		✓	✓		✓	✓	✓	✓		✓		
			CO2	✓	✓	✓	✓	✓	✓	✓	□		✓	□	✓	
			CO3	✓	✓	✓	□	✓	□	✓	✓	✓	✓	✓	✓	✓
			CO4	□	✓		✓		✓	✓		✓	✓			
55	15BL51C3	Seminar II ( Electives)	CO1	✓	□	✓	✓	✓	✓	□	✓	✓	□	✓	✓	
			CO2	✓	✓		✓	✓	✓	□	✓		✓	✓	✓	
			CO3	□	✓	✓	□	✓	□	✓	✓	✓	✓	✓	□	✓
			CO4	✓	✓	✓	✓	□	✓	✓		✓	□	✓	✓	□
56	15BL51C4	Seminar III (Electives)	CO1	✓	□	✓	□	✓	✓	□	✓	□	✓	□	✓	
			CO2	□	✓	□	✓	✓	□	✓	□	✓	✓	✓	✓	
			CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓		□	✓	
			CO4	✓	✓	✓		✓	✓		✓	□	✓	✓	✓	
57	15BL52C0	Professional Ethics and Professional Accountancy system	CO1	✓			✓		✓	✓	✓	✓	✓	✓		
			CO2	✓	✓		✓	✓	□	✓		✓	✓	□	✓	
			CO3	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	
			CO4	□		✓	✓		✓	✓	□	✓		✓		
58	15BL52C1	Moot Court Exercises-111	CO1	✓	✓	✓	✓	✓	□	✓	✓		✓	✓	✓	
			CO2	✓	□	✓	□	✓	✓	□	✓	✓	□	✓	✓	
			CO3	✓	✓		✓		□	✓		✓	✓			
			CO4	□	✓	✓	□	✓	✓	✓	✓	□	✓	✓	✓	
59	15BL52C2	Gender Justice and Feminist Jurisprudence	CO1	✓	✓		✓	✓	✓	✓	✓		□	✓	✓	
			CO2	✓	□	✓	✓	□	✓	□	✓	✓	✓	✓	□	
			CO3	✓	✓	✓	□	✓	✓	✓		✓	✓	□	✓	
			CO4	✓	✓	✓	✓	✓	□	✓	✓	□	✓	✓	✓	
60	15BL52C3	Final Internship	CO1	□	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	□	
			CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
			CO3	✓	✓	✓		✓	✓		✓	✓	✓	□	✓	
			CO4	✓			✓		✓	✓	✓	✓	□	✓	✓	

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**KL University Vision**

To be a globally renowned university.

**K L University Mission :**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

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**KLUBS BUSINESS SCHOOL**

**KLUBS VISION**

To be a Centre of excellence for value based management education.

**KLUBS MISSION**

1. To attain leadership in management education, research and consultancy.
2. To nurture the students industry ready and
- 3.To make them responsible citizens of nation.

**OBJECTIVES**

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- e. To nurture young students to be effective managers capable of contributing value to organizations.
- f. To contribute to the body of knowledge through research and publications.
- g. To provide consultancy to industry for value creation by applying contemporary management concepts, theories and practices.
- h. To be a socially responsible business management and commerce education provider.

**KLUBS VISION & MISSION MAPPING**

<b>KL University Vision</b>	<b>KLUBS Vision</b>	
	To be a Centre of excellence	To impart value based management education
To be a globally renowned university	✓	✓

<b>KL University Mission</b>	<b>KLUBS MISSION</b>

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	To attain leadership in management education	To attain leadership in Research	To attain leadership in Consultancy	To nurture the students industry ready	To make the students as a responsible citizen of nation.
To impart quality higher education	✓				
To undertake research and extension with emphasis on application and innovation		✓			
To cater the emerging societal needs through all-round development of students of all sections			✓	✓	
To enable students to be globally competitive and socially responsible citizens with intrinsic values					✓

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**KLU BUSINESS SCHOOL**  
**BBA-MBA INTEGRATED PROGRAM**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOS)**

To be a globally renowned university, as per our vision, we need to produce quality products (graduates) into the market who have potential strengths to meet all the professional and personal challenges prevailing at global levels and who can serve in all the possible positions of their respective job domains and contribute towards holistic growth of their respective employment providers as well as the nation, world. The graduates must also possess cutting edge R&D skills in their domain areas.

This, is exactly what has been framed into the University's Mission and thereby the Mission has converged into the following **Program Educational Objectives (PEOs)** which are best suited to Undergraduate Management program, and are those that compliment the university vision, mission.

**PROGRAM EDUCATIONAL OBJECTIVES**

- D. To educate the business graduates to respond effectively in meeting the competitive business needs of the society.
- E. To nurture the spirit of Entrepreneurship among the students that propagates the business world.

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F. To train the students in emerging as efficient managers equipped with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.

These PEOs are designed to be attained by all the graduates within 3 to 5 years of their graduation.

**PROGRAM OUTCOMES (POs):**

<b>PO</b>	<b>Description</b>
<b>a. Core Business Knowledge</b>	Demonstrate competency in the underlying concepts, theory and tools taught in the core undergraduate curriculum.
<b>b. Critical Thinking skills</b>	Able to define, analyze and devise solutions for multifunctional business problems and issues in the areas like Marketing, Finance, Human Resources and Production.
<b>c. Global Perspective</b>	Identify and analyze relevant global factors that influences decision making in International Business Perspective
<b>d. Investigation of complex problems</b>	An ability to use research-based knowledge and research methods including design of innovative processes, analysis and interpretation of data and synthesis of the information to obtain solutions to organizational problems
<b>e. Application of Statistical and Analytical tools</b>	Ability to create, select and apply appropriate analytical tools, techniques and methods in the modern management activities.

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<b>PO</b>	<b>Description</b>
<b>f. The Manager and society</b>	Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional management practices.
<b>g. Legal Environment and sustainability</b>	Ability to demonstrate the knowledge of contemporary issues in legal aspects, understanding and reporting their impact on societal and environmental contexts, leading towards sustainable organizational development through entrepreneurial orientation.
<b>h. Ethics &amp; Corporate Social Responsibility</b>	An ability to apply ethical principles and commit to professional ethics and responsibilities and norms of management practice. Identify and analyze ethical conflicts and social responsibility issues involving different stakeholders.
<b>i. Individual and Team Work</b>	An ability to perform different roles effectively as an individual and a member or leader in diverse teams and in multi-disciplinary streams with entrepreneurial edge.
<b>j. Communication</b>	Ability to communicate effectively oral, written reports and graphical forms on complex managerial and administrative activities.
<b>k. Project Management and Finance</b>	Ability to demonstrate knowledge and understanding of the business and operational activities and having sound knowledge in the financial aspects and applying those concepts to manage projects in multi-disciplinary environments.
<b>l. Lifelong Learning</b>	An ability to recognize the need for and having the preparation and ability to engage independent and life-long learning in global context of technological and organizational change.

**PROGRAM SPECIFIC OUTCOMES –BBA- MBA INTEGRATED PROGRAM**

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**Department of Petroleum Engineering**

3. Graduates will develop a goal-oriented sense of business purpose.
4. Graduates will be able to excel in their chosen career by experiential learning, critical and analytical thinking.

**MISSION - PEO MAPPING**  
**BBA-MBA INTEGRATED PROGRAM**

PEO	MISSION				
	To attain leadership in management education	To attain leadership in Research	To attain leadership in Consultancy	To nurture the students industry ready	To make the students as a responsible citizen of nation.
To educate the business graduates to respond effectively in meeting the competitive business needs of the society.	✓	✓		✓	✓
To nurture the spirit of Entrepreneurship among the students that propagates the	✓			✓	

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business world.					
To train the students in emerging as efficient managers	✓	✓	✓	✓	✓
To equip with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.	✓	✓	✓	✓	✓

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**K L U BUSINESS SCHOOL**

**BBA- MBA PROGRAM PEO – PO MATRIX**

PO	PEO		
	To educate the business graduates to respond effectively in meeting the competitive business needs of the society	To nurture the spirit of Entrepreneurship among the students that propagates the business world.	To train the students in emerging as efficient managers equipped with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.
<b>a. Core Business Knowledge</b>	✓		
<b>b. Critical Thinking skills</b>			✓
<b>c. Global Perspective</b>		✓	✓
<b>d. Investigation of complex problems</b>			✓
<b>e. Application of Statistical and Analytical tools</b>	✓		✓
<b>f. The Manager and society</b>		✓	
<b>g. Legal Environment and sustainability</b>	✓	✓	
<b>h. Ethics &amp; Corporate Social Responsibility</b>	✓		

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<b>i. Individual and team work</b>			✓
<b>j. Communication</b>			✓
<b>k. Project management and finance</b>	✓	✓	
<b>l. Lifelong learning</b>	✓	✓	✓

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KLU BUSINESS SCHOOL																				
BBA-MBA INTEGRATED PROGRAM																				
CO-PO ARTICULATION MATRIX AY 2016-17																				
S.No.	Course code	Course Name	L-T-P	Cr	Course Outcomes	PO										PSO				
						a	b	c	d	e	f	g	h	i	j	k	l	1	2	
1	15HS109	English Language Skills I	2-2-0	3	Write effective drafts for self improvement											3				
					Speak effectively that help individual development											3				
					Develop professional behaviors' in work contexts.											3				
					Improve their personality and accommodate himself/herself in different contexts											3				
2	15BS114	Business	3-2-0	4	Functions, different types of functions and limit of a function	3				1										

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		Mathematics																	
						Differentiate the functions using standard derivatives and rules of differentiation and determine the points of maxima and minima		2											
						Use matrices and matrix operations various business and economics related problems such as resource allocation, input-output analysis.		2											
						Use simple and compound interest to do business calculations such as value of money, present and future value and be able to differentiate which method should be used for different problems.		3											
3	15ES119	Introduction to IT	1-0-4	3		Understand the basic use of computer hardware and software, networks, and the Internet in the workplace and apply the acquired skills and concepts in the professional assignments.					3								
						Apply the knowledge of networks for effective business operations expansions.					3								
						Analyze business communication with effective use of Word and Excel.					3								
						Create business databases and dashboards using MS-Excel and MS-Access applications					3								
4	15HS110	Human Skills	3-0-0	3		Enhanced use of basic abilities in organizational scenarios and self-analysis							2	3	1				
						Appropriate use of Written and Oral Communication in								3					

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				Business world															
				Appropriate use of Written and Oral Communication in Business world									2	1					
				Development of interpersonal skills to succeed in the modern business world										1					
	15BB11C4	Perspectives of Management	3-0-0	3	Apply the key management concepts along with an insight into skills and functions of managers	3													
					Implement various tools and processes used in planning	3													
					Develop hands on in-depth knowledge and insight into organization and staffing related Issues	3													
					Analyze the link between planning and controlling, and the various means of directing, controlling thereby developing the ability to resolve managerial issues and problems.	3													
	15BB11K5	Business Communication	2-2-0	3	Write effective drafts for self improvement										3				
					Prepare effective reports and proposals that help individual development.										3				
					Develop professional behaviours in work contexts.										3				
					Perceive organizational culture and accommodate himself/ herself in different cultural contexts										3				

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1	15HS111	English Language Skills II	2-2-0	3	Write effective drafts for self improvement															3																																		
					Speak effectively for individual development															3																																		
					Develop professional behaviours in work contexts.															3																																		
					Improve their personality and accommodate himself / herself in different contexts															3																																		
2	15BB12C1	Introduction to Financial Accounting	3-4-0	5	Understand and apply different methods of depreciation to find out the net value of assets	3																																																
					Understand and apply various methods of marinating accounts of branches	3																																																
					Understand and Apply various bases of allocation of common expenses and incomes while preparing departmental accounts																																																	
					Analyze final statements of a company																																																	
3	15BS115	Business Statistics	3-4-0	5	Capable to calculate and interpret basic descriptive statistics	3																																																

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					Calculate probabilities for simple events from a variety of random experiments or surveys and describe basic probability distributions	3													
					Understand and be able to perform statistical inference in the form of confidence intervals and hypothesis tests	3				1									
					Identify the appropriate trends in the evaluation, analysis and prediction in business decisions					1									
4	15BB12C3	Indian Business Environment	3-0-0	3	Understand different business environments in which various organizations operate.	3					2	1							
					Identify different factors affecting the day-to-day operations of the Business.						2								
					Develop decision-making ability in real time business situations.							1							
					Develop operational and analytical skills to tackle business problems in different sectors.						2	1							
5	15BB12C4	Managerial Economics	3-0-0	3	Measure the responsiveness of consumers' demand to changes in the price of a good or service, the price of other goods and services, and income.	3							1						

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					Understand the different costs of production and how they affect short and long run decisions	3						1							
					Categorize any real world market as being competitive, oligopolistic, or monopolistically competitive and to describe to a non-economist how that market structure affects firm decisions.	3													
					Analyze different types of competition that exist in external environment.							1							
6	15HS112	Environment Science	3-0-0	2	Understand the natural environment and its relationships with human activities.							1	3						
					Understand the principles of ecology and environmental issues that apply to air, land, and water issues							1	3						
					Demonstrate an understanding of current environmental challenges.								3						
					Analyze the social, economic, and political and policy dynamics involved in both the emergence and the resolution of environmental problems and restoration of degraded environments														
												1	3						

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1	15BB21C0	Macro Economics	3-0-0	3	Analyze the macro economy using national income and aggregate demand and aggregate supply analysis	3						1						
					Understand the causes and effects of inflation and unemployment.	3												
					Analyze monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run.							1						
					Understand how comparative advantage provides the basis for gains through trade							1						
	15BB21C1	Financial Accounting	4-2-0	5	Understand and apply different methods of depreciation to find out the net value of assets	3											2	
					Understand and apply various methods for maintaining accounts of branches.	3												
					Understand and Apply various bases of allocation of common expenses and incomes while preparing departmental accounts												2	
					Analyze financial statements of a company	3											2	
	15BB21C2	Business Law	3-0-0	3	The students will be able to understand and apply the law relating to formation, performance and discharge of contracts and special contracts.	1						3						
					The students will be able to acquire legal knowledge relating to transactions involving Sale of Goods and also apply appropriate remedies available under the Act							3						
					The students will be able to comprehend the use of negotiable instruments ie. Promissory Notes, Bills of	1												

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					Exchange and Cheques. The students will also be able to create new instruments, discharge their liabilities and avail their rights under the instruments effectively.																
					The students will be able to understand the nature of partnership and also appreciate the law governing relationship between the partners and working of partnership															<b>3</b>	
<b>2</b>	<b>15BB21K3</b>	Foreign Language	2-1-0	<b>3</b>	Learn vocabulary, pronunciation and different accents															<b>2</b>	
					Understand grammar															<b>2</b>	
					Understand and create different kinds of messages in French in various experiential situations for a variety of purposes.															<b>2</b>	
					Students will apply knowledge of the French language for specific communication needs.															<b>2</b>	
<b>3</b>	<b>15BB21C4</b>	Statistical Data Analysis	1-0-4	<b>3</b>	Understand the basic terminology and environment in SPSS															<b>3</b>	<b>2</b>
					Understand different levels of measurement and Permissible statistics in SPSS															<b>3</b>	
					Apply the ability to build the databases in SPSS															<b>2</b>	
					Analyze the data through Descriptive and inferential statistics for various levels of measurement in SPSS. Verifying through Lab															<b>3</b>	

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4	15BB21C5	International Business Environment	3-0-0	3	Analyze international factors that affect business decisions		3				2	1							
					Practice regional economic integration and political integration.		3												
					Analyse issues involved in managing International finance and HR.						2	1							
					Evaluate Cognitive knowledge of global issues, to internationalise business.						2								
1	15BB22C0	Company Law	3-0-0	3	Understand the Procedure Relating to Convening and Proceedings of meeting in a company prescribed by companies act of 2013.		1						3						
					Analyze different sources of the capital and the role and responsibilities of various parties involved in it.								3						
					Analyze the procedures involved in Reconstruction, rehabilitation and amalgamation under various modes.		1												
													3						
2	15BB22C1	Financial Management	4-2-0	5	Understand on basics of management of business finance		3										2		1
					Evaluate the long term and short term investment		3												

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					decisions														
					Evaluate the financial and divided decisions by using different techniques of valuation	3											2		
					Determine the working capital requirements in order to maintain optimum level of working capital in the organization												2	1	
3	15BB22C2	Business Report Writing	2-2-0	3	The students will be able to understand the basics of verbal communication, non-verbal communication, developing professional telephonic skills, Improving Informal communication, making formal presentation and working with customers												3	1	
					The students will be able to understand e-mail messages and memos, uncovering the secrets of clear writing, develop reports and proposals, write professional letters and for employment.												3		
					The students will be able to understand how reports enable the authorities to take timely decisions and may be used for further analysis.													1	
					The students will be able to understand the importance of Reading, listening skills, oral presentations, note making, barriers to effective listening.												3		
4	15BB22C3	Taxation	3-4-0	5	Understand the fundamental principles of Income tax	1											3		
					Find various incomes which are exempted from Income tax												3		

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					Calculate Residential status and incidence of tax.	1													
					Gain Knowledge to compute Income under five heads							3							
5	15BB22C4	Business Research Methods	4-2-0	5	Understand and independently apply the research process to business problems.						3	2							
					Evaluate different statistical methods that are applicable to specific research problems.						3								
					Take data driven business decisions							2							
					Analyze organizational data using software packages						3								
6	15HS115	Soft Skills I	2-0-2	3	understand the importance of business conversation, Verbal and non verbal cues in conversation, stress full conversation.													3	
					understand the importance of general awareness, how to build up the confidence, how he should be adaptable, personal grooming.													3	
					understand the importance of effective listening skills, Concept of motivation, different types of motivational theories, positive and negative attitude, social dilemmas faced in general.													3	
					understand the Importance of Group discussion, handling emotions, problem solving ability, develop the persuasive skills in order to realize their dreams.													3	

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1	15BB31C0	Management Accounting	4-2-0	5	Understand the concept of management accounting and financial statement analysis.	3												2	
					Analyze the ratios, funds flow and cash flows and applying those techniques for the analysis of financial health of the organisation.	3													
					Design, evaluate, and submit budget reports to the top management for proper financial decisions													2	
					Execution and evaluation of company financial reports with the help of Management Accounting.	3												2	
2	15HS116	Soft Skills 2	1-0-4	3	The students will be able to use the effective language to convey clear business message to achieve a predetermined purpose, develop self discipline and should have a dressing sense in different occasions.													3	
					The students will be able to understand the importance of telephone, email, dining, office manners so that they can able to succeed in careers and in business.													3	

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					The students will be able to analyze the importance of all types of communication like Intra, interpersonal communication, team building, ability to talk in a group.											3		
					The students will be able to understand the importance of cross cultural communication, power of negotiation, assertiveness, becoming professional in all spears of life.											3		
3	15BB31C2	Organizational Behaviour	3-0-0	3	Ability to manage people with an understanding of Individual behavior.	1						2	3					
					Ability to manage groups with an understanding of the Group behavior and leadership.								3					
					Ability to motivate in competitive business environment							2						
					Ability to perceive organizational culture and implement organization Change and Development interventions.	1						2						
4	15BB31C3	Marketing Management	3-0-0	3	Explain the key terms, definitions, and concepts used in the study of Marketing Management.	3	1											
					Apply the knowledge of marketing concepts to analyze changing	3												

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					marketing environment and factors influencing success in the market														
					Evaluate the effectiveness of marketing decisions and their applicability in a given environment		1												
					Create better marketing programs and strategies basing on the knowledge of Marketing concepts	3	1												
5	15BB31C4	Business Case studies	2-4-0	4	The students is able to demonstrate problem solving skills to evaluate corporate and unit strategies in the organization by the end of the semester.		3		2										
					Analyze various types of organizations and evaluation of various plans in the organization		3												
					Design, evaluate, recommend, and submit budget reports to the top management in order to take complex decisions.				2										
					Coping with ambiguities		3												
6	15BB31C5	Project Management	3-2-0	4	Apply knowledge and skills to manage the project scope, project time and work flow, project cost and budgets, project resources, project quality, project human resource													3	

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					requirements, project communication (reports, meetings, correspondence, etc.) project changes and project risk management.														
					Problem solving skills														3
					Usage of analytical tools which enhance their quantitative skills.														3
					The role of a Decision maker in complex situations														3
1	15BB32C0	Operations Management	3-2-0	4	Illustrate the general concepts of overall plant and production management using appropriate analysis tools	3			2										1
					Establish methods for maximizing productivity and understand the purpose of setting and attaining high levels of throughput, quality, and customer service	3													1
					Optimize the use of resources which include: people, plant, equipment, tools, inventory, premises and information systems				2										1
					Make the best use of computers to achieve maximum efficiency,	3													

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					especially in the planning and control of operations														
2	15BB32C1	Human Resource Management	3-0-0	3	Integrated perspective on role of HRM in modern business	3												2	
					Ability to plan human resources and implement techniques of job design	3													
					Competency to recruit, train, and appraise the performance of employees													2	
					Rational design of compensation and salary administration and ability to handle employee issues													2	
3	15BB32C2	Management Information Systems	3-0-0	3	Understand the information needs of an organization and a business function.							3							
					Evaluate effectiveness of decision making process and identify it's tools.							3							
					Apply DSS techniques for effective decisions							3							
					Design parameters for MIS application, for data analysis uses.							3							
4	15BB32C3	Innovation & Entrepreneur	3-0-0	3	Explain and apply the key terms, definitions, and concepts used in the study of Innovation and							3						2	

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		ship			Entrepreneurship Development														
					Demonstrate how as an entrepreneur he can use the concepts of Innovation, to create new product , services and business processes				3										
					Construct a well structured business plan by including all the necessary elements of the business plan												2		
					Demonstrate how as an entrepreneur he can use the concepts of Entrepreneurship, to develop a new entrepreneurial organization				3								2		
5	15BB32C4	Strategic Management	4-0-0	4	Articulate a vision that gives meaning to all the firm's stakeholders of the firm's objectives	3					2	1							
					Formulate a strategic plan that operationalizes the goals and objectives of the firm	3													
					Identify the resource endowments specific to the firm and those that are homogeneous to industry participants						2	1							
					Evaluate and revise programs and procedures in order to achieve organizational goals	3						1							
6	15BB32C7	Management	3-0-0	3	Develop analytical and critical thinking skills necessary to make												3		

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		of SME's			sound financial decisions in business and personal arenas.														
					Exhibit risk management skills necessary to succeed in challenging environment													3	
					Apply sound business and economic principles to successfully launch and effectively manage SMEs.													3	
					Design a well-presented business plan and model that is feasible for SME startup.													3	
1	15BB41C0	Business Case Studies	3-2-0	4	Problem solving skills	3		2											
					Usage of analytical tools, quantitative and/or qualitative, depending on the case	3													
					The role of a decision maker in complex situations			2											
					Coping with ambiguities.	3													
2	15BB41C1	Business Ethics & Corporat	3-0-0	3	Gain knowledge about differences between ethics and morals, various					1	3								

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		e Governance			ethical theories														
					Have proficiency about the definition, objectives, natures and sources of ethics.							1							
					Have adequate knowledge in ethical issues in corporate governance, the problems of whistle blowing.								3						
					Become an expert in ethical issues in employer-employee relations, ethical issues in marketing.							1							
1	15BB42N0	Internship		12			3		3	3								3	
2	15BB42P3	Project		8			3		3	3								3	
	15BB51C0	Seminar Course		0-0-6	3	Identify the important areas, which need exchange of information and knowledge.	3												
						Analyze the management secrets and corporate instincts that allow them to											2		

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					thrive and prosper even as others fail														
					Ensure Applied Management Techniques in organizing & Co-ordinating events.														
	15BB51C1	Business Analytics		2-4-0	4	Apply quantitative modeling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques.													
						Apply ethical practices in everyday business activities and make well-reasoned ethical business and data management decisions.													
						Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.													
						Apply principles of Data Science to the analysis of business problems and also Use data mining software to solve real-world problems													

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	15MB52E0	Managem nt Application Project		20			3				3	3									3			
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FUNCTIONAL SPECIALIZATIONS

S.No	Course code	Course Name	L-T-P	C r	Course Outcomes.	PO																	
						a	b	c	d	e	f	g	h	i	j	k	l						
	MARKETING																						
1	15MBx1M0	Consumer Behaviour	3-0-0	3	Apply concepts used in the study of consumer behavior	1	2																
					Apply the knowledge of consumer behavior concepts to analyze changing consumer profiles and factors influencing consumer purchase decision	1	2																
					Apply the knowledge of consumer behaviour to analyse the changing consumer perceptions, attitudes, values and lifestyles and overall behavior		2																
					Create better marketing programs and strategies basing on the knowledge of	1																	

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					consumer behavior														
2	15MBx1M1	Services Marketing	3-0-0	4	Implement the best practices of the Services Marketing	1	2												
					Apply knowledge of Customer Relationship techniques in the corporate world		2												
					Analyze, interpret and solve problems in service Recovery	1													
					Perform lifelong learning and professional development to enrich the services marketing strategies.	1	2												
3	15MBx1M2	International Marketing	3-0-0	3	Assess various foreign markets			3											
					Analyze the impact of cultural, social, political and economic factors on marketing strategies			3											
					Determine when to use different market entry and penetration strategies			3											
					Examine the different skills and systems required to implement marketing strategies across country borders			3											
4	15MBx1M3	Sales and Distribution Management	3-0-0	3	Understand basic concepts of sales management	1	2												

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					Design and implement the strategies for building sales volume.	1	2												
					Evaluate performance of sales force and develop ability to organize and control sales related activities.	1													
					Design distribution network and analyze the performance of channel members.		2												
	15MBx1M4	Digital Marketing	3-0-0	3	Understand the impact of technology on the traditional marketing mix.	3	2												
					Understand how they can use digital marketing to increase sales and grow their business	1	2												
					Analyze the elements of the digital marketing plan	1													
					Apply the core concepts to develop basic digital marketing plan to reach online target market.		2												
	15MBx1M5	Brand Management	3-0-0	3	Describe and identify all the components of Brand Management.	1	2												
					Design, implement and evaluate Branding Strategies.		2												
					Describe and analyze Brand Portfolio and how it can be built and developed.	3													

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				Evaluate sources of “Brand equity” as well as outcomes of “Brand equity”.		3												
	15MBx1M6	Global Marketing Strategy	3-0-0	To understand the changing nature of marketing from purely commercial to social marketing	1	2												
				To analyze the objective sand goals of social marketing		3												
				To analyze the factors which are to be considered while developing social marketing strategies		3												
				To evaluate the importance of designing a message that can influence the mind set of the audience		2												
	15MBx1M7	Social Marketing	3-0-0	To understand the changing nature of marketing from purely commercial to social marketing	1	2												
				To analyze the objective sand goals of social marketing		3												
				To analyze the factors which are to be considered while developing social marketing strategies		3												
				To evaluate the importance of designing a message that can influence the mind set of the audience		1												

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<b>II</b>														
	FINANCE													
1	15MBx1F0	Financial Services and Markets	3-0-0	3	Understand the role and function of the financial system in reference to the macro economy.	2								3
					Demonstrate an awareness of the current structure and regulation of the Indian financial services sector.	2								
					Evaluate and create strategies to promote financial products and services.									3
					Describe the impact that financial innovation, advances in technology, and changes in regulations has had on the structure of the financial firms/industry.	2								3
2	15MBx1F1	Security Analysis	2-1-0	5	Explored to different avenues of investment.	2			1					
					Equipped with the knowledge of security analysis.	2								
					Apply the concept of portfolio management for the better investment.				1					

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					Invest in less risk and more return securities.		2			1								
3	15MBx2	Personal Financial Planning	2-1-0	5	To understand personal financial planning process			3										1
					To analyze tax related decision process for houses and automobiles			3										
					To plan for investments													1
					To formulate retirement plans			3										
4	15MBx1F3	Corporate Taxation	2-1-0	3	Understand the fundamental principles of Income tax			1				3						
					Find various incomes which are exempted from Income tax.			1										
					Calculate Residential status and incidence of tax.							3						
					Gain Knowledge to compute Income under five heads.							3						
5	15MB62F4	Financial Derivatives (Pre-requisite: Security Analysis)	2-1-0	3	Students will be able to analyze the risks in different financial markets.	1		2										
					Acquire the ability to selection of various options and then can apply them to specific markets.			3										

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					The student will be able to strategically manage the financial derivatives.			2										
					The student will be able to analyze various models in order to take wise decisions for improving their wealth	<b>1</b>												
	15MBx1F5	Portfolio Management	2-1-0	3	Explored to different avenues of investment.			1		3								
					Equipped with the knowledge of security analysis.			1		3								
					Apply the concept of portfolio management for the better investment.					3								
					Invest in less risk and more return securities.			1										
	15MBx1F6	Taxation Planning	2-1-0	3	Learn various provisions of set off and carry forward of losses.		1					3						
					Acquaint with Deductions under Sec 80.		1											
					Assess the taxable income of individuals, Partnership firms and Hindu Undivided family.							3						
					Apply various principles of tax planning, avoidance and management.							3						
	15MBx1F7	International Financial Reporting	2-1-0	3	To understand the structure of international Accounting Standards Board		2											

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					To analyze various elements of Financial Statements and its usage			3										
					To analyze the preparation of external Financial Reports for single entities												3	
					To evaluate equity accounting and proportional consolidation of joint ventures												3	
	15MBx1F8	Accounting & Finance for Multinationals	2-1-0	3	To understand the advantages and disadvantages of international Finance												2	3
					To analyze the strategies followed by multinational in Asset – Liability Management												2	
					To analyze the various approaches to transfer pricing adopted by multinationals													3
					To evaluate the need for transnational reporting and disclosure												2	
<b>III</b>																		
	HR																	
1	15MBx1H0	Performance Management System	3-0-0	3	Identifying the elements and describe the purpose of a performance management system			2										1

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					Outline the process of designing and implementing a performance management system	2												
					Identifying different types of reward systems, performance appraisals, analyzing performance through various measuring tools	2			1									
					Developing and implementing performance consultation.				1									
	15MBx1H1	Training and Development	3-0-0	3	Understand basic concepts associated with learning process, learning theories, training and development;	2			1									
					Understand training needs, identification of training needs, training processes, training methods, and evaluation of training;	2												
					Analyze emerging trends in training and development; and				1									
					Relevance and usefulness of training expertise in the organizational work environment.	2												
	15MBx1H2	Leadership in Organizations	3-0-0	3	Capacity to apply leadership in changing business environment	2											3	

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					Equip the learners with skills, tactics, styles for leadership roles	<b>2</b>												
					Understanding of executing leadership in organizations										<b>3</b>			
					Ability to develop leaders in organizations	<b>2</b>												
<b>2</b>	15MBx1H3	Compensation Management (Pre-requisite: Performance Management Systems)	3-0-0	3	Recognize how pay decisions help the organization achieve a competitive advantage.	<b>2</b>				<b>1</b>								
					Analyze, integrate, and apply the knowledge to solve compensation related problems in organizations.	<b>2</b>												
					Demonstrate comprehension by constructing a compensation system encompassing; 1) internal consistency, 2) external competitiveness 3) employee contributions, 4) organizational benefit systems, and 5) administration issues.	<b>2</b>												
					Design rational and contemporary compensation systems in modern organizations.					<b>1</b>								
<b>3</b>	15MBx1H4	Strategic Human Resource Management	3-0-0	3	Integrate HR with the business strategy	<b>3</b>				<b>1</b>								
					Develop competency to enhance employee development	<b>3</b>												

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					Gain rational ability to manage performance strategically						<b>1</b>							
					Develop competency to implement global HR practices	<b>3</b>					<b>1</b>							
	15MBx1H5	Human Resource Development (Pre-requisite: Training & Development)	3-0-0	3	Competency to perform HRD functions	<b>2</b>					<b>1</b>							
					Competency to design and implement and evaluate HRD programs	<b>2</b>												
					Competency to be an expert in organizational climate and development	<b>2</b>					<b>1</b>							
					Competency to execute HRD instruments						<b>1</b>							
	15MBx1H6	Cross Cultural Management	3-0-0	3	To understand the determinants and dimensions of western and eastern cultures in Business	<b>2</b>												
					To analyze the concept of organizational culture and cultural change in leadership			<b>3</b>										
					To analyze the barriers to intercultural communication and	<b>2</b>												
					To evaluate the implications of management theory and practice in						<b>3</b>							

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					cultural adjustments.														
	15MBx1H7	Human Resource Information Systems	3-0-0	3	To understand the evolution of Human resource information system and its applications	2													
					To analyze the implementation, integration and maintenance of HRIS	2													
					To analyze the issues related to HRIS applications					3									
					To evaluate the future trends in the field of HRIS and work force technologies	2													
<b>SECTORAL SPECIALIZATION</b>																			
S.No.	Course code	Course Name	L-T-P	C r	Course Outcomes.	PO													
						a	b	c	d	e	f	g	h	i	j	k	l		
	BANKING																		
1	15BB41B0	Overview of Banking	3-0-0	3	Understand the Indian financial Services	1	2												
					Understand the role of central Bank and commercial banks	1	2												
					Analyze credit appraisal mechanism and regulatory system of Indian banking		2												

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					Industry														
					Analyze the functioning of various banks	1													
2	15BB51B1	Banking Service Operations	3-0-0	3	Apply the concepts, theoretical ideas and empirical findings to develop their own views on strategic decision making in Banks.		2												3
					Assess the implications of customer relationship management.		2												
					Analyze and evaluate the concepts of service quality metrics of banks														3
					Apply the concepts, theoretical ideas related to Quality metrics and risk management to prepare risk management strategies in banks		2												
	FOREIGN TRADE																		
1	15BB41T0	International Logistics Management	3-0-0	3	To understand the concepts Global supply chain	1					2								
					To analyze the role and components of International Logistics system	1													
					Analyze Ocean Transport and Chartering						2								

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				Evaluate the problems and prospects of Fright Stations	1													
	15MB51T1	Export & Import Documentation & Insurance	3-0-0	3	Understand the process of documentation in International business	1	3											
					Evaluate the basic documents required for export and import	2	3											
					Understand the insurance procedure for export and import	1	2											
					Analyze the challenges of documentation and insurance for international Business Organizations													3
	HEALTHCARE MANAGEMENT																	
	15BB41D0	Overview of <b>Healthcare Management</b>	3-0-0	3	Understand basics of Healthcare Sector	1					3							
					Analyze the role of clinical and diagnostic services	1												
					Evaluate the impact of hospital operations management						3							
					Evaluate the components and process of maintaining medical	1												

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					records													
	15BB51D1	Management of Healthcare Operations	3-0-0	3	Implement the best practices of the health care Services								3					2
					Apply knowledge of financial management techniques in the corporate hospitals								3					
					Analyze, interpret and solve HR related issues in the hospitals													2
					Perform lifelong learning and professional development to enrich the professionalism by learning production functions and store management functions								3					
	<b>HOSPITALITY MANAGEMENT</b>																	
	15BB41V0	Overview of Hospitality Management	3-0-0	3	Understand the context of Indian and international hospitality sector and its relation with tourism	3												
					Analyze the role of hotel industry in enhancing the experience of tourist		2											
					Analyze the differences between food beverages and restaurants								2					

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					Evaluate the changing trends in hospitality industry in India		<b>2</b>											
	15MB51V1	Managing Hospitality Services	3-0-0	3	Understand the operations of hotel industry in India		<b>3</b>											
					Analyze the strategy followed the financial and accounting department		<b>1</b>											
					Analyze the strategies followed by hotel industries to market their services								<b>1</b>					
					Evaluate the changing dimensions of HR and CRM in hospitality industry		<b>2</b>											
	<b>INFORMATION TECHNOLOGY</b>																	
	15BB41I0	IT Enabled Services	3-0-0	3	Understand the basic concepts of IT enabled services markets		<b>2</b>											
					Analyze software technologies & Frameworks		<b>2</b>											
					Analyze the constituents of Medical Transcription Market		<b>3</b>											
					Evaluate the quality issues and challenges in IT Enabled													<b>3</b>

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					Outsourcing Market														
	15MB5111	Marketing of Software Solutions (Pre-requisite: Project Management)	3-0-0	3	Understand the basics of software enabled services	1	3												
					Understand the marketing strategies for Software solutions	1													3
					Evaluate the current state of software sector in India		3												
	<b>MANUFACTURING MANAGEMENT</b>																		
	15BB41Z0	Overview of Manufacturing Management	3-0-0	3	Understand the origin and purpose of manufacturing industries	3													
					Analyze the role of manufacturing organizations in the development of countries economy		3												
					Analyze various manufacturing practices followed to ensure safety and security of the employees									2					

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					Evaluate the role of computers In enhancing the efficiency of tools used in manufacturing		2												
	15MB51Z1	Operations Strategy	3-0-0	3	Understand the strategic issues in manufacturing	3													
					Analyze the methodology to be adopted for developing operations strategy	3													
					Analyze the role of quality as a strategic factor					2									
					Evaluate the use of information technology and management perspectives in enhancing investment decisions in operations		2												
	<b>AGRO-BUSINESS MANAGEMENT</b>																		
	15BB41W0	Overview of Agri- business Management	3-0-0	3	Understand the role of agriculture in Indian economy	3													
					Analyze the various forms of inventions in marketing agricultural products						2								
					Analyze the implications of corporate forming in retail		2												

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					revolution														
					Evaluate the role of ITAC, GATT, WUTU these in the trade of agricultural commodities														
	15MB51W1	Agricultural Marketing	3-0-0	3	Understand the concept of seed production and marketing of pesticides	2											2		
					Analyze the various grading and standardization strategy adopted to maximize the farm products marketing												2		
					Analyze various manufacturing channels adopted for agricultural commodities marketing		1												
					Evaluate the role of marketing intelligence agencies in India														
RETAILING																			
12BB41R0	Overview of Retailing	3-0-0	3		Excel in the functions of a retailer. Student will be aware of the role of a retailer in global economy, career opportunities in retail, retail theories and various retail formats.	1	2												

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				Gain practical expertise in designing of retail marketing strategies including Retail communication mix and pricing strategies. Further he/she can able to understand role of consumer in retail environment and various factors influencing consumer behavior. Identify consumer motivations, shopping behaviors, loyalty programs and decision processes for a retail consumer and accordingly designing strategies to give a robust experience to consumers	1													
				Apply HR programs and identify initiatives to improve operations and Employee retentions	2													
				Understand measures of financial performance including strategic profit model	1													
12MB51R1	Managem ent of Retail Operations	3-0- 0	3	Design the factors influencing store location and location strategies including store layout and space planning.	2													3
				Understand store environment, the roles and responsibilities of a store manager and build strategies to enhance the store loyalty.	2													
				Source, plan and procure merchandise for a retail organization and also able to design suitable promotion mix strategies for a														3

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				Retail store.															
				Implement trends and practices of supply chain management in retail.		2													

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# **K L UNIVERSITY**

## **DEPARTMENT OF COMPUTER APPLICATIONS**

### **University**

**Vision:** To be a globally renowned university.

**Mission:** To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

### **Department:**

**Vision:** Inculcate high quality skills in cloud technologies and security to excel in IT industry.

**Mission:** To produce quality IT security and Cloud technology professionals having strong theoretical foundation, innovative ideas, good design experience by bridging industry-academic gap in IT through the use of technology and innovative teaching and exposure to research and progress with social ethics.

### **PEOs**

1. Outperform in Information Technology across various specializations like Cloud Technologies.
2. Gain exposure in preventive, ethical hacking and forensic security technologies.
3. Develop skills to demonstrate functional knowledge of data centres and modern storage methods.

### **Program Outcomes**

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At the end of the Program, students will be able to:

- a. Apply knowledge of mathematics, science, and engineering in IT solutions.
- b. Design a system, component, or process to meet desired needs within realistic constraints such as economic, social, political, health and safety, manufacturability, and sustainability
- c. Apply elements of information security to solve problems.
- d. Employ cloud concepts to demonstrate cloud computing solutions
- e. Communicate effectively
- f. Understand professional and ethical responsibility
- g. Recognize the need for engaging in lifelong learning
- h. Adapt to the fast changing world of information technology needs

**MAPPING OF PEOs with MISSION OF THE DEPARTMENT:**

**M1:** To produce quality IT security and Cloud technology professionals

**M2:** Gain design experience in IT-infrastructure.

**M3:** Exposure to research and development with social ethics

S.No.	Program Educational Objectives (PEOs)	M1	M2	M3
1	Outperform in Information Technology across various specializations like Cloud Technologies.	✓	✓	
2	Gain exposure in preventive, ethical hacking and forensic security technologies.	✓		
3	Develop skills to demonstrate functional knowledge of data centres and modern storage methods.			✓

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**MAPPING OF POs WITH PEOs:**

<b>Mapping of POs to PEOs</b>				
<b>S.No.</b>	<b>Program Objectives (POs)</b>	<b>Program Educational Objectives (PEOs)</b>		
		<b>1</b>	<b>2</b>	<b>3</b>
<b>a</b>	Apply knowledge of mathematics, science and Information Technology	<b>√</b>		
<b>b</b>	Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability			<b>√</b>
<b>c</b>	Apply elements of Information Security to solve problems			<b>√</b>
<b>d</b>	Employ cloud concepts to demonstrate cloud computing solutions		<b>√</b>	
<b>e</b>	Communicate effectively	<b>√</b>	<b>√</b>	<b>√</b>
<b>f</b>	Understand professional and ethical responsibility	<b>√</b>		
<b>g</b>	Recognize the need for engaging in Life Long learning	<b>√</b>		
<b>h</b>	Adapt to the fast changing world of information technology needs		<b>√</b>	<b>√</b>

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**COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES**

**MAPPING OF COs WITH POs:**

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SNo.	Course Code	Course Title	Credits	Course Outcomes	Program Outcomes (POs)								
					a	b	c	d	e	f	g	h	
1	15EN1101	Rudiments of Communication Skills	2	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills.					2				
				Identify writing strategies and apply those by using the basic and advanced concepts of grammar.				2					
				Explain the types of texts and tone of the author.				1					
				Identify the importance of interpersonal skills				1					
2	15MT1105	Fundamentals of Mathematics	4	Solve problems of matrices, limits and differential equations	2								
				Formulate differential calculus, differentiation rules and identify a method for solving and interpreting the results.	2								
				Formulate physical laws and relations mathematically	2								
				Verify the solution of problems through MATLAB.	2								
3	15GN1001	Ecology and Environment	2	Identify the importance of Environmental education and conservation of natural resources.						1			
				Describe the importance of ecosystems and biodiversity.					1				
				Apply the environmental science knowledge on solid					2				

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				waste management, disaster management and EIA process.										
4	15CA1101	Computer Fundamentals & Computer Organization	4	CO1	1									
				CO2	1									
				CO3		2								
				CO4		3								
5	15CA1102	Programming in C	4	Explain different concepts of C programming, used to create programs.	2									
				Discuss about different data types and control structures	2									
				Demonstrate the working of functions, arrays and pointers		3								
				Identify the working of different file handling methods	2									
				Create programs using basic and advanced concepts of C language		3								
6	15CA1103	Linux Programming	4	Explain different concepts of Linux and illustrate the working	2									
				Describe the functionalities, features, types and commands of Unix/Linux			1							

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				Demonstrate the Unix/Linux commands	2								
				Analyze process concepts and create applications	2								
				Create programs to demonstrate different functionalities in Linux	2								
7	15EN1202	Interpersonal Communication Skills	2	Describe the method of identifying the meaning of words from the context and form sentences using words.					2				
				Analyze seven types of reading techniques and improve reading speed.					2				
				Explain writing strategies for office/ formal communication.					2				
				Identify and analyze different cultures and the importance of empathy in cross-cultural communication.					2				
8	15MT1208	Computer-Oriented Statistical Methods	4	To understand the basic concepts of statistics and explains the various methods of descriptive data collection and analysis	1								
				Construct the probability distribution of a random variable, based on real-world situation, and use it to compute expectation and variance	2								
				Predict the relationship between two variables and	2								

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				construct the linear and non-linear regression lines for the given data												
				Predict the trend variations for times series data and also identify the Statistical data using Ms-Excel	2											
				Verify the solution of problems through MINITAB												2
9	15CA1204	System Configuration and Maintenance	4	Discuss about the use and features of hardware and peripheral devices		1										
				Discuss the configuration and maintenance of a system and its associated devices		2										
				Describe the features and requirements of operating systems in terms of configuration and maintenance.		1										
				Identify the difference between different connectors and port		2										
10	15CA1205	Operating System	4	Discuss the working of an operating system, with its features, uses, and other functionalities.		2										
				Describe process and storage management and how OS performs various functionalities			1									

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				Identify the purpose of different process synchronization and management methods	2								
				Describe security and file system management in an operating system.		1							
11	15CA1206	Programming in Java	4	Discuss different object oriented concepts, features and its application through java.	2								
				Apply the java concepts to create stand alone desktop applications.							1		
				Identify the different predefined classes and methods in packages	2								
				Apply java concepts to create UI oriented applications, along with database manipulation.	3								
				Create applications using java concepts, swings and JDBC								3	
12	15CA1207	Elementary Data Structures using C	4	Discuss various data structures and explain how they can be used for searching and sorting elements	2								
				Identify the pros and cons of different searching and	2								

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				sorting algorithms									
				Discuss the working of different data structures and their applications		2							
				Summarize the working of linked lists, trees and graphs		2							
				Create programs to demonstrate the functionality of different data structures, sorting algorithms, searching algorithms, etc.		3							
13	15EN2103	Professional Communication Skills	2	Understand the concept of Group Discussion and listen and speak effectively during the discussion.					2				
				Understand and improve learners' competency in competitive English and apply the principles of grammar in real life contexts.					2				
				Understand skimming & scanning, and apply the types of reasoning in comprehending the information.							2		
				Understand the mechanics and application of presentation skills.							2		
14	15CA2108	Fundamentals of Storage	4	Explain the types of storage and usage in different scenarios		2							
				Outline concepts of a backup recovery and management					2				

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				of data								
				Explain consistency and management of storage infrastructure				2				
				Identify different storage management challenges			2					
15	15CA2109	Software Engineering	4	Discuss the need for following a well structured format for the development of software applications						2		
				Generalize how to reduce the complexity to transition from one phase in software development to another.	2							
				Summarize different testing concepts		2						
				Identify how to manage a software development project							2	
16	15CA2110	Computer Networks	4	Explain the different networking concepts and devices that are used today for establishing connectivity.	2							
				Summarize the functionalities of different network protocols			1					
				Describe different WAN technologies, topologies and other basic networking concepts.				1				

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				Explain how to troubleshoot a network.		2							
17	15CA2111	RDBMS	4	Discuss the importance of creating and maintaining an error free database.	2								
				Apply different SQL commands to manipulate a database		3							
				Discuss how to normalize a database	2								
				Describe transaction concepts in a database		2							
				Create database tables and manipulate them using SQL queries			3						
18	15CA2112	Web Technologies	4	Describe the features of different web technologies		2							
				Illustrate applications using HTML, CSS and JS		2							
				Identify the different tools used for creating web pages and what are their pros and cons		2							
				Apply multimedia, canvas and storage concepts to develop HTML5 apps							3		
				Create web pages, forms, etc. Use styling techniques in the web pages and validate them.							3		

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19	15CA2113	Principles of Virtualization	4	Enumerate basic concepts of Virtualization		2						
				Illustrate deployment of VMWare				2				
				List types of Virtualization software and their applications							2	
				Summarize the features of virtualization software							2	
20	15EN2204	Employability Skills	2	Analyze one's own strength as a speaker/ Communicator and use discretion while listening.				2				
				Apply and analyze various concepts of writing strategies in professional communication skills like, reports, resume and minutes of the meeting.					2			
				Understand the organization of the passage and also analyze the tone, attitude and style of the author.						2		
				Acquire knowledge of and apply people skills in various social organizational and corporate ambiances.						2		
21	15GN1002	Human Values	2	Understand and identify the basic aspiration of human beings					2			
				Envisage the roadmap to fulfill the basic aspiration of human beings.					2			

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				Analyze the profession and his role in this existence.									2		
22	15CA2214	Information Security Fundamentals	4	Explain various information security concepts				2							
				Discuss the need for information security in the internet, and how to manage the risks.	2										
				Summarize how to identify and access risks	2										
				Describe network infrastructure security and how to monitor a network			2								
23	15CA2215	Ethical Hacking Fundamentals	4	Explain the concepts and types of Ethical Hacking		2									
				Using tools create hack in scenarios		2									
				Identify how to perform web hacking					2						
				Implement report writing and mitigation			2								
				Demonstrate the concepts of ethical hacking using tools and techniques							3				
24	15CA2216	Cryptography Fundamentals	4	Explain concepts of cryptography/ algorithms/ keys	2										
				Identify the use of digital signatures	2										

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				Explain concepts involved in key management			2					
				Discuss various applications of cryptography			2					
25	15CA2217	Introduction to Cloud Technology	4	Describe cloud concepts and types of cloud			2					
				Explain how to perform cost management			2					
				Identify the need for IT governance in cloud			2					
				Study and report various cloud services							3	
26	15CA2218	Fundamentals of Data Center	4	Explain the basic concepts of data centre and its components		1						
				Describe data centre designs		2						
				Compare different types of server farms			2					
				Discuss data centre construct and back-up/recovery technologies							3	
27	15EN3105	Verbal and Quantitative Reasoning	2	Understand the method of identifying synonyms and antonyms and analyze the meaning of a word from the context.				2				
				Analyze issues and arguments in the process of critical reasoning and apply grammar rules to correct sentences.				2				

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				Apply the Concepts of basic Algebra and their importance while solving the problems					2			
				Apply the short-cut methods on the concepts of different models in Calendars, Clocks, Blood relations and various types of arrangements.					2			
28	15CA3119	Computer Forensics – An Introduction	4	Explain Forensics in Information Technology World	2							
				Discuss different data recovering methods		2						
				Identify various forensics techniques and their working			3					
				Explain the use of cyber laws and describe them					2			
				Analyze and validate forensic data							3	
29	15CA3120	Virtualization and Cloud Security	4	Explain importance of Information Security in the Cloud Context			2					
				Discuss various concepts of cloud security			2					
				Classify the cloud vulnerabilities and threats				3				
				Outline how cloud and Security works in a seamless model							1	
30	15CA3121	IT	4	Define Governance in Info Sec areas	2							

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		Governance, Risk & Information Security Management		Classify various threats and risk involved	2								
				Summarize the Risk IT Framework						2			
				Identify how to manage information security		2							
31	15CA3122	Server Operating System - II	4	Explain the components of Linux OS and their functions	2								
				Summarize network configuration process		2							
				Discuss user and file management in Linux		2							
				Identify how to manage advanced users and groups									2
				CO5									3
32	15CA3123	Server Operating System - I	4	Explain the components of Windows Server 2008 and their functions	2								
				Discuss how to configure networking and network services		2							
				Explain how to configure and manage Active Directory Domain Services		2							
				Recall the functions of the Sub elements of the various components of Windows 2008			1						

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33	15EN3206	Corporate Communication Skills	2	Understand and analyze the depth of a topic and use the advanced levels in creative speaking and debating.					2			
				Understand and analyze various strategies involved in writing an essay and apply various styles in writing.						2		
				Understand and analyze the given text critically and answer questions on critical reasoning based on the given information.							2	
				Acquire knowledge on various employability skills & analyze a situation and develop adaptability.							2	
				Apply the Concepts of basic geometry and their importance while solving the problems.					2			
34	15CA3224	Wireless and VOIP Security, Security in Mobile Application Development	4	Explain context of security in Wireless environment	2							
				Summarize how to provide VoIP security			2					
				Classify types of threats in Mobile, Wireless and VOIP		2						
				Explain how security should be enforced during mobile application development							2	
35	15CA3225	Introduction to Windows Azure	4	Define windows azure basics and cloud background	2							
				Discuss the concepts of storage in Azure				2				
				Summarize the process for creating and manipulating				2				

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				tables									
				Identify the steps for creating a web site				2					
				Illustrate how to create basic elements such as websites, SQL server etc									3
36	15IE3049	Internship	2	Apply basic concepts learnt to solve real-time problems									3
				Discuss the IT organization hierarchy and working		2						3	
				Identify the tools/network and their functionalities to create and test application/connectivity		2							
				Summarize the procedures used for creating and testing applications							3		
				Create real time applications								3	
37	15IE3050	Project and Viva-Voce	9	Apply technologies learnt to real life situations									2
				Apply knowledge of IT Sec and Cloud security		2							
				Identify how to create a project keeping in mind Organizational Ethics and responsibilities						2			

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UNIVERSITY

**Vision**

To be a globally renowned university.

**Mission:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

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**DEPARTMENT VISION**

To create a platform to sculpture the learner's too professional by binding innovative, international standardized education with leadership, entrepreneur skills and applied research.

**DEPARTMENT MISSION**

1. To simplify the hospitality education.
2. To provide effective learning through goal orientation in promoting innovative skills.
3. To create entrepreneurs with international industrial standards.
4. To collaborate with national & international hospitality organizations.

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**KLU & KLUHM VISION & MISSION MAPPING**

	<b>KL University</b>	<b>KLUHM</b>
<b>Vision</b>	To be a globally renowned university	To create a platform to sculpture the learner's too professional by binding innovative,international standardized education with leadership, entrepreneur skills and applied research.

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<b>Mission</b>	To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.	1. To simplify the hospitality education. 2. To provide effective learning through goal orientation in promoting innovative skills. 3. To create entrepreneurs with international industrial standards. 4. To collaborate with national & international hospitality organizations.
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**PROGRAM EDUCATION OBJECTIVES (PEO's)**

1. Make students to be leaders in hospitality industry through industry immersion and national and international linkages in order to support business in the field of relevance.
2. To intensify student's knowledge and skills with instruction based on international standards, to produce quality graduates with balanced knowledge, skills and industry exposure in catering, hotel and management.
3. Inculcate leadership skills needed for integration of hotel and restaurant development, to demonstrate community involvement in travel and tour operation, airlines and other related industries to strengthen their knowledge and skills.

**PROGRAM OUTCOMES**

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- a) Knowledge of techniques and equipment for planting, growing, and harvesting food products (both plant and animal) for consumption, including storage/handling techniques.
- b) Knowledge of raw materials, production processes, quality control, costs, hygiene and sanitation and other techniques for maximizing the effective manufacture and distribution of goods.
- c) Knowledge of business and management principles involved effectively in strategic planning, resource allocation, human resources modelling, leadership technique, production methods, and coordination of people and resources.
- d) Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- e) Knowledge of economic and accounting principles and practices, the financial markets, banking, analysis and reporting of financial data involved in industrial sectors.
- f) Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labour relations and negotiation, and personnel information systems.
- g) Knowledge of the structure and content of different language including the meaning and spelling of words, rules of composition, and grammar.
- h) Knowledge of principles and methods for showing, promoting, and selling products or services. This includes marketing strategy and tactics, product demonstration, sales techniques, and sales control systems.
- i) Knowledge of principal methods of cleaning, controlling, recycling process, maintenance of equipment's, latest technology and its usage, safety measures to taken in hotel industry.
- j) Knowledge on Tourism, hospitality industry history, sales, promotions, Audit, general knowledge, share market, excellent skill to communicate and computer knowledge.

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**PROGRAM SPECIFIC OBJECTIVES (PSO's)**

1. To train and develop students to be leaders in hotel and food and beverage management through industry immersion and national and international linkages.
2. To intensify students skills in understanding the tasks, functions, duties and activities in the operation of the hotels, restaurants, travel, government and non-government agencies in accordance with the competency standards.
3. To produce quality graduates with balanced knowledge, skills based on international standards to have industry exposure in catering, hotel and management areas.

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**PEO MISSION MATRIX**

<b>PEO's</b>	To simplify the hospitality education <b>(M 1)</b>	To provide effective learning through goal orientation in promoting innovative skills <b>(M 2)</b>	To create entrepreneurs with international industrial standards <b>(M 3)</b>	To collaborate with national & international hospitality organizations <b>(M 4)</b>
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Make students to be leaders in hospitality industry through industry immersion and national and international linkages in order to support business in the field of relevance.	✓			
To intensify student`s knowledge and skills with instruction based on international standards, to produce quality graduates with balanced knowledge, skills and industry exposure in catering, hotel and management.		✓	✓	
Inculcate leadership skills needed for integration of hotel and restaurant development, to demonstrate community involvement in travel and tour operation, airlines and other related industries to strengthen their knowledge and skills.			✓	✓

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PEO's – PO's MATRIX

PO's	PEO - 1	PEO - 2	PEO - 3	PSO - 1	PSO - 2	PSO - 3
a	✓			✓		
b		✓		✓		
c		✓			✓	
d	✓				✓	
e			✓		✓	

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<b>f</b>			✓			✓
<b>g</b>		✓		✓		
<b>h</b>			✓			✓
<b>i</b>	✓					✓
<b>j</b>			✓		✓	

**CO - PO's Mapping**

Name of The Program: BHM - I Year - I Sem														
S.No	Course Code	Course Title with Code	Course Outcomes	Description of Course Code	PROGRAM OUTCOME(Pos)									
					PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
1	15HS101	Rudiments of Communication	CO1	Speak with confidence & Understand the importance of								1		

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		Skills		listening. Make presentations fluently in English.														
			CO2	Understand the basic concepts of grammar and usage.							2							
			CO3	Implement English Grammar rules while writing or speaking.							2							
			CO4	Express or present in written form Identify Key concepts Ask and record information for extended writing							2							
2	15BH11C6	Introduction to Food Production	CO1	Understand the professionalism of being an educated chef and the concepts of developing modern cookery practices.	1													
			CO2	Understand the kitchen hierarchy and its coordination with stakeholders [Other department]										2				
			CO3	Understand the principles of cooking and basic classification in identifying edible commodities in kitchen	2													
			CO4	Understand the basic bakery concepts this includes the measuring of														

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				ingredients, physical & chemical changes during baking.											
3	15BH11C7	Introduction to Food & Beverage Service	CO1	Able to understand the basic of Food and Beverage service Industry.	1										
			CO2	Knowledge on Organization structure duties and responsibilities.				2							
			CO3	Type of Restaurant and Equipment used in restaurant.									2		
			CO4	Skills required for types of service.	2										
4	15BH11C8	Introduction to House Keeping	CO1	Understand & perform the basic responsibilities of a House keeper				1							
			CO2	Remember & identify the organization structure and can design a House keeping layout.				2							
			CO3	Understand & perform the cleaning procedures of various equipments					2						
			CO4	Remember and identify the types of guest rooms.				2							
5	15BH11C9	Introduction to	CO1	Importance of Tourism & Hotel definition, Introduction of its				1							

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		Front Office		growth											
			CO2	Classifies the Hotel & Types of rooms in hotels				2							
			CO3	Organizational Structure of Hotel & departments					2						
			CO4	Sections & layout of Front Office department & Staff			2								
6	16BH11K0	Food Safety & Hygiene	CO1	Understand the concept of importance of safe food storage and food laws.		1									
			CO2	Understand about the importance of food hygiene in service sector.		2									
			CO3	Familiarize them with methods of quality testing of food.									2		
7	15BH12 I0	Introduction to Information Technology	CO1	Understand the basic knowledge of computers – Hardware & software			1								
			CO2	Learn about MS office in all aspects					2						
			CO3	Understand about the networks.									2		
<b>Name of The Program: BHM - I Year - II Sem</b>															

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1	15HS102	Interpersonal Communication Skill	CO1	Identify the meaning of words from context. Frame sentences using words. Understand the method of identifying antonyms.							2			
			CO2	Develop different reading skills. Comprehend given information							2			
			CO3	Write different types of office communication. Understand and write good summaries							2			
			CO4	Understand and value diverse societies. Respond effectively to cultural communication differences. Demonstrate understanding of ethical values central to the communication discipline. Demonstrate LSRW skills							2			
2	15BH12C6	Principles of Food Production	CO1	Remember and demonstrate pre food preparation concepts during his food production practices	1									
			CO2	Understand and apply different cooking methods [Dry & Moist] to reproduce simple classic dishes, stocks and sauces.									2	

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			CO3	Understand and demonstrate about Indian cuisine. Gain knowledge and identify the basic masalas & gravies used in Indian cooking	2									
3	15BH12C7	Principles of Food & Beverage Service	CO1	Knowledge on type of Meals.	1									
			CO2	Type of Menu and Planning a Menu			2							
			CO3	Control Methods used in Food and Beverage service							2			
			CO4	Able to understand Beverages and its preparations.	3									
4	15BH12C8	Principles of House Keeping	CO1	Remember and perform the cleaning procedure of a guest room & public area's			1							
			CO2	Understand and remember the importance's of Housekeeping control desk and its coordination with other departments.				2						
			CO3	Remember and implement the procedures of lost & found during career growth					2					
			CO4	Design the layouts of linen room				3						

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				and can identify the types of linen.											
5	15BH12C9	Principles of Front Office	CO1	Room tariff details and meal plans			1								
			CO2	Will be known about arrival procedures reservation procedures			2								
			CO3	Will be known about registrations procedures and group check-in procedures				2							
			CO4	Will be known about various guest services like Handling messages, Wakeup calls			3								
6	16BH12K0	Food Science & Nutrition	CO1	Understand the importance of different nutrients. Understand about daily requirements of nutrients		2									
			CO2	Develop knowledge regarding balanced diet and menu planning		2									
			CO3	Understand about the food preservation and its importance in catering industry									2		
<b>Name of The Program: BHM - II Year - I Sem</b>															
1	15HS103	Professional Communication Skills	CO1	Apply communication concepts and theories to address everyday dilemmas within dimensions. Analyze communication variables										2	

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				in personal, professional, and community settings. Propose competent communication strategies.										
			CO2	Demonstrate positive group communication exchanges. Advance decision-making processes within group							2			
			CO3	Demonstrate written communication skills expected of a future professional in the field							2			
			CO4	Demonstrate oral communication skills expected of a future professional in the field. Speak in public settings							2			
2	15BH21C6	Food Production Operations	CO1	Understand and design the operation of quantity kitchens in various sectors	2									
			CO2	Remember and apply the principles of ordering, indenting and planning of volume caterings.									2	
			CO3	Remember and demonstrate various regional Indian cuisines.	2									

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			CO4	Identify the different techniques of bread making methods and faults	3										
3	15BH21C7	Food & Beverage Services Operations	CO1	Wine Cultivation and its Preparations	1										
			CO2	Wine Regions and labeling Rules				2							
			CO3	Wine Regions, labeling & storage. Aperitifs									2		
			CO4	Cultivation of Tobacco and type of consuming	3										
4	15BH21C8	Accommodation Operations	CO1	Understand & remember the procedure for out sourcing of various housekeeping service				2							
			CO2	Understand & identify the types of fibers, layout of laundry, laundry equipment's. Design the flower arrangement by implementing its concepts.					2						
			CO3	Remembering and applying the accounting concepts in real time practices.						2					
			CO4	Deal with complaint handling procedures.				3							

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5	15BH21K1	Hotel Laws	CO1	Understanding the concept of Indian hotel industry and it's first growth cycle. Hotel Legal issues and Origin of Hotel Law			2							
			CO2	Understanding the accurate Laws in Hotel Operations, Laws related to Employees and Guests and Laws related to Food and Beverage.				2						
			CO3	Understanding the Laws related to Public Health and Safety.					2					
6	15BH21F0	Hotel Accountancy	CO1	Gain knowledge about the principles of accounting, Double entry system of book keeping		2								
			CO2	Implement various accounting principles in preparation of Journals and ledgers		2								
			CO3	Preparation of Guest billing and visitors paid out								2		
			CO4	Draft the Final accounts for a small restaurants and hotels.								3		
7	15HS107	Environmental Studies	CO1	Understand about environment and its functioning			2							

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			CO2	Develop knowledge regarding availability of natural resources						2				
			CO3	Aware about the environmental problems and issues								2		
<b>Name of The Program: BHM -II Year - II Sem</b>														
1	15HS104	Employability Skills	CO1									2		
			CO2								2			
			CO3								2			
			CO4								2			
2	15BH22C6	Food Production Management	CO1	Identify the types of meats, inspect & grade them. Apply the suitable cooking principles methods during meat cooking.	2									
			CO2	Identify the types of fish, classification and can demonstrate suitable cooking methods.									2	
			CO3	Understand and produce types of salad's, dressings, and sandwiches as per the standard presentation	2									
			CO4	Knowledge of cake making methods and their faults &	3									

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				remedies.											
3	15BH22C7	Food & Beverage Services Management	CO1	Knowledge on Alcoholic Beverage and type of Distillation.	1										
			CO2	Types of Spirits and its preparations.			2								
			CO3	Able get knowledge on other Alcoholic Beverage.									2		
			CO4	Cocktail and its Preparations	3										
4	15BH22C8	Accommodation Management	CO1	Remember and understand the concepts of budgeting and controlling expenses.			2								
			CO2	Understand & apply the art of interior designing to the guest rooms. Knowledge of night auditing job role			2								
			CO3	Knowledge of applying selling techniques to increase guest returns. Knowledge of forecasting rooms availability.					2						
			CO4	Apply marketing techniques to increase hotel business			3								

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5	15BH22K0	Hotel Engineering	CO1	Understand the equipment usage and maintenance in the hotel industry			2							
			CO2	Aware of water safety and sanitation measures			2							
			CO3	Demonstration of fire and pollution safety measures				2						
6	16BH22K1	Food & Beverage Quality Control	CO1	Understanding the definitions, objectives and basic concepts of pricing and control aspects in Food and Beverage and understanding the concept of budgeting		2								
			CO2	Understanding the crucial food and beverage purchasing specification, sequence of purchase and receiving. Knowing the procedure of stores and issuing of goods from hotel stores and record maintenance		2								
			CO3	Understanding the importance of having a standing recipes and forecasting of volumes.								2		

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Name of The Program: BHM - III Year - I Sem													
1	15HS105	Verbal & Quantitative reasoning	CO1	Identify the meaning of words from context.							2		
			CO2	Develop different linguistic skills							2		
			CO3	Understand and apply the basic techniques to crack Quantitative reasoning tests							2		
			CO4	Demonstrate critical and innovative thinking to solve Analytical reasoning tests.							2		
2	15BH31C6	Advanced Food Production	CO1	Describe & demonstrate different types of international Cuisine	2								
			CO2	Deliver different types of sandwiches, Terrines, forcemeats and cold buffets with standard presentations								2	
			CO3	Identify different types of pastries and preparation procedures	2								
			CO4	Knowledge of different types of Icings used in producing confectionery products	3								

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3	15BH31C7	Advanced Food & Beverage Services	CO1	Learning and demonstrating the In Room Dining Service and Banquets Service	1									
			CO2	Understanding and demonstrating of the Buffet Service and its types				2						
			CO3	Understanding the Hotel Bar Operations and its types. Understanding the Bar Licensing and Staffing									2	
			CO4	Learning and Demonstration of Gueridon Trolley Services, Recipes and Preparation Methods.	3									
4	15BH31K0	Hospitality Services Marketing	CO1	Gain knowledge about the basic service marketing concepts in Hospitality Industry			2							
			CO2	Understand and implement various theories like marketing mix, service product life cycle, methods of pricing a service product during his career growth				2						
			CO3	Design new products if required can further develop it . And can promote the product effective in the					2					

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				hotel industry.											
5	15BH31K1	Human Resource Management In Service Sector	CO1	Know the importance of human recourses management and its functions			2								
			CO2	Have knowledge on organization Behavior and its Characteristics.			2								
			CO3	Develop the values of human resources by gifts are by solving Grievances & Discipline				2							
6	15BH31K2	Travel & Tourism	CO1	Identify different Transport sectors in Tourism & understand means of accommodation.		2									
			CO2	Understand & Perform the Economics, Social, Culture, Political & environmental impact in tourism Industry.		2									
			CO3	Organize all the functions held in Domestic & international organization in promotion of Tourism.									2		
7	16BH31L0	French for Hotel Professionals	CO1	Make introductions and greetings in hotel industry.			2								

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			CO2	Use articles in different contexts						2				
			CO3	Form sentences which are useful for hotel operations.2								2		
<b>Name of The Program: BHM - III Year - II Sem</b>														
1		<b>Intensive Internship</b>	CO1											
<b>Name of The Program: BHM - IV Year - I Sem</b>														
1	15HS106	Corporate Communication Skills	CO1	Speak fluently and effectively in interpersonal contexts								2		
			CO2	Write technically sound English								2		
			CO3	Read and interpret expeditiously								2		
			CO4	Understand and apply the basic techniques to crack Quantitative Reasoning sections in Campus Recruitment Tests, GRE, GMAT, CAT and other types of Competitive Exams								2		
			CO5	Demonstrate employability skills										

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2	15BH41K0	Total Quality Management	CO1	Understand how importance is to maintain quality in hotel industry and also learn the concepts of quality	2										
			CO2	Tools and techniques used to maintain quality									2		
			CO3	Know about the personnel's co-ordination to improve the quality as well as business.	2										
3	15BH41K2	Customer Relationship Management	CO1	Knowledge on managing customer relations by various types	1										
			CO2	Able to handle various Consumer behaviors problems related to hotel industry.				2							
			CO3	Providing a bridge with law and Order									2		
4	15BH41K3	Entrepreneurship	CO1	Understand the term Entrepreneurship its concept in decision making and developing an idea				2							
			CO2	Create new venture with new ideas				2							

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				and will be able to solve the problems											
			CO3	Write a business plan that can leads to financial seeds, advertisements and recruitment				2							
5	16BH41K3	Organization Behavior In Hospitality Industry	CO1	Able to understand Hospitality organization behaviour.			2								
			CO2	Identify the personality development, attitudes and motivation.			2								
			CO3	Analyse the group behaviour and classify the leadership and power.			2								
			CO4	Distinguish the hospitality dynamics of organizational behaviour.			2								
1	15BH41E0	<b>ELECTIVES – VII Semester</b>	CO1	Understand and demonstrate various classical dishes of cold kitchen.		2									
			CO2	Gain knowledge of designing kitchen outlet for various catering sectors.		2									

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		Food Production Management-I	CO3	Operate modern developed kitchen equipments with care and maintenance.																	2					
2	15BH41E1	Food & Beverage Services Management – I	CO1	Understand Type of Restaurant and its planning.					2																	
			CO2	Understand Type of Bar and its Planning.						2																
			CO3	Capable of handling Events.															2							
			CO4	Personal Management Handling in Food and Beverage service industry.						2																
3	15BH41E2	Accommodation Management – I	CO1	Understand furnishing materials, cleaning equipment and agents.	2																					
			CO2	Design guest room and its amenities, furnishings, furniture's etc.			2																			
			CO3	Know about the design and layout of front desk, planning atrium etc.					2																	
			CO4	Sales and marketing procedures, co-ordination with front office department.	2																					
4	15BH41E3	Food Production Management – II	CO1	Understand the principles of desserts preparation methods and can demonstrate in preparing classical desserts.					2																	

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			CO2	Remember the techniques of melting, molding and preparing chocolate base desserts, garnishes and chocolate cakes			2								
			CO3	Apply the standards of maintaining the kitchen records and budget files.	2										
5	15BH41E4	Food & Beverage Services Management - II	CO1	Organize the operations of F&B Service.											
			CO2	Control to Budget in F&B services.											
			CO3	knowledge on F & B Management Catering					2						
			CO4	Apply Policies, Strategies in F & B Management of Hotels and Restaurant	2										
6	15BH41E5	Accommodation Management- II	CO1	Understand & manage the operations of front office & housekeeping.			2								
			CO2	Apply the concepts in managing the staff, workload , duty times					2						
			CO3	Understanding the key concepts in managing the financial transactions,			2								

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				cost control.										
			CO4	Implement the computer skills in room division. Apply of HR practices to motivate staff.						2				
1	15BH42P0	<b>Hotel Industry Project 4Months</b>	CO1											

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To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

### **DEPARTMENT VISION**

To produce comprehensively trained, socially responsible and creative media professionals with global perspectives to serve the society and industry.

### **DEPARTMENT MISSION**

<b>DM 1</b>	Provide Visual Media education through well designed curriculum to media professionals with an ability to solve real world problems using emerging technology.
<b>DM 2</b>	Create learning environment and providing facilities for creative thinking and personality development.
<b>DM 3</b>	Promote ethical and moral values among the students to enable them to emerge as responsible professionals.
<b>DM 4</b>	Establish Industry Institution Interaction to make students ready for the industrial environment

Programme - Bachelor of Fine Arts (Digital Filmmaking & Vfx)

Programme Type – Under Graduation : Duration – Four Years

### **Programme Educational Objectives (PEO's)**

<b>PEO 1</b>	Students must demonstrate achievement of professional, entry-level competence in the major area of specialization, including significant technical mastery, capability to
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	produce work and solve professional problems independently, and a coherent set of artistic/intellectual goals that are evident in their work.
<b>PEO 2</b>	Students must demonstrate their competence by developing a body of work for evaluation in the major area of study. A senior project or final presentation in the major area is required.
<b>PEO 3</b>	Students must have the ability to form and defend value judgments about art and design and to communicate art/design ideas, concepts, and requirements to professionals and laypersons related to the practice of the major field.

**Department Mission vs PEO'S Mapping**

	<b>DM1</b>	<b>DM2</b>	<b>DM3</b>	<b>DM4</b>
<b>PEO 1</b>	✓		✓	
<b>PEO 2</b>	✓	✓		✓
<b>PEO 3</b>	✓	✓	✓	

**Programme Outcomes (PO's)**

<b>a</b>	Understanding, through production-oriented studies, of the communication, aesthetic, and design principles in the elements of film/video.
<b>b</b>	Knowledge and skills in the use of basic concepts, tools, techniques, and procedures sufficient to produce work from concept to finished product.
<b>c</b>	Functional knowledge of the history of film/video, its artistic and technological evolution, and an understanding of basic aesthetic and critical theory.
<b>d</b>	The ability to coordinate project elements and communicate with involved personnel at all stages of the production process.
<b>e</b>	Experiences provide an understanding of the marketing procedures for film/video production, distribution, and exhibition.
<b>f</b>	Effectively manage the resources and logistics required to produce a film.
<b>g</b>	ability to form and defend value judgments about art and design and to communicate

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	art/design ideas, concepts, and requirements to professionals and laypersons related to the practice of the major field.
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Programme Specific Outcomes (PSO's)

<b>PSO 1</b>	Analyze story structure and the screenwriting process for use in the critique and creation of film.
<b>PSO 2</b>	Apply current best practices in editing language and visual effects.

**BFA Filmmaking & Vfx PEO'S vs PO'S Mapping**

	<b>PEO 1</b>	<b>PEO 2</b>	<b>PEO 3</b>
<b>a</b>	✓		✓
<b>b</b>	✓	✓	
<b>c</b>		✓	✓
<b>d</b>		✓	✓
<b>e</b>	✓		✓
<b>f</b>	✓	✓	
<b>g</b>	✓	✓	
<b>PSO 1</b>		✓	✓
<b>PSO 2</b>		✓	✓

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**Name of The Program:**

**BACHELOR OF FINE ARTS (DIGITAL FILMMAKING & VFX) AY-2015-16**

S.No	Course Code	Course Title with Code	Course Outcomes	STUDENT OUTCOME(SOs)									
				a	b	c	d	e	f	g	PSO1	PSO2	
1	15EN1101	Rudiments of Communication Skills	CO1		2								
			CO2		3			2					
			CO3					2					
			CO4		2						2		
2	15GN1001	Ecology and Environment	CO1	2									
			CO2	2									
			CO3							2			
			CO4							2			
3	15FA1101	Introduction to Art	CO1	2	2								
			CO2	3		2							
			CO3								3		
			CO4			3		2					
4	15FA1102	Basics of Photography (15 FA 1102)	CO1	2	2								
			CO2		3				2				
			CO3						2				
			CO4								3	3	
5	15FA1103	Introduction to Cinema & Film Appreciation (15 FA 1103)	CO1	3			2						
			CO2	3				2					
			CO3	2							3		
			CO4	2				2					
6	15FA1104	Basics of Practical Filmmaking (15 FA 1104)	CO1			3			2				
			CO2		2			2					
			CO3		2						2		
			CO4			2							2

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7	15EN1202	Interpersonal Communication Skills	CO1		2							
			CO2		3			2				
			CO3					2				
			CO4		2					2		
8	15FA1201	Writing for Visual Media	CO1			3					3	
			CO2		2							3
			CO3			3			3			
			CO4	1							2	
9	15FA1202	Concept of Story Boarding	CO1		2				3			3
			CO2			3			2			
			CO3	2								2
			CO4				3			2		
10	15FA1203	Production Design	CO1		2				3			3
			CO2			3			2			
			CO3	2								2
			CO4				3			2		
11	15FA1204	Basics of Cinematography – I	CO1	2	2							
			CO2		3				2			
			CO3						2			
			CO4								3	3
12	15FA1205	Basics of Documentary Film Making	CO1			3			2			
			CO2		2			2				
			CO3		2						2	
			CO4			2						2
13	15EN2103	Professional Communication Skills	CO1		2							
			CO2		3			2				
			CO3					2				

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			CO4		2						2	
14	15FA2101	Introduction to Direction for Television	CO1			2					3	
			CO2	2								2
			CO3				3		2			
			CO4				2					2
15	15FA2102	Importance of Sound and Sound Special Effects	CO1	2	3							
			CO2			3						2
			CO3		2							
			CO4						2	2		
16	15FA2103	Editing Concepts	CO1				2				2	
			CO2		3							3
			CO3				3				3	
			CO4	1								2
17	15FA2104	Concepts of Post Production and Computer Graphics – I	CO1				2				2	
			CO2		3							3
			CO3				3				3	
			CO4	1								2
18	15FA2105	Basics of Cinematography – II	CO1	2	2							
			CO2		3				2			
			CO3						2			
			CO4								3	3
19	15FA2106	Intermediate Practical Film Making	CO1			3		2				
			CO2		2			2				
			CO3		2						2	
			CO4			2						2
20	15FA2201	Introduction to Direction for	CO1			2					3	
			CO2	2								2

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		Films	CO3				3		2			
			CO4				2					2
21	15EN2204	Employability Skills	CO1		2							
			CO2		3		2					
			CO3				2					
			CO4		2						2	
22	15FA2202	Introduction to Media theory	CO1				3	2				
			CO2				2	3				
			CO3	2			2					
			CO4					2	2			
23	15FA2203	Concepts of Post Production and Computer Graphics – II	CO1				2				2	
			CO2		3							3
			CO3				3				3	
			CO4	1								2
24	15FA2204	Visual Special Effects and Compositing Fundamentals	CO1		2			2				
			CO2			2						2
			CO3				3					
			CO4		2						2	
25	15FA2205	Advertisement Film Making	CO1			3		2				
			CO2		2		2					
			CO3								2	3
			CO4			2						2
26	15FA2206	Intermediate Documentary Film Making	CO1			3		2				
			CO2		2		2					
			CO3		2						2	
			CO4			2						2
27	15EN3206	Corporate	CO1		2							

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		Communication Skills	CO2		3			2				
			CO3					2				
			CO4		2					2		
28	15FA3101	VFX Pre Production	CO1				2			2		
			CO2		3							3
			CO3				3			3		
			CO4	1								2
29	15FA3102	Digital compositing – I	CO1			1				2		
			CO2			2				2		
			CO3		3							2
			CO4	2				2				
30	15FA3103	Rotoscopy and Keying	CO1			1				2		
			CO2			2				2		
			CO3		3							2
			CO4	2				2				
31	15FA3104	Character Effects	CO1			1				2		
			CO2			2				2		
			CO3		3							2
			CO4	2				2				
32	15FA3205	Shading, Lighting and Rendering – I	CO1				2			2		
			CO2		3							3
			CO3				3			3		
			CO4	1								2
33	15FA3106	3D Lab - I	CO1				2			2		
			CO2		3							3
			CO3				3			3		
			CO4									2

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34	15FA3201	VFX Pipeline and Management	CO1		2				2	3		
			CO2					3	2			
			CO3				2		2			
			CO4			2		2				
35	15FA3202	Digital Compositing – II	CO1			1						2
			CO2			2					2	
			CO3		3						2	
			CO4								3	2
36	15FA3203	Paint and Match Moving	CO1			1					2	
			CO2			2					2	
			CO3		3							2
			CO4	2				2				
37	15FA3204	3D Dynamics	CO1		2				2			
			CO2			2						
			CO3					3				
			CO4		2				2			
38	15FA3205	Shading, Lighting and Rendering – II	CO1				2				2	
			CO2		3							3
			CO3				3				3	
			CO4	1								2
39	15FA3206	3D Lab -II	CO1				2				2	
			CO2		3							3
			CO3				3				3	
			CO4									2
40	15FA4101	Media Laws	CO1					3	2			
			CO2					2	3			
			CO3	2				2				

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			CO4						2	2		
41	15FA4102	Media and New Media Business	CO1					3	2			
			CO2					2	3			
			CO3	2				2				
			CO4						2	2		
42	15FA4103	Marketing and Publicity Design	CO1					3	2			
			CO2					2	3			
			CO3	2				2				
			CO4						2	2		
43	15FA4104	Media 'Project Management'	CO1					3	2			
			CO2					2	3			
			CO3	2				2				
			CO4						2	2		
44	15FA4105	New Media and Technology	CO1					3	2			
			CO2					2	3			
			CO3		2						2	
			CO4						2	2		
45	15FA4106	Advanced Practical Film Making	CO1			3			2			
			CO2					2				3
			CO3		2						2	
			CO4			2						2
46	15IE4049	Minor Project	CO1								2	3
			CO2								2	3
			CO3						3		2	
			CO4	1				2				
47	15IE4050	Final Project	CO1								2	3
			CO2								2	3

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			CO3					3		2	
			CO4	1			2				

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**DEPARTMENT VISION**

To produce comprehensively trained, socially responsible and creative media professionals with global perspectives to serve the society and industry.

**DEPARTMENT MISSION**

<b>DM 1</b>	Provide Visual Media education through well designed curriculum to media professionals with an ability to solve real world problems using emerging technology.
<b>DM 2</b>	Create learning environment and providing facilities for creative thinking and personality development.
<b>DM 3</b>	Promote ethical and moral values among the students to enable them to emerge as responsible professionals.
<b>DM 4</b>	Establish Industry Institution Interaction to make students ready for the industrial environment

Programme - Bachelor of Science (Visual Communication)

Programme Type – Under Graduation , Duration – Three Years

**Programme Educational Objectives (PEO's)**

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<b>PEO 1</b>	Graduate Apply appropriate communication skills across settings, purposes, and audiences.
<b>PEO 2</b>	Graduates shall promote professionalism in the practice of visual communication.
<b>PEO 3</b>	Graduates with sense of responsibility and rooted in community involvement with a global perspective.

**Department Mission vs PEO'S Mapping**

	<b>DM1</b>	<b>DM2</b>	<b>DM3</b>	<b>DM4</b>
<b>PEO 1</b>	✓		✓	
<b>PEO 2</b>		✓	✓	✓
<b>PEO 3</b>	✓	✓		✓

**Programme Outcomes (PO's)**

<b>a</b>	Building a solid foundation in the elements, principles and process of visual design.
<b>b</b>	communicate effectively with clients and utilize the talents and strengths of design colleagues to develop the best design products.
<b>c</b>	applying fundamentals to solve increasingly complex design problems in technologically innovative ways
<b>d</b>	Engage in critical analysis of their own and their peer's creative work.
<b>e</b>	Explore media, communication and dissemination techniques to entertain via written, oral and visual media.
<b>f</b>	apply design principles to software in a manner that provides the skills to adapt to the

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	newest technologies in expectation for the technologies which will emerge in the future.
<b>g</b>	Understanding of and ability develop strategies for planning, producing, and disseminating visual communications.

Programme Specific Outcomes (PSO's)

<b>PSO 1</b>	Understand and make use the nature and basic concepts of print, electronic and new media productions.
<b>PSO 2</b>	Discover the relationships and adapt production procedures in contemporary print, electronic and new media industries.

**B.Sc. Visual Communication PEO'Svs PO'S Mapping**

	<b>PEO 1</b>	<b>PEO 2</b>	<b>PEO 3</b>
<b>a</b>	✓	✓	
<b>b</b>	✓	✓	✓
<b>c</b>		✓	✓
<b>d</b>	✓	✓	
<b>e</b>	✓		✓
<b>f</b>		✓	✓
<b>g</b>	✓	✓	
<b>PSO 1</b>	✓	✓	
<b>PSO 2</b>	✓	✓	

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## **COLLEGE OF LAW**

### **VISION**

3. To be a centre of excellence in legal education and research
4. To be a catalyst in law reforms.

### **MISSION**

1. To impart and disseminate knowledge of law and legal processes;
2. To develop among students and scholars of law a sense of social responsibility to serve the community in the field of law.

Program – Bachelor of Business Administration and Law (BBA; LL.B)

Duration – Five Years

Started in Academic Year 2015-2016

### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

5. Should be able to stimulate compassion and creativity in the field of legal profession.
6. Strengthen intellectual growth and the capacity to develop ingenious and conscientious solutions to unique and varying tribulations of society and business environment.
7. Acquire leadership capabilities necessary for the competent practice of law and lifelong learning in practice
8. Pursue advanced education, research and development, and other innovative and pioneering efforts in the field of law.

### **PROGRAM OUTCOMES (POs)**

The BBA; LL.B program in KL University is designed to meet the Program Outcomes as identified by Bar Council of India. These constitute a superset of program outcomes identified by National Assessment and Accreditation Council.

- m) Ability to gain knowledge of law and the application of such knowledge in practice;

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- n) Be proficient to use the fundamentals and vital principles in law;
- o) Identify and solve the social, economic and cultural issues in law;
- p) Ability to synthesis academic knowledge to legal problems and find solutions;
- q) Recognize the ethical and professional responsibilities and the norms of advocacy ;
- r) Ability to research, review, comprehend and utilize such knowledge for Law reform;
- s) Converse effectively and work in inter-disciplinary groups and legal institutions;
  
- t) To guide the trainee legal practitioners in the right direction;
- u) Ability to understand the real life situation in legal profession and practice;
- v) To make the student to learn aesthetically pleasing practice and make it socially relevant;

PSOs

- w) To equip skills required to deal with a fast changing business environment and legal arena (PSO1);
- x) To acquaint with technological developments and to make suitable changes in the field of law and legal profession(PSO2)

<b>Mission vs Program Educational Objectives</b>		
<b>PEO's</b>	<b>MISSION-1</b>	<b>MISSION-2</b>
<b>PEO 1</b>	✓	✓
<b>PEO 2</b>	✓	✓
<b>PEO 3</b>	✓	✓
<b>PEO 4</b>	✓	✓

<b>Program Educational Objectives vs Program Outcomes</b>
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	<u>PEO-1</u>	<u>PEO-2</u>	<u>PEO-3</u>	<u>PEO-4</u>
PO 1	✓	✓	✓	✓
PO 2	✓	✓		✓
PO 3	✓		✓	
PO 4			✓	✓
PO 5	✓	✓		✓
PO 6	✓		✓	
PO 7		✓	✓	✓
PO 8	✓	✓		✓
PO 9	✓		✓	
PO 10	✓		✓	✓

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KLU COLLEGE OF LAW																	
				PO-CO MAPPING													
S.No	CODE	TITLE	CREDITS	CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	
1	15BL11C0	General English and Legal Language	3	CO1: Understanding general english and legal language with accuracy.	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	
				CO2:Apply the reading Techniques to understand the concept fully.	✓	✓	✓		✓	✓		✓	✓	✓	☐	✓	
				CO3:Demonstrating the Professional mannerisams in Cour Room context	✓		✓	✓		✓	✓	✓	✓	✓		✓	
					☐	✓	✓	✓	✓	☐	✓	✓		✓	✓	✓	✓
2	15BL11C1	Principles of Management	4	CO1:Understand the key management concepts along with an insight into skills and functions of managers	✓	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				CO2:Understand the various tools and processes used in planning.	✓	✓		☐		✓	☐		✓	☐			
				CO3:Develop in-depth knowledge and insight into organization and staffing related issues.	✓	✓	✓	✓	✓	☐	✓	✓	✓	✓	✓	✓	
				CO4: Analyze the link betwven planning and controlling, and various menas of directing ,controlling there by developing the ability to resolve managerial issues and problems.	☐	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓
3	15BL11C2	Principles of Economics and Managerial	4	CO1:To understand the basic concepts of economics and responsiveness of consumers' demand to changes in the price of a	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

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		Economics		good or service, the price of other goods and services, and income.														
				CO2:Understand the different costs of production and how they affect short and long run decisions.	✓	☐	✓	✓	☐	✓	☐		✓	☐	☐	☐		
				CO3: To understand managerial economics and the theory of the firm to model business organizations.	✓	✓	✓	☐	✓	☐	✓	✓	✓	✓	✓	✓	✓	✓
				CO4:Analyze the real world market as being competitive, oligopolistic, or monopolistically competitive and to describe to a non-economist how that market structure affects firm decisions.	☐	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓	✓	☐	
4	15BL11C 3	Law of Torts	4	CO1:Understand the nature and extent of tortuous liability.	✓	✓	✓	✓	✓	✓	✓	✓	✓	☐		☐	✓	
				CO2:Understand and Disposition on issues of Law Of Trots.	✓	✓	✓		✓	☐		✓	✓	✓	✓	✓	✓	✓
				CO3:Apply the Principles of other laws to settle the dispute relating to Law Of Trots.	☐			✓		✓	✓	✓	✓	✓	✓	☐		
				CO4:Analyze the legal issues of the Law OfTrots and Consumer safety and Protection.	✓	✓		✓	✓	☐	✓		☐	✓	✓	✓	✓	✓
5	15BL11C 4	Law of Contracts – I	4	CO1:Understand the basic principles reklating to the conctrcts under the provisions of the Indian contract Act.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
				CO2:Understand the legal requirements relating to	✓		✓	✓		✓	✓	✓	✓		✓			

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				formation and performance of contracts.															
				CO3:Apply various remedies available for breach of contracts and other circumstances of discharge of contracts.	<input type="checkbox"/>	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓		✓	<input type="checkbox"/>	✓		
				CO4: Analyze the appropriate remedies in appropriate circumstance.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
6	15BL11C5	Introduction to Law and Legal system	4	CO1:Understand the concept of law.	✓	✓		✓		✓	✓		✓	✓					
				CO2:Understing the law and its interrelation with principles of ethics,religion and morality,	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3:Apply legal provisions to the legal issues.	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
				CO4:Analyze the legal issues by explaining the structure and working of legal systems.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	15ES119	Introduction to I.T	4	CO1:Understand the importance of a coputes,devices, basic concepts of software and networks.	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		
				CO2: Evaluate various formating option of MS Word	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3:Understand different features of presenatation and Spreadsheet.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	15BL12C0	Legal Professional Communicati on Skills	3	CO1:Understanding professional communication skills with accuracy	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓		
				CO2: Applying the reading technique to understand the context fully.	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓		

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		(English – II)		CO3: Demonstrating the professional manner in a courtroom context.	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	
9	15BL12C 1	Human Resource Management	4	CO1: Integrated perspective on role of HRM in modern business.	✓		✓	✓		✓	✓	✓	✓		✓		
				CO2: Ability to plan human resources and implement techniques of job design.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
				CO3: Competency to recruit, train, and appraise the performance of employees.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO4: Rational design of compensation and salary administration and ability to handle employee issues.	✓	✓		✓		✓	✓		✓	✓			
10	15BL12C 2	Business Environment	4	CO1: Out line various components of business environment.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				CO2: Recognize, distinguish, paraphrase and explain impact of business environment on business activities.	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
				CO3: Apply the knowledge to analyze the current situation take prudent decisions .	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO4: Identify, distinguish and present the various facts and uniqueness of the any components of the Business Environment.	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
11	15BL12C 3	Corporate Law	4	CO1: Understand the core concepts in the legal structure of the formation, operation and fundamental aspects of the company.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

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				CO2: Apply the main statutory provisions of the company and other relevant enactments of the company.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3:Analyze the legal provisions to the legal issues arising in incorporation,functions and operations of the company.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	15BL12C 4	Law of Contracts – II	4	CO1: Understand the core concept in the legal structure of contracts,partnership,sale of Goods etc.	✓			✓		✓	✓	✓	✓	✓	✓	
				CO2: Apply the main statutory provisions of the Contract ,partnership and Sale of Goods etc.	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓
				CO3: Analyze legal provisions to the legal issue arising in some of the main day to day dealing of the business.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
14	15BL12C 6	Cyber Security	4	CO1:Introduction to Information System,Development of Information System,Introduction to information security, Cyber security.	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
				CO2:Analyze Application Security, Archival Storage and Disposal of Data, Identifying security Threats, security ?Threats to E-Commerce.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3:Caterorize Developing Secure Information System, Security Architecture & Design Security Issues, Physical Security of IT Assets, CCTV and instruction	☐	✓	✓	✓	✓	✓	✓		✓	✓	☐	✓

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				Detection Systems.													
				CO4: Analyze Why Policies should be Developed?, Publishing and Notification Recruitment of the policies, Information security standards- ISO, IT Act 2000 Provisions, Intellectual Property Law.	✓	✓	☐	✓	✓	☐	✓	✓	✓	✓	✓	✓	✓
15	15BL21C0	Marketing Management	4	CO1: Explain the key terms, definitions, and concept used in the study of Marketing Management.	✓	✓	✓	✓	✓	✓	☐	✓	✓	✓	✓	✓	✓
				CO2: Apply the Knowledge of marketing concepts to analyze changing marketing environment and factors influencing success in the market.	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3: Evaluate the effectiveness of marketing decisions and their applicability in a given environment.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	☐	✓
				CO4: Create better programs and strategies based on the knowledge of Marketing concepts.	✓			✓		✓	✓	✓	✓	✓	✓	✓	
16	15BL21C1	Macro Economics	4	CO1: Understand the macro economy by using National Income, full employment and unemployment.	✓	✓		✓	✓	☐	✓		✓	✓	✓	✓	✓

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				CO2:Understand the concepts of Classical Theory, Keynes's Theory of Income and Employment, Consumption function, Investment function, Multiplier and Accelerator and Inflation.	<input type="checkbox"/>	✓	✓		✓	✓		✓	✓	✓	<input type="checkbox"/>	✓
				CO3:Understand the Money meaning and it's functions. Analyze monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run.	✓		✓	✓		✓	✓	✓	✓		✓	
				CO4:Understand how comparative advantage provides the basis for gains through trade.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
17	15BL21C 2	Financial and Cost Accountancy	4	CO1:To gain comprehensive understanding of all aspects relating to financial statements,principles,procedure of accounting and their application to different partial situation.	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓
				CO2:Understand and explain the conceptual frame work of accounting.	<input type="checkbox"/>	✓		✓		✓	✓		✓	✓		
				CO3:Prepare accounts for various entities under different situations.	✓	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓
				CO4:Acquire basic concepts of cost accounting relevant for managerial decision making	✓	<input type="checkbox"/>		<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	✓		<input type="checkbox"/>	✓	✓
18	15BL21C 3	Constitutional Law – I	4	CO1:The student will be able to understand the law relating to constitutional functionaries.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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				CO2:The students will be able to acquire knowledgement relating to three different organs of state and their powers and functions.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
				CO3:The students will be able to grasp the basic ideology about legislature,executive and judiciry and their sphere of activity.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				CO4:The students will be able to understand the nature of performance of three organs of state and also appriate the law governing relationshipbetwn them and their working.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
19	15BL21C 4	Law of Crimes - I	4	CO1: The students will be able to understand the concept of crime,princlpkes,definition and essential ingredients.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
				CO2:The students will be able to attain the basic concept of general exceptions to the criminal liability.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
				CO3:The students will be able to apply the general principles to various kinds of offences and its criminal liability under the indian penal code.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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20	15BL21C 5	Family Law – I	4	CO1:The students will be able to get full knowledge about family system and different aspects of marriage under various personal Laws.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				CO2:The students will be able to acquire full knowledge about divorce and maintenance under various personal Laws	☐		✓	✓	✓	✓	✓	✓	✓	✓		
				CO3:The students will be able to get full knowledge about legitimacy, conditions relating to adoption, various kinds of guardians and their powers and also working of Family Courts.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
				CO4:Finally the learner develops his professionalism by applying the rules in solving various disputes between the parties to the marriage.	✓	☐	✓	✓	✓	☐	✓	✓	✓	✓	✓	✓
21	15BL22C 0	Dynamics of Social Change	4	CO1: Understand the core concept of the society in sociological perspectives.	✓	✓		✓		✓	✓		✓	✓		
				CO2:Apply the principles of sociology to the relevent issue and problems of social change.	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3:Analyze the different theories of sociology on the different dimensions of the social change.	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
					✓	✓	✓	✓	✓	☐	✓	✓	✓	✓	✓	✓
22	15BL22C 1	Financial Management	4	CO1:To gain comprehensive understanding of all aspects relating to financial managementr and basics of	✓	☐	✓	✓	✓	✓	✓	✓	✓	✓		

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				management of business finance.														
				CO2:Evaluate the financial and divided decisions by using different techniques of valuation.	<input type="checkbox"/>	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓
				CO3:Evaluate the Long term and short term investment decisions.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO4:Determine the working capital requirement in order to maintain optimum level of working capital in the organosation.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	15BL22C 2	Management Information Systems	4	CO1:Understand the information needs of an organization and business function.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
				CO2: Evaluate effectiveness of decision making process and identify its tools.	✓			✓		<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	
				CO3:Understand DSS techniques for making effective decisions.	<input type="checkbox"/>	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
				CO4:Design paremeters for MIS application , for data analysis uses.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
24	15BL22C 3	Constitutional Law – II	4	CO1:The students will be able to understand the law relating functionaries.	✓		✓	✓		<input type="checkbox"/>	✓	✓	✓		✓		✓	
				CO2: The student will be able to acquire knowledge relating to three different organs of state and their powers and functions.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

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				CO3: The students will be able to grasp the basic ideology about legislature, executive and judiciary and their sphere of activity.	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
				CO4: The student will be able to understand the nature of performance of three organs of State and also appreciate the law governing relationship between them and their working.	✓	✓		✓		✓	✓		✓	✓				
25	15BL22C4	Administrative Law	4	CO1: The basic distinction between the constitutional law and administrative law.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
				CO2: Various methods and procedure to be adopted by the administrative authorities while exercising their powers.	✓	<input type="checkbox"/>		✓	✓	✓	✓	✓		✓	✓	✓		
				CO3: The jurisdiction of court and the extent of judicial review of administrative action.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	✓		
26	15BL22C5	Family Law – II	4	CO1: The student will be able to get full knowledge of succession issues in Hindu family law.	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓		
				CO2: The students will be able to acquire rich understanding of succession issues in Muslim personal Law.	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
				CO3: The students will be able to get full knowledge about succession issues in Christian Family law.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		

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				CO4:Finally the learner is able to apply such principles of solution in dispute settlement.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
27	15BL31C0	Organizational behavior	4	CO1:Understand concept of managing individual behaviour.	☐			✓		✓	✓	✓	✓	✓	✓	
				CO2: Understand managing groups with an understanding of the group behaviour and leadership.	✓	✓		✓	✓	☐	✓		✓	✓	✓	✓
				CO3:Analyse various motivational levels of people and competitive business environment.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
				CO4:evaluate organizational culture and implement organization change and Development interventions.	✓		✓	✓		✓	✓	✓	✓		✓	
28	15BL31C1	Management accounting	4	CO1: To gain comprehensive understanding of all aspects relating to management accounting, principles and procedure of financial statements.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
				CO2: Understand and explain the conceptual framework of ratio analysis.	✓	✓	✓	✓	✓	☐	✓	✓	✓	✓	✓	✓
				CO3: Understand the preparation of funds flow statements.	✓	✓		✓		✓	✓		✓	✓		
				CO4:Acquire basic concept of cash flow statements.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	☐	✓
29	15BL31C2	Labour law – i	4	CO1:The student will be able to UNDERSTAND THE Law Relating to labour vis-a-vis Employers.	☐	✓		✓	✓	✓	✓	✓		✓	✓	

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				CO2:The learner will be proficient to acquire knowledge relating to various labour legislations available in India.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3: The student will be capable to grapple the basic problems of labour against employers such as situation of labour, service conditions and division of labour, discipline of labour and their sphere of activity.	✓	✓	✓	✓	✓	☐	✓	✓	✓	✓	✓	✓
				CO4:The students will be competent to recognize the possible disagreements between labour and employers and provide the solution for them.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	☐	✓
30	15BL31C3	Jurisprudence	4	CO1: Students will be familiar with basic concepts of Jurisprudence .	✓	✓	✓	✓	✓	✓	✓	✓	☐	✓	✓	✓
				CO2: Students will gain knowledge as to various schools of thought. Students will be able to distinguish differences between various schools of thoughts and their relevance to the present context. Students also be familiar with Sources of Law.	☐	✓	✓	✓	✓	☐	✓	✓	✓	✓	✓	✓
				CO3: Students will learn judicious application of mind to various Jural Concepts of law.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
					☐			☐		☐	☐	☐	☐	☐	☐	
31	15BL31C4	Law of property	4	CO1:The student will be able to learn different ways of transferring property.	☐	✓		✓	✓	☐	✓		✓	✓	✓	✓

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				CO2:The students will have deeper understanding of procedural understanding of transfer of property.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
				CO3: Improve ability to examine the substantive blaw relating to particular transfers such as sale, mortgage,lease,exchange ,gift and actionalbe claims and Easements Act,1882.	✓		✓	✓		✓	✓	✓	✓		□	
					□	✓	✓	✓	✓	□	✓	✓		✓	✓	✓
32	15BL31C5	Public international law	4	CO1:The students will be able to understand the concept of public international law.	✓	✓	✓	✓	✓	□	□	✓	✓	✓	✓	✓
				CO2:The students will be able to acquire Knowledge about basic concept of various international institutions.	✓	✓		✓		✓	✓		✓	□		
				CO3:The students will be able to apply the general principles of public international law and its adoption under the Indian Law.	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	✓	✓
					✓	□		✓	✓	✓	✓	✓		□	✓	✓
33	15BL32C0	Quantitative methods	4	CO1:Graphical representation of a given numerical data through its frequency distribution and also calculation of various measures of location and dispersion.	□	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓
				CO2:To estimate the closeness of Bivariate data and its predictions.	✓	✓	✓	□	□	✓	✓		✓	✓	□	□

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				CO3:Determines the chances of occurrences of an event through various probability distributions .	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
					✓	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
34	15BL32C 1	Interpretation of statutes		CO1: Make students aware of the need for statutory interpretation given the imprecision of language and impossibility of anticipating all future events.	☐	✓	✓	✓	✓	☐	✓	✓	✓		✓	✓		
				CO2: Introduce students to various theories of interpretation and familiarize them with positions of scepticism and faith in judicial process.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	
				CO3: Enable students to understand and apply various canons of statutory interpretation followed in the common law legal system.	✓			✓		✓	✓	✓	✓	✓		☐		
				CO4:Develop among students the skills involved in legislative drafting	☐	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
35	15BL32C 2	Labour law – ii	4	CO1:The student will be able to understand the law relating to Wages and factors influencing labour and employer relations.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		
				CO2:The learner will be proficient to acquire knowledge relating to various social security legislations available in India.	✓		✓	✓		✓	✓	✓	✓		✓			

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				CO3:The trainee will be capable of grapple the basic problems of labour against employers such as payment of wages, minimum wages and compensation in respect of employment injuries and retirement benefits etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				CO4:The student will be competent to identify the possible differences between labour and employers in respect of social security & remuneration aspects and provide for the resolution of such incongruity.	□	✓	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	✓	
36	15BL32C 3	Law of Banking and N.I.Act	4	CO1:Students will learn various services of banks do have a significant contribution to the development of the economy as such the security to the assets like Money as well as other valuables belonging to individuals and family units is to a large extent assured.	✓	□		✓		✓	✓		✓	✓				
				CO2:The variety of assistance tended by the banks to the common people and business community cannot be overemphasized in this context.	✓	✓	✓	□	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO3: The process of the working of the banks and the legal control over them as well as the protection to the consumers of banking services are areas which a student of law is necessarily familiar with.	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	

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					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
37	15BL32C 4	Human rights law	4	CO1:1. Students will have international perspective of law and Human Rights.	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	✓		✓	✓	✓	<input type="checkbox"/>
				CO2:2. students will be conversant about various conventions and Protocols on Human Rights	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓
				CO3:3. Students will develop analytical frame work of Municipal & International laws with regard to human rights.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
					<input type="checkbox"/>	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓		✓	✓
38	15BL32C 5	Moot Court training-I	2	CO1:• Articulate the arguments relevant for the competition case.	✓	✓	✓		✓	✓		✓	✓	✓	<input type="checkbox"/>	✓
				CO2:• Define the structures and general procedures of the Courts in India.	✓			✓		✓	✓	✓	✓	✓	✓	
				CO3:• Understand and competently utilize the rules of procedure, protocol, and negotiating techniques common to Moot Court competitions;	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓
				CO4:• Explain the rationale, format, and instructional methods of the Moot Court simulation.	<input type="checkbox"/>	✓	✓		✓	<input type="checkbox"/>		✓	✓	✓	✓	✓
39	15BL32C 6	Mobile device threats & investigation	3	CO1: Students will be familiar with mobile technological investigating tools/mobile applications.	✓		✓	✓		✓	✓	✓	✓		✓	
				CO2:Students will know the associated legal aspects of the mobile applications.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
				CO3: acquire the the necessary knowledge of	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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				mobile threats													
					<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>			
40	15BL41C0	Intellectual Property Rights	4	CO1: able to understand the basics of IPR Law	✓	✓	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	
				CO2: able to apply the same in the profession	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
				CO3: analyze legal provisions to the legal issue arising in copy rights and patent laws	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
					✓	✓	✓	✓	✓	<input type="checkbox"/>	✓		✓	✓	✓	✓	
41	15BL41C1	Law of Taxation	4	CO1: acquire the basic concepts of tax laws	✓	✓	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	✓	✓	<input type="checkbox"/>	✓	
				CO2: builds good practice of tax matters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				CO3: acquaint with the formal procedures of tax matters	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	✓	
42	15BL41C2	Law of Insurance	4	CO: able to understand nature of insurance contracts	✓			✓		✓	✓	✓	✓	✓	✓		
				CO2: able to apply the same in the profession	✓	✓		✓	✓	✓	✓		✓	✓	<input type="checkbox"/>	✓	
				CO3: able to settle the disputes of insurance claims.	✓	✓	✓		✓	<input type="checkbox"/>		✓	✓	✓	✓	✓	
				CO4: apply the principles of different insurance and the respective liabilities and rights.	<input type="checkbox"/>		✓	✓		✓	✓	✓	✓		✓		
43	15BL41C3	Environmental Law	4	CO1: able to understand the basics of environmental Law.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
				CO2: able to apply constitutional law protections	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	
				CO3: familiar with litigations in environmental law issues.	✓	✓		✓		<input type="checkbox"/>	<input type="checkbox"/>		✓	✓			

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				CO4: able to settle issues of environmental law.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
44	15BL41C4	Cyber Law	4	CO1:acquires knowledge of Information System,	☐	✓		☐	✓	✓	✓	✓		☐	✓	✓
				CO2: Application of cyber law in respect of infringements of privacy rights	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				CO3: basic knowledge of e commerce and data protection etc	✓	✓	✓	✓	☐	☐	✓		✓	✓	✓	☐
				CO4: Anylyze Why Policies schould be Developed?,Publishing and Notification Recruitment of the policies,Information security standards- ISO,IT Act 2000 Provisions,Intellectual Property Law.	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓	☐	✓
45	15BL41C5	Seminar – I CHOICE	2	CO1: student must personally collect material and put it in systamatic writing	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO2: student will be given training in article writing	✓	✓	✓	✓	✓	✓	✓	✓	☐		✓	✓
				CO3: present the same in seminar with updated knowledge	✓	✓	✓		✓	☐		✓	✓	✓	✓	✓
					✓			✓		✓	✓	✓	✓	✓	✓	
46	15BL42C0	Code of Civil Procedure and Law of Limitation	4	CO1: able to understand basic procedures of civil litigation.	✓	✓		✓	✓	✓	✓		✓	✓	☐	✓
				CO2: able to apply special procedures in respect of particular suits.	☐	✓	✓		✓	✓		✓	✓	✓	✓	✓
				CO3: acquires knowledge in court procedures and jurisdictional issues.	✓		✓	✓		☐	✓	✓	✓		✓	

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				CO4: also acquaints with the knowledge of appeal procedures and review procedures.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
47	15BL42C 1	Law of Crimes – II ( Cr.P.C )	4	CO1: able to understand basic procedures of criminal litigation.	✓	✓	✓	☐	✓	✓	✓	☐	✓	✓	✓	✓
				CO2: able to apply special procedures in respect of particular criminal case summons case,warrant case	✓	✓		✓		✓	✓		✓	✓		
				CO3: acquires knowledge in court procedures and jurisdictional issues.	✓	☐	✓	☐	✓	☐	☐	✓	✓	☐	✓	✓
				CO4: also acquaints with the knowledge of appeal procedures and review procedures.	☐	✓		✓	✓	☐	✓	✓		✓	✓	✓
48	15BL42C 2	Law of Evidence	4	CO1: acquires knowledge of adducing evidence on either side of parties	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO2: able to conduct cases in procedure for examination of witness etc	✓	✓	✓	✓	☐	✓	✓		✓	✓	☐	☐
				CO3: able to lead and conduct cross examination of witness.	✓	☐	✓	☐	✓	☐	✓	✓	✓	✓	✓	✓
				CO4: able to settle issues relating to burden of proof.	☐	✓	✓	✓	✓	✓	✓	✓	☐	✓	✓	✓
49	15BL42C 3	Theories of Justice	4	CO1: understands the concepts of law and justice system	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
				CO2: understands the theories of justice while implementing the laws enforcement.	☐	✓	✓		✓	✓		✓	✓	✓	✓	✓
				CO3: able to apply the basic principles of social justice ,economic justice etc.	✓			✓		✓	✓	✓	✓	✓	☐	

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				CO4: learns justice delivery systems and their objectives.	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓		
50	15BL42C 4	Media law & Right to Information Act	4	CO1: learns the basic rights of freedom of speech and expression	☐	✓	✓		✓	✓		✓	☐	✓	✓	✓		
				CO2: acquires the knowledge of rights of persons to know the information from public offices	✓		✓	✓		✓	✓	✓	✓		✓			
				CO3: able to apply right to information as a tool to have good governance.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
				CO4	☐	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
51	15BL42C 5	Moot Court Training – II	2	CO1: able to advance the arguments relevant for the competition case.	✓	✓		✓		✓	✓		✓	✓				
				CO2: acquires basic structures and general procedures of the Courts in India.	✓	✓	✓	✓	✓	☐	☐	✓	✓	✓	✓	✓	✓	
				CO3:• Understand and competently utilize the rules of procedure, protocol, and negotiating techniques common to Moot Court competitions;	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	
				CO4:• able to apply the rationale, format, and instructional methods of the Moot Court simulation.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
52	15BL51C 0	Alternate Dispute Resolution	4	CO1: understands the nature of ADR	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
				CO1: able to dispose of the legal matters in the lok adalat quickly.	✓	✓	✓	✓	✓	✓	☐	✓	✓	✓	☐	✓	✓	
				CO3: able to give advice the parties to go for legal aid .	✓	✓	✓	✓	✓	☐	✓	✓	☐	✓	✓	✓	✓	
				CO4: apply the ADR for settlement of disputes in	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	

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				legal process.													
53	15BL51C 1	Drafting, Pleading and Conveyance	4	CO1: understands the drafting principles in preparation of documents necessary for submission to courts.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓
				CO2: acquires the knowledge of guidelines for the drafting of various pleadings for court procedures.	✓			✓		✓	✓	✓	✓	✓	□		
				CO3: acquaint with the drafting of conveyance of documents.	✓	✓		✓	✓	□	✓		✓	✓	✓	✓	✓
				CO4: understands the practice of legal profession through documentation.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓
54	15BL51C 2	Criminology, Penology and Victimology	4	CO1: understands the basic traits of criminal.	✓		✓	✓		✓	✓	✓	✓		✓		
				CO2: able to verify and apply the penal provision for appropriate case.	✓	✓	□	✓	✓	✓	✓	□		✓	□	✓	
				CO3: understands the sufferings of victims and justify them in dealing with their cases.	✓	✓	✓	□	✓	□	✓	✓	✓	✓	✓	✓	✓
				CO4: learns the circumstances in which victims entitle to compensation.	□	✓		✓		✓	✓		✓	✓			
55	15BL51C 3	Seminar II (CHOICE)	2	CO1: student must personally collect material and put it in systematic writing	✓	□	✓	✓	✓	✓	□	✓	✓	□	✓	✓	
				CO2: student will be given training in article writing	✓	✓		✓	✓	✓	□	✓		✓	✓	✓	✓
				CO3: present the same in seminar with updated knowledge	□	✓	✓	□	✓	□	✓	✓	✓	✓	✓	□	✓

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				CO4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
56	15BL51C 4	Seminar III (CHOICE)	2	CO1: student must personally collect material and put it in systematic writing	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>			
				CO2: student will be given training in article writing	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓		
				CO3: present the same in seminar with updated knowledge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	
				CO4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
57	15BL52C 0	Professional Ethics and Professional Accountancy system	4	CO1: learns the concepts of professional ethics.	✓			✓		✓	✓	✓	✓	✓	✓	✓				
				CO2: able to maintain the good relations among bench and bar	✓	✓		✓	✓	<input type="checkbox"/>	✓		✓	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	
				CO3: to be able to extend good advocacy and maintains professional conduct.	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
				CO4: learns to protect himself from any contempt proceedings in case of his deviant behaviour in court	<input type="checkbox"/>		✓	✓		✓	✓	<input type="checkbox"/>	✓		✓		✓		✓	
58	15BL52C 1	Moot Court Exercises-111	4	CO1: able to advance the arguments relevant for the competition case.	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓		✓	✓	✓	✓			
				CO2: acquires basic structures and general procedures of the Courts in India.	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	✓	✓	
				CO3: • Understand and competently utilize the rules of procedure, protocol, and negotiating techniques common to Moot Court competitions;	✓	✓		✓		<input type="checkbox"/>	✓		✓	✓		✓	✓			

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				CO4:• able to apply the rationale, format, and instructional methods of the Moot Court simulation.	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓
59	15BL52C 2	Gender Justice and Feminist Jurisprudence	4	CO1: learns basic concepts of gender justice	✓	✓		✓	✓	✓	✓	✓		<input type="checkbox"/>	✓	✓
				CO2: able to apply the concept of certain protections of women against men	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	<input type="checkbox"/>	✓	✓	✓	<input type="checkbox"/>	
				CO3: understands the discriminative laws in our country about succession, property rights etc.	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓		✓	✓	<input type="checkbox"/>	✓
				CO4: learns the studies for balancing the rights of gender discrimination.	✓	✓	✓	✓	✓	<input type="checkbox"/>	✓	✓	<input type="checkbox"/>	✓	✓	✓
60	15BL52C 3	Final Internship	8	CO1: the student be able to maintain a diary to record the proceedings of his internship at every year in their course of study.	<input type="checkbox"/>	✓	✓	✓	<input type="checkbox"/>	✓	✓	✓	✓	✓	✓	<input type="checkbox"/>
				CO2: learns about the pleadings both civil and criminal.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
				CO3: understands the various stages of cases at the court trails.	✓	✓	✓		✓	✓		✓	✓	✓	<input type="checkbox"/>	✓
				CO4: learns the court formalities and maintainence of decency and decorum of the court.	✓			✓		✓	✓	✓	<input type="checkbox"/>	✓	✓	

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**K L UNIVERSITY**  
**DEPARTMENT OF CHEMISTRY**  
**PROGRAM DEVELOPMENT DOCUMENT**  
**M.Sc Chemistry**  
**2017**

**Vision of University:**

To be a globally renowned university.

**Mission of University:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**VISION:**

Attaining new heights in academic and research with global perspective for creation of health, wealth and welfare by applying engineering knowledge, creativity and technologies that will provide solutions to environmental, industrial, agricultural and health based problems.

**MISSION:**

M1. To develop a top-notch research centre with State-of-the art infrastructure facilities to foster scientific research and technology development programs.

M2. To offer a comprehensive exploration of basic science, applied science, and lab science with an industry focus and to act collectively like a catalyst in enhancing, improving and supporting interdisciplinary research and training in cutting edge technologies to fit for industry and entrepreneur.

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M3. To provide a quality education in pursuit of knowledge, that establishes a strong foundation for understanding developments in the rapidly advancing field of biotechnology with the development of new biochemical technologies and therapies through research and education.

M4. To provide the nation with highly trained professional who are able to implement the scientific principles to the continuous improvement of the safe, quality and value biotechnological services and products.

M5. Ensuring empowerment of India's incomparable human resource by creating strong infrastructure both for research and commercialization

#### PROGRAMME EDUCATIONAL OBJECTIVES:

The Program Educational Objectives (PEOs) are as follows:

**PEO-1:** To prepare students for successful practice in diverse fields of Chemical Sciences such as pharmaceutical, chemical, polymer / advanced material, energy, biotechnology and environmental engineering and in the fields of Societal expectations on time.

**PEO-2:** To prepare students for advanced studies in Chemical sciences and its allied fields.

**PEO-3:** To ensure our students to achieve excellence and get selected for high-ranking industrial, academic, Government and other professional positions, as well as to inculcate leadership qualities.

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**PEO-4:** To develop graduate's skills and awareness to become socially, ethically and morally responsible individual in all the challenges they take over, in our communities and in the field of chemical Sciences.

PROGRAMME OUT COMES: ( PO:)

### Programme Outcomes

- (a) An ability to identify, formulate and solve chemical problems.
- (b) An ability to design a system, component, or process to meet the desired needs.
- (c) An ability to design and conduct experiments, as well as to analyze and interpret data.
- (d) An ability to communicate effectively.
  
- (e) An understanding of professional and ethical responsibility.
- (f) An ability to function on multidisciplinary teams.
- (g) The broad education necessary to understand the impact of chemical solutions in a global and societal context.
- (h) A recognition of the need for, and an ability to engage in lifelong learning.
- (i) A knowledge of contemporary issues.

### MAPPING OF PEOs with MISSION OF THE DEPARTMENT:

S.No	Description of PEOs	Key Components of Mission			
		M 1	M 2	M 3	M 4

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		To prepare students for successful practice in diverse fields of Chemical Sciences	To offer a comprehensive exploration of basic science	To offer a comprehensive exploration of basic science	To provide the nation with highly trained professional who are able to implement the scientific principles
PEO 1	To prepare students for successful practice in diverse fields of Chemical Sciences	.	. ✓	. ✓	
PEO 2	To prepare students for advanced studies in Chemical sciences and its allied fields		✓		✓
PEO 3	To ensure our students to achieve excellence and get selected for high-ranking industrial, academic, Government and other professional positions	✓			
PEO 4	To develop graduate's skills and awareness to become socially, ethically and morally responsible individual in all the challenges	✓		✓	✓

### MAPPING OF POs/PSOs with PEOs:

S No.	Key Components of POs and PSOs	Description of PEO			
		To prepare students for successful practice in diverse fields of Chemical Sciences	To prepare students for advanced studies in Chemical sciences and its allied fields	To ensure our students to achieve excellence and get selected for high-ranking industrial, academic, Government and other professional positions	To develop graduate's skills and awareness to become socially, ethically and morally responsible individual in all the challenges

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		<b>PEO 1</b>	<b>PEO 2</b>	<b>PEO 3</b>	<b>PEO 4</b>
PO1	An ability to identify, formulate and solve chemical problems	✓	✓		✓
PO2	An ability to design a system, component, or process to meet the desired needs.	✓	✓		✓
PO3	An ability to design and conduct experiments, as well as to analyze and interpret data	✓	✓		✓
PO4	An ability to communicate effectively	✓	✓		✓
PO5	An understanding of professional and ethical responsibility	✓	✓		✓
PO6	An ability to function on multidisciplinary teams	✓	✓	✓	✓
PO7	An ability to function on multidisciplinary teams	✓	✓	✓	✓
PO8	The broad education necessary to understand the impact of chemical solutions in a global and societal context	✓	✓	✓	✓

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PO9	A recognition of the need for, and an ability to engage in lifelong learning	✓	✓	✓	✓
PO10	A knowledge of contemporary issues	✓	✓	✓	✓

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**K L UNIVERSITY**  
**DEPARTMENT OF CHEMISTRY**  
**2017-2019 M.Sc BATCH Course Outcomes vs Program Outcomes**  
**Course Articulation Matrix**

S No	Course Code	Course Title	CO NO	Description of the Course Outcome	Program Outcomes									
					1	2	3	4	5	6	7	8	9	10
1	16 CY 1101	<i>General Chemistry-I</i>	CO1	Classification and explanation of analytical data	2									
			CO2	Illustrate the Titrimetric Analysis	2									
			CO3	Description and Application of Visible spectrophotometry and potentiometry	2									
			CO4	Develop the small computer codes using any one of the languages FORTRAN/C/BASIC	2									
2	16 CY	<i>Inorganic Chemistry- I</i>	CO1	the bonding fundamentals for both ionic and covalent compounds, including electronegativities, bond distances and bond energies using MO diagrams and										

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	1102			thermodynamic data										
			CO2	predicting geometries of simple molecules	2									
			CO3	the use of group theory to recognize and assign symmetry characteristics to molecules and objects, and to predict the appearance of a molecule's vibrational spectra as a function of symmetry	2									
			CO4	the bonding models, structures, reactivities, and applications of coordination complexes, boron hydrides, metal carbonyls, and organometallics	2									
				The design and application of an analysis related to a question of relevance based on experience in the laboratory and research of the scientific literature. The application of analytical methods based on titrations, separations, mass spectrometry, electrochemical measurements, and spectroscopy at an introductory level										
3	16 CY 1103	<i>Organic Chemistry-I</i>	CO1	Understand the basics of Stereo Chemistry, Green Synthesis & Substitution reactions.	1									

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			CO2	Identify the stereo isomerism in many newly synthesized drugs	1														
			CO3	Understand the concept of NGP, Aromaticity and Nucleophilic substitution reactions.	1														
			CO4	Design the green synthetic approaches to replace conventional synthesis methods	1														
			CO5	Knowledge in this course will train the students in scientific research approach.				2											
4	16 CY 1104	<i>Physical Chemistry-I</i>	CO1	Concepts of Classical thermodynamics & laws of thermodynamics	2	2													
			CO2	Applications of macromolecules & Micells.	2	2													
			CO3	Discuss the different aspects of kinetics of the types of reactions	2	2													
			CO4	To understand the concepts of photo chemistry & luminescence				2											
			CO5	An ability to analyze, generate experimental skills towards the industrial applications.	2	2		2											
5			CO1		1				1										

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				Symmetry and Group theory of the molecules													
	16 CY			CO2	Energy associates with the degrees of freedom	1				1							
	1205		<i>General Chemistry-II</i>	CO3	Classical and quantum theories of Raman and Electronic Spectra of diatomic molecules and poly atomic molecules												
				CO4	Basic principles and Applications of Nuclear Magnetic Resonance Spectroscopy												
6	16 CY		<i>Inorganic Chemistry- II</i>	CO1	Understand the principles behind the formation of metal cluster compounds.	2	2										
	1206			CO2	Explain the synthesis, properties, bonding and structures of $\pi$ -complexes of transition metals,	2	2										
				CO3	Illustrate, the principles behind the Metal Ligand equilibria in solution with respect to the formation, their Kinetic and thermal stability, and determinations.	2	2										
				CO4	Explain the features of Inorganic reaction mechanisms		2										

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			CO5	Expertise the student in the semi-micro qualitative analysis of mixtures containing some interfering radicals and rare cations					2						
7	16 CY 1207	<i>Organic Chemistr-II</i>	CO1	Derive the Electrophilic addition reaction mechanisms of C=C compounds					2						
			CO2	Describe the relationship among aromatic substitution and addition reactions.					2						
			CO3	Apply various reaction pathways to develop new and notable organic compounds.					2						
			CO4	Differentiate the Alkaloids and Terpenoids by their unique properties.					2						
			CO5	An ability to analyze, generate experimental skills towards the industrial applications.					2						
8	16 CY 1208	<i>Physical Chemistry-II</i>	CO1	Physical methods of molecular structure determination.											1
			CO2	Application of Electron Spin Resonance spectroscopy.											2
			CO3	Discuss fundamental aspect of electrochemistry for energy device application.											2
			CO4	Electrochemistry of electrode electrolyte interface											

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			CO5	An ability to analyze, generate experimental skills towards the industrial applications.													2						
9	16 CY 2109	Organic Reaction Mechanisms and pericyclic reactions	CO1	Ability to apply nucleophilic /electrophilic pathway to synthesize new organic entities	2																		
			CO2	Apply aromatic nucleophilic and free radical substitution mechanisms in new chain linkages	2																		
			CO3	Understand organic reaction mechanism in terms of pericyclic reactions at different conditions.	2																		
			CO4	Ability to explain pericyclic reactions involved in various organic rearrangement reactions.	2																		
			CO5									2											
			CO5																				
10	16 CY 2110	Organic Spectroscopy - I	CO1	Evaluate theoretical and experimental methods of analysis using IR spectroscopy	2															2			
			CO2	Evaluate theoretical and experimental methods of analysis using UV spectroscopy	2																	2	
			CO3	Understand proton NMR & 13C NMR and mass spectrometry methods of analysis	2																		2
			CO4	Able to apply spectroscopic methods (UV,IR,1H-NMR,13C-NMR	2																		2

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				& mass spectrometry) in organic structure elucidation.																
			CO5		2													2		
11	16 CY 2111	Organic Synthesis-I	CO1	Build carbon-carbon single bond associated molecules (carbenes-carbenoids)			2	2												
			CO2	Develop carbon-carbon double bonds using notable elimination reactions			2	2												
			CO3	Make use of organic polymerization processes			2	2												
			CO4	Understand the applications of organic boranes.			2													
			CO5				2	2												
12	16 CY 2112	<i>Natural Products</i>	CO1	Illustrate the synthesis and significance of microbial metabolites			1													
			CO2	Outline the origin & chemical nature of Terpenes	1			1												

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			CO3	Outline the origin & chemistry of Alkaloids	1			1							
			CO4	Demonstrate properties & synthetic methods of peptides	1			1							
			CO5					2							
13	16 CY 2214	Organic Reaction Mechanisms and organic photochemistry	CO1	Adopt addition and elimination mechanism in order to understand selected named reactions	2	2									
			CO2	Conclude classification and mechanistic treatment of nucleophilic, electrophilic and free radical rearrangements.	2	2									
			CO3	Summarize basic concepts behind organic photo chemistry	2	2									
			CO4	Select and photo chemical concepts to generate enone and aromatic compounds.					2						
			CO5		2	2			2						
14			CO1	Outline optical rotatory dispersion and circular dichroism.	2										

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	16 CY 2215	Organic Spectroscopy - 2	CO2	Examine the separation of chemical shifts and coupling on 2D axis	2													
			CO3	Take part in fragmentation of organic molecules associated with functional groups	2													
			CO4	Elucidate organic structures using mass fragmentation ORD&CD	2													
15	16 CY 2216	Organic Synthesis-2	CO1	Apply organo silanes and phase transfer catalyst in organic synthesis														2
			CO2	Choose appropriate oxidizing agents in oxidative coupling reactions														2
			CO3	Choose appropriate reducing agents in reducing coupling reactions														2
			CO4	Develop convergent and linear synthetic methods using disconnection approach														2
16	16 CY 2217	<i>Techniques for modern industrial applications</i>	CO1	Understand classical methods of purification techniques	1													
			CO2	Classify the different chromatographic methods for separation of chemicals				1										
			CO3	Explain theory, instrumental description of gas chromatography and HPLC	1													
			CO4	Understand the preparation of ion exchange resin in chromatographic applications.	1													

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			CO5		1														
17	16 CY 2119	<i>Separation Techniques -I</i>	CO1		1														
			CO2		1														
			CO3		1														
			CO4		1														
18	16 CY 2120	Quality Control and Traditional Methods of Analysis-I	CO1	Understand the principles of Quality control in Analytical Chemistry	1														
			CO2	Explain the various concepts of decomposition techniques in analysis	2	2													
			CO3	Illustrate, discuss and apply the various principles behind the various Red-ox systems involved in the classical Volumetric methods of Analysis.	1														
			CO4	Explain the various principles involved in the analysis of Organic Functional Groups	2	2													
			CO5							2									

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19	16 CY 2121	Applied Analysis-I	CO1	Understand the principles, methodology and adoptability various procedures for the analysis of Analysis of Iron, Manganese, Chromite , Phosphate and Aluminium Ores				2												
			CO2	Discuss, explain and illustrate the applications of the general methods of analysis for finished products such as Steel, dolomite, fire clay, four spar and magnesite				2												
			CO3	Finding the adoptability by applying the general methods of analysis for Cement, Soaps, Oils and paints analysis		2														
			CO4	Explain and apply the various principles involved in the chemical and physicochemical analysis of Organic Functional Groups		2														
			CO5					2												
20	16 CY 2122	Instrumental Methods of	CO1	Understand the concepts of excitation spectroscopic methods.		1														
			CO2	Understand the basic concepts of rotational and vibrational spectroscopic methods.		1														

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	Analysis - I													
		CO3	Illustration of the concept of Nuclear magnetic and ESR spectroscopy and their applications.		1									
		CO4	Comprehend the basic knowledge of mass spectroscopy and X-ray spectroscopy to characterize the unknown molecules		1									

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			CO5					2											
21	16 CY2224	Separation Methods – II	CO1	Understanding the concepts and applications of paper chromatography and thin layer chromatography	1	1													
			CO2	Understanding the concepts and applications of Ion exchange	2	2													
			CO3	Understanding the Concepts of sampling of solids, liquids, gases in chromatography	2	2													
			CO4	Discuss the importance of analytical chemistry for industrial research and understand the concepts of solvent extraction	2	2													
			CO5						2										
22			CO1	Understand the principles, and methodology involved in precipitations and its titrations for assaying different ions.	1	1													
			CO2	Discuss, explain and illustrate the Precipitations from	2	2													

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	16 CY2225	Traditional Methods of Analysis - II		Homogeneous Solutions. Their significance in Gravimetric determinations involving various complexing agents																
			CO3	Discuss and apply the principles involved in the redox titrations involving Inorganic and Organic redox reagents.	2	2														
			CO4	Illustrate the principles and methodology involved in the analysis some selected drugs.	2	2														
			CO5					2												
23	16 CY2226	Applied Analysis – II	CO1	Under the principles and methodology involved in the analysis of non-ferrous alloys and Ferro alloys	1															
			CO2	Discuss the principles and methodologies involved in the Analysis of Soil, Fertilizer and Fuel	1															

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			CO3	Assessing the air quality with respect to primary and secondary pollutants	1														
			CO4	Discuss and apply the principles involved in the kinetic methods of analysis and non-aqueous titrations.	1														
24			CO1	Discuss and understand the principles and instrumentation		1													

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16 CY2227	Instrumental Methods of Analysis -II	involved in the Flame photometry. Atomic Absorption Spectrometer, Inductively coupled plasma spectrometer and Arc and Spark spectrographic Direct analysis.																		
		CO2	Discuss and apply the various principles and methodology in TGA, DTA and DSC	1																
		CO3	Discuss and apply the principles and methodology involved in Voltametry, polarography, Anode stripping voltametry and Coulometry.	1																
		CO4	Discuss the principles and methodology in assaying the analytes using Ion Selective Electrodes and Radio chemical methods	1																
Total																				

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**K L University**

**Department of ECE**

**Academic Year 2016**

**Mapping of ECE Department M.Tech (CR) Mission Statement with POs, PSOs and PEOs**

**Program Outcomes**

**Mission statement of K L University**

**Vision**

To be a globally renowned university.

**Mission**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with

intrinsic values.

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## Vision and Mission statement of ECE department

### **VISION**

- To evolve into a globally recognized department in the frontier areas of Electronics & Communication Engineering (ECE).

### **MISSION**

**M1-** To produce graduates having professional excellence.

**M2-** To carry out quality research having social & industrial relevance.

**M3-** To provide technical support to budding entrepreneurs and existing industries.

### **PROGRAM EDUCATIONAL OBJECTIVES (PEOS):**

- **PEO1:** Apply concepts of Statistics, Linear Algebra and Residue Calculus in Communication, Signal processing and Electromagnetic domain.
- **PEO2:** Solve issues in real world communication sectors, and develop feasible and viable communication systems.
- **PEO3:** Inculcate effective communication skills, practice effective team work, professional ethics and pursue research.

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### Programme Outcomes

PO1	a	The courses expose students to a deep understanding of Channel Encoding and Decoding, Modulation and Demodulation, Radio Frequency Conversion, Channel Transmission, and performance extraction.
PO2	b	The course involves understanding of the physical issues in communications and its abstraction to mathematical models, followed by engineering approximation leading to a viable algorithm
PO3	c	The course involves mathematical modeling of communication events including noise, devices and systems that are different across various channels and hence is intensively problem oriented.
PO4	d	The approach in this course has been to provide a strong exposure to fundamentals with full mathematical rigor in Signal Processing, Communications and Electromagnetic followed by an exposure to specific courses in state of art in wireless, wire line and optical communications. This provides a strong background to engage in developments in these communication systems.
PO5	e	The student is exposed to Numerical and Algorithmic procedures in the theoretical courses with a strong lab component using Matlab environment, Embedded Environment and Electromagnetic Flow solver tools like HFSS and FEKO.
PO6	f	As a part of the mini project, major project or internship the student is exposed to interfacing for communications with real world sensors, transmission of speech and complex images from cameras all of which require multidisciplinary work.

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PO7	g	Dev As a part of progress reports on mini and major projects the student is expected to develop his skills in written and oral presentation of the work that he has accomplished. Develop professional and ethical attitude and become socially responsible citizens.
PO8	h	Exposure to prerequisite math's and a mathematically rigorous approach to communication theory will provide him with all the necessary background to pursue a career in any field of communications going forward in his career.
PO9	i	In the individual lab assignments, mini project and major project tasks the student is exposed to thought provoking issues in communication system practice that need association of theoretical learning with real issues in a communication environment.

Mapping of Mission statements with program educational objectives

	M1	M2	M3
PEO1			✓
PEO2		✓	✓
PEO3	✓	✓	

Mapping of PEOs with Pos and PSOs

	PEO1	PEO2	PEO3
PO1	✓	✓	

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PO2	✓	✓	
PO3	✓	✓	
PO4	✓		✓
PO5	✓		
PO6		✓	✓
PO7			✓
PO8	✓		
PO9	✓	✓	

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## MTech COMMUNICATION & RADAR [A.Y - 2016 - 2017]

S. N O	COURSE CODE	COURSE NAME	CO No	CO	1	2	3	4	5	6	7	8	9
1	15EC5101	Modern Digital Communication Techniques	1	Understand different modern digital modulation techniques and probability of error statistics.	1								
			2	Analyze the performance of baseband and pass band data transmission in terms of signaling schemes.	2								
			3	Understand the concepts of block and convolution codes with respect to transfer functions and decoding operations.	1								
			4	Analyze the spread spectrum signals and signal analysis for different digital communication technologies.			2						
			5	Interpret different digital communication modules with respect to signal analysis in application orientation.			2						
2	15EC5102	Microwave Antennas	1	Understand the basic antenna parameters and radiation mechanism for different types.	1								
			2	Identify the significance of aperture of antenna models and their feeding mechanism.		1							
			3	Design microstrip radiators with different shapes, slots and feeding techniques for communication applications.			3						
			4	Analyze the concepts of beam formation with respect to gain, directivity, impedance and polarization.	3								
			5	Estimate the performance characteristics of microwave antennas with the help of electromagnetic tools.				2					

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3	15EC5103	EMI/EMC	1	Describe the concept of electromagnetic interference, compatibility and sources of EMI.	1									
			2	Understand the electromagnetic interference in circuits and measurement techniques with open area test sites.			1							
			3	Interpret the conducted and radiated interference and measurements.			2							
			4	Utilize the techniques like grounding, shielding, bonding and EMI filters in the usage of cables , connectors and components.			1							
4	15EC5104	Radar Engineering	1	Understand the concept of radar communication and its ground environment.	1									
			2	Analyze the transmitter characteristics like output power, spectrum analysis and harmonics from transmitter.	3									
			3	Identify the factors outside the radar and analyze the propagation mechanism with scattering and clutter.			1							
			4	Classify different steps in receiver design and its parameters for determination of position.			2							
5	15EC51A	Microwave Semiconductor Devices and Applications	1	Understand the behavior of high frequency equivalent circuits and operation of varactor, schottky diodes with applications.			1							
			2	Outline the functionality of tunnel and IMPATT diodes with performance characteristics.	1									
			3	Estimate the applications of Gunn and PIN diodes in microwave integrated circuits.			2							
			4	Categorize different microwave transistors and their applications.			1							
6	15EC51B	Global Navigation	1	Understand GPS and UTC Time, Signal Structure and Get an idea about Receiver Components and Specifications.	1									

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		<b>Satellite System</b>	2	Perform Mathematical Analysis to estimate Clock Errors, Total Electron Content and Dual Frequency.		3								
			3	Discussion on GPS Data Processing and Position Fixing.		1								
			4	Understand GNSS Principle of Operation and Architecture.		1								
			5	Understand Different Satellite Navigation Systems like Galileo, GLONASS, IRNSS Space, Control and Ground Segments.		1								
<b>7</b>	<b>15EC5205</b>	<b>Microwave and Millimetric wave circuits</b>	1	Classify different microwave circuits based on applications.		1								
			2	Estimate the importance of transformers and resonators in microwave circuit design.			3							
			3	Design of microwave filters and periodic structures.				3						
			4	Understand the feeding principles and excitation techniques in waveguide design.				1						
			5	Construct millimeter wave circuits using electromagnetic tools.					3					
<b>8</b>	<b>15EC5206</b>	<b>Antenna Measurements</b>	1	Understand the concepts of antenna pattern measurements and modeling techniques.		1								
			2	Estimate antenna testing in different environments like elevated, ground, near and radar cross section.			2							
			3	Examine the far field testing of antenna for gain, directivity and patterns.			1							
			4	Analysis of compact ranges and near field testing with cylindrical and spherical scanning.				2						
			5	Determine antenna parameters using measurement instruments like VNA and SR in real time environment.						1				
<b>9</b>	<b>15EC5207</b>	<b>Wireless Cellular Commun</b>	<b>1</b>	Understand the basic elements of cellular mobile radio system design.		1								

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		<b>ications</b>	2	Identify different applications of speech coding in wireless systems.		1								
			3	Understand the radio propagation and cellular engineering concepts	1									
			4	Identify digital modulation and demodulation principles and architectures, interference in wireless communication systems.	1									
<b>10</b>	<b>15EC5208</b>	<b>Modern RADAR Systems</b>	1	Summarize the advanced techniques in modern radar system.	3									
			2	Categorize advanced pulse compression waveform modulations and techniques.		1								
			3	Understand the concept of MIMO radar system and applications.				1						
			4	Realize the radar applications related to sparse reconstruction and compressed sensing and digital beam forming.				2						
<b>11</b>	<b>15EC52C</b>	<b>Estimation and Detection Theory</b>	1	Classify different criteria associated to detection theory at receiver.		1								
			2	Understand the concepts of integration of optimum receiver and matched filter receiver.				1						
			3	Analyze the maximum likelihood estimation methods.				3						
			4	Understand the concepts of estimation in the presence of Gaussian noise and prediction with Kalman filters.				1						
<b>12</b>	<b>15EC52D</b>	<b>RF and Microwave</b>	1	Understand the importance of RF & Microwave System design with passive components.	1									
			2	Understand Smith chart concept for analyzing S, Y,		1								

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		<b>System Design</b>		Z parameters.										
			3	Analyze S-parameters with conversions and modeling.		2								
			4	Design of RF- filters, amplifiers and oscillators.			3							

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Professor incharge

### M.Tech Cloud Computing R16 Batch

#### K L UNIVERSITY:

#### Vision statement of K L University

To be a globally renowned university.

#### Mission statement of K L University

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

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### **Vision statement of CSE department**

To be a department of International repute through continuous research, innovation and industry led curriculum.

### **Mission statement of CSE department**

To Impart Quality Education with social consciousness and make them Globally Competent.

M1	Provide quality undergraduate and graduate education in both the theoretical computer science
M2	Train students to effectively apply this education to solve real-world problems
M3	Give students a competitive advantage in the ever-changing and challenging global work environment
M4	Conduct research to advance the state of the art in theoretical computer science and integrate results, innovations into other scientific disciplines

### **Programe Educcational Objectives**

PEO1	I. Develop technologically competent computer professionals in today's IT centric scenario by training them in the contemporary software engineering principles and
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	paradigms.
PEO2	II. Provide students a deep insight into various cutting edge technologies& tools and thereby creating diverse career opportunities.
PEO3	III. Improve analytical, logical and presentation skills of the students by applying evolving technologies of software engineering in developing practical solutions to complex problems in consonance with the legal and ethical responsibilities.
PEO4	IV. Provide the students with project engineering and management skills catering to the changing industry needs and constraints across the advancing domains of computing

#### PROGRAM OUTCOMES

PO1	1. Apply the knowledge of computer engineering principles and paradigms in the design of system components and processes that meet the specific needs of the industry
PO2	2. Identify, analyze and formulate solutions to complex engineering problems using innovative and emerging technologies.
PO3	3. Effectively communicate technical information in speech, presentation and documentation.

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PO4	4. Extract information relevant to novel problems and apply appropriate research methodology to develop scientific knowledge.
PO5	5. Self-learn and pursue higher studies to upgrade qualifications and attain constructive growth in profession

#### PROGRAM SPECIFIC OUTCOMES

PSO1	1. Make valuable contributions to design, development, and production in the practice of computer science and related engineering or application areas, particularly in software systems and algorithmic methods.
PSO2	2. Provide exposure of latest software tools and technologies in the area of engineering and technology.
PSO3	3. Publish a research paper on the findings of research conducted in the domain of specialization.

#### Mapping of Mission statements with program educational objectives

	M1	M2	M3	M4
PEO1	✓	✓		
PEO2	✓			✓
PEO3		✓	✓	✓
PEO4			✓	

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Mapping of PEOs with Pos and PSOs

	PEO1	PEO2	PEO3	PEO4
PO1	✓	✓		
PO2	✓	✓		
PO3			✓	✓
PO4				✓
PO5	✓			✓
PSO1	✓			
PSO2			✓	
PSO3				✓

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**Department of Computer Science & Engineering**

**COURSE ARTICULATION MATRIX-M.Tech(CC)**

**for R16**

SNO	Course Code	Course Title	Credits	CO NO	Description of the Course Outcome	Program Outcome (PO)					Program Specific Outcomes(PSO)		
						1	2	3	4	5	1	2	3
1	15CS5119	Cloud computing	4	CO1	Identify the appropriate cloud services for a given application	1	2				3		
				CO2	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.	2					3		
				CO3	Analyze authentication, confidentiality and privacy issues in Cloud computing environment.	1	2				3		
				CO4	Determine financial and technological implications for selecting cloud computing platforms	2	2				3		
2	15CS5120	Web application development	4	CO1	define modern protocols and systems used on the Web (such as HTML, HTTP, URLs, CSS, XML)	1					3		

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				CO2	explain the functions of clients and servers on the Web, and describe the strengths and weaknesses of the client-server internet approaches to web design and implementation		<b>2</b>							3		
				CO3	program, access, and manipulate data through the adoption of accepted standards, mark-up languages, client-side programming, and server-side programming	1	<b>2</b>							3		
				CO4	design and implement an interactive web site(s) with regard to issues of usability, accessibility and internationalisation		<b>2</b>							3		
				CO5	justify and explain particular internet application concepts, relevant alternatives and decision recommendations, including design considerations for internet security	<b>1</b>	<b>2</b>							3		
3	15CS5117	Enterprise devices and networks	4	CO1	Use network analysis tools to examine and explain how common user applications work.	<b>2</b>	<b>2</b>								2	
				CO2	identify the role of the Network layer as it describes communication from one end device to another end device.	<b>2</b>	<b>2</b>								2	

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				CO3	Variable Length Subnetting (VLSM).	2	2						2	
				CO4	Identify a router as a computer with an operating system (OS) and hardware designed for the routing process.	2	2						2	
4	15CS5118	Enterprise Storage systems	4	CO1	Understand Storage Area Networks characteristics and components	1							2	
				CO2	Describe the challenges associated with data center networking and the need for switch network convergence.		2					2		
				CO3	Learn Fibre Channel protocols and how SAN components use them to communicate with each other.	1	2					2		
				CO4	Apply Enterprise storage area networks for a system, case study		2					2		
5	15CS5221	Parallel Algorithms	4	CO1	Understand Algorithms and sorting networks	1	2					3		
				CO2	Ability to design and analyze parallel algorithms		2					3		
				CO3	Apply graph and search algorithms on sorting networks	1						3		
				CO4	Understand arithmetic and randomized computations	2	2					3		

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6	15CS5223	Mobile Cloud	4	CO1	Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures	1						2	
				CO2	Design different workflows according to requirements and apply map reduce programming model.		2				2		
				CO3	Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.	1		2			2		
				CO4	Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds		2	2			2		
7	15CS5224	Data Center Virtualization	4	CO1	Understand the value of data business and data management.	1						2	
				CO2	Understand the physical components of a disk drive and their functions.		2					2	
				CO3	Understand the different storage systems used in data centres.	2						2	
				CO4	Explain the different terminology used with Fibre Channel over Ethernet.		2					2	
				CO5	Discuss Virtualization technologies and processes	1	2					2	

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8	15CS5222	Cloud Security	4	CO1	Demonstrate knowledge of cloud security principles and mechanisms	1							2	
				CO2	Demonstrate computer programming and configuration skills required to develop a cloud security infrastructure		2						2	
				CO3	Identify cloud security weaknesses by recognising and discovering threats and vulnerabilities to cloud computing		2	?					2	
				CO4	Demonstrate knowledge and skills to prepare for industry cloud security certificate exams e.g. CCSK, CCSP	1							2	
9	15CS5111	Data Analysis	3	CO1	Acquire the ability to identify potential sources of data and distinguish between quantitative and qualitative data	1							2	
				CO2	Learn to identify and describe a variety of analysis tools that will assist in processing data.		2						2	
				CO3	Demonstrate basic data analysis techniques and show how this analysis can contribute to a business' future growth	2							2	
				CO4	Learn how to effectively communicate the results of your analysis.		2	?	?	?			2	

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10	15CS51A3	Data Mining	3	CO1	Student should be able to Understand the necessity of data preprocessing in construction of data warehouse.	1	1							2	
				CO2	Student should be able to Analyze multidimensional data using OLAP tools to facilitate effective data mining.	2								2	
				CO3	Student should be able to Apply the concepts of data analysis and clustering to postulate accurate classification model for a given problem.		1							2	
				CO4	Student should be able to Recommend a methodology formining complex data types and detection of anomaly for the given Application.	1	1							2	
11	15CS51I2	Distributed Systems	3	CO1	demonstrate knowledge of the basic elements and concepts related to distributed system technologies;	1								2	
				CO2	demonstrate knowledge of the core architectural aspects of distributed systems;		2							2	
				CO3	demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems);	1								2	

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				CO4	use and apply important methods in distributed systems to support scalability and fault tolerance		2						2	
12	15CS5113	Big Data Analytics	3	CO1	Explain the big data that is emerging from multiple big data sources in terms of velocity, variety and veracity	1	2						2	
				CO2	Illustrate the technologies, processes and methods for analyzing big data	1						2		
				CO3	Demonstrate the key principles of data analysis using the R tool		2					2		
				CO4	Examine advanced Graphs, Regression, Forecasting and Time Series models using R analytical platform.	2	2					2		
13	15CS5111	Service Oriented Architecture	3	CO1	introduce the concepts and design principles of SOA,	1							2	
				CO2	Non-technical aspects such as governance, impact on culture and organization,		1						2	
				CO3	various interoperability standards, technology infrastructure	1						2		
				CO4	security considerations associated with SOA implementations.		1					2		

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14	15CS51J2	Application Development Frameworks	3	CO1	Describe and compare different mobile application models/architectures and patterns.	1							2	
				CO2	Apply mobile application models/architectures and patterns to the development of a mobile software application.		1						2	
				CO3	Describe the components and structure of a mobile development framework (Google's Android Studio).	1						2		
				CO4	Demonstrate advanced Java programming competency by developing a maintainable and efficient cloud based mobile application.		1					2		
15	15CS51J3	Web Semantics	3	CO1	understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web and its uses.	1							2	
				CO2	understand the concepts of metadata, semantics of knowledge and resource, ontology, and their descriptions in XML-based syntax and web ontology language (OWL).		1						2	
				CO3	describe logic semantics and inference	1						2		

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					with OWL.									
				CO4	Program semantic applications with Java API.		1						2	
16	15CS51J4	Network Security	3	CO1	Understand the classic ciphers and world war II ciphers	1							2	
				CO2	Understand the Stream Ciphers and Block Ciphers		2						2	
				CO3	Illustrate and Examine Hash Functions	1							2	
				CO4	Describe the Public Key System and analyze the Attacks on Public Key System		2						2	
17	15CS52K1	Natural Language Processing	3	CO1	Understand the concept of Essential Information Theory , Linguistic Essentials and Statistical Inference n-gram models	1						2		
				CO2	Analyze Word Sense Disambiguation ,HMM and CFG	1						2		
				CO3	Illustrate Text and Sentence Alignment, Clustering in detail.	1	1					2		
				CO4	Explain Information Retrieval and Text Categorization , Perceptron in detail.		1					2		
18	15CS52K2	Cloud Application	3	CO1	Develop and deploy cloud application using popular cloud platforms,	1							2	

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		Architectures		CO2	Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud.	1												2
				CO3	Explain and identify the techniques of big data analysis in cloud.		1											2
				CO4	Make recommendations on cloud computing solutions for an enterprise		1											2
19	15CS52K3	Cloud Strategy Planning &management	3	CO1	Explain the areas in which cryptography provides security as well as give examples of how each can be subverted	1												2
				CO2	Trace an email across two MTAs based on the email headers and explain the related DNS queries.	1	1											2
				CO3	Identify cloud security weaknesses by recognising and discovering threats and vulnerabilities to cloud computing		1											2
				CO4	Make recommendations on cloud computing solutions for an enterprise		1											2
20	15CS52K4	Scripting for System Administrators	3	CO1	Explain the most common duties of a System Administrator, including, but not limited to, technical skillsets required and overlap with other disciplines	1												2

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				CO2	Have a general understanding of how virtualized hosts are bootstrapped and how shared resources in the cloud are accessed		1							2	
				CO3	Write a multi-platform tool to address a well-defined problem with consideration for hidden requirements and scalability.	1								2	
				CO4	Analyze network traffic by inspection of the actual packets through the use of "tcpdump"	1	1							2	
21	15CS52L1	Object oriented Software Engineering	3	CO1	The objectives of this course are to expose students to formal processes for the design, implementation and management of large software systems	1	2							3	
				CO2	Students experience these processes through case studies and a large software design project through the entire semester.	2								3	
				CO3	Tools for software development/computer-aided software engineering (CASE) including IDE's, SDK's and software version control systems		2							3	

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				CO4	The software design process - Requirements, Analysis, System Design, Object Design, Implementation, Testing	1	2							3	
22	15CS52L2	MapReduce Design Patterns	3	CO1	What is Hadoop and how can it help process large data sets	1								3	
				CO2	How to use HDFS (the Hadoop Distributed Filesystem), from the command line and API, for effectively loading and processing data in Hadoop.		2						3		
				CO3	How to ingest data from a RDBMS or a data warehouse to Hadoop	1							3		
				CO4	Get introduced to tools like Pig, Hive, HBase, Elastic MapReduce etc. and understand how they can help in BigData projects.		2						3		
23	15CS52L3	Open Source Cloud Computing and Testing	3	CO1	Introduce the broad perceptive of cloud architecture and model	1								2	
				CO2	Apply different cloud programming model as per need		2						2		
				CO3	Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses	1							2		

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				cloud applications									
				CO4	Software Environments for Distributed systems and clouds: Parallel and Distributed Programming Models		<b>2</b>					2	
24	15CS52L4	Advances in Computing	3	CO1	Advances in Computing deals with the theoretical foundations of information and computation and their implementation and application in computer systems	1						2	
				CO2	It has also provided contributors with a medium in which they can explore their subjects in greater depth and breadth		<b>2</b>					2	
				CO3	That continue to be of significant, lasting value in this rapidly expanding field.		<b>2</b>					2	
25	15IE5149	Seminar	2					<b>2</b>	<b>2</b>	2		1	
26	15IE5250	Term Paper	2					<b>2</b>	<b>2</b>	2		3	
27	15IE6050	Dissertation	36					<b>2</b>	<b>2</b>	2		3	
					<b>TOTAL</b>	<b>71</b>	<b>##</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>55</b>	<b>160</b>	<b>7</b>

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## **M.Tech CNS R16 Batch**

### **K L UNIVERSITY:**

#### **Vision statement of K L University**

To be a globally renowned university.

#### **Mission statement of K L University**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

#### **Vision statement of CSE department**

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M1	Provide quality undergraduate and graduate education in both the theoretical computer science
M2	Train students to effectively apply this education to solve real-world problems
M3	Give students a competitive advantage in the ever-changing and challenging global work environment
M4	Conduct research to advance the state of the art in theoretical computer science and integrate results, innovations into other scientific disciplines

#### Programme Educational Objectives

PEO1	I. Develop technologically competent computer professionals in today's IT centric scenario by training them in the contemporary software engineering principles and paradigms.
PEO2	II. Provide students a deep insight into various cutting edge technologies & tools and thereby creating diverse career opportunities.
PEO3	III. Improve analytical, logical and presentation skills of the students by applying evolving technologies of software engineering in developing practical solutions to complex problems in consonance with the legal and ethical responsibilities.

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PEO4	IV. Provide the students with project engineering and management skills catering to the changing industry needs and constraints across the advancing domains of computing
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#### PROGRAM OBJECTIVES

PO1	1. Apply the knowledge of computer engineering principles and paradigms in the design of system components and processes that meet the specific needs of the industry
PO2	2. Identify, analyze and formulate solutions to complex engineering problems using innovative and emerging technologies.
PO3	3. Effectively communicate technical information in speech, presentation and documentation.
PO4	4. Extract information relevant to novel problems and apply appropriate research methodology to develop scientific knowledge.
PO5	5. Self-learn and pursue higher studies to upgrade qualifications and attain constructive growth in profession

#### PROGRAM SPECIFIC OBJECTIVES

PSO1	1. Make valuable contributions to design, development, and production in the
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	practice of computer science and related engineering or application areas, particularly in software systems and algorithmic methods.
PSO2	2. Provide exposure of latest software tools and technologies in the area of engineering and technology.
PSO3	3. Publish a research paper on the findings of research conducted in the domain of specialization.

Mapping of Mission statements with program educational objectives

	M1	M2	M3	M4
PEO1	✓	✓		
PEO2	✓			✓
PEO3		✓	✓	✓
PEO4			✓	

Mapping of PEOs with Pos and PSOs

	PEO1	PEO2	PEO3	PEO4
PO1	✓	✓		
PO2	✓	✓		
PO3			✓	✓
PO4				✓
PO5	✓			✓
PSO1	✓			
PSO2			✓	
PSO3				✓

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**COURSE ARTICULATION MATRIX FOR CNS**

**for R16**

Course Code	Course Title	Credits	CO NO	Description of the Course Outcome	PROGRAM OUTCOMES (PO)					Program Specific Outcomes(PSO)				
					1	2	3	4	5	1	2	3		
15-CS-5109	Data Network	4	CO1	The student will learn importance of data communications and the Internet in supporting business communications and daily activities.	2				2			2		
			CO2	The student Explain how communication works in data networks and the Internet.	2				2			2		
			CO3	The student Recognize the different internetworking devices and their functions.	2				2			2		
			CO4	The student Explain the role of protocols in networking	2				2			2		
			CO5	Students Analyze the services and features of the various layers of data networks.	2				2			2		
15-CS-5110	Network Programming	4	CO1	analyse the requirements of a networked programming environment and identify the issues to be solved;	2				2			3		

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			CO2	create conceptual solutions to those issues and implement a programming solution;	2				2	3		
			CO3	understand the key protocols that support the Internet;	2				2	3		
			CO4	apply several common programming interfaces to network communication;	2				2	3		
			CO5	understand the use of TCP/UDP Sockets	2			2	2	3		
15-CS-5112	Secure Coding	4	CO1	Understand the basics of secure programming.		1	1			2		
			CO2	Understand the most frequent programming errors leading to software vulnerabilities.	1		2			2		
			CO3	Identify and analyze security problems in software			2		1	2		
			CO4	Understand and protect against security threats and software vulnerabilities	1					2		
			CO5	Effectively apply their knowledge to the construction of secure software systems						2		
15-CS-5111	Applied Cryptography	4	CO1	<i>(Comprehension)</i> Describe how various cryptography algorithms and protocols work.	1				1	2		

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			CO2	( <i>Analysis</i> ) Criticize other people's work based on rigorous principles.	2				2	2		
			CO3	( <i>Analysis</i> ) Appraise the great work in this field, and articulate why the work is great.	2				2	2		
			CO4	( <i>Evaluation</i> ) Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations.	1				1	2		
			CO5	( <i>Synthesis</i> ) Formulate research problems in the computer security field.					3	2		
15-CS-5213	Performance Analysis of Computer Networks	4	CO1	Identify the main parameters and metrics related to the performance analysis of systems , and particularly networks and computer systems.	1						2	
			CO2	Analyze single and multiple queues systems, with or without priority.	2						2	
			CO3	Use Queueing theory and Markov processes to model and measure the performance of systems					2		2	
			CO4	Model , analyze performance of, and dimension , analyze performance of, and dimension					2		2	

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			CO5	Analyze queueing networks.		<b>2</b>						2	
15 CS 5214	Wireless Network Security	4	CO1	The course will provide knowledge of information security technology and methods for communication systems that provide services for mobile users by wireless access networks.	<b>1</b>							2	
			CO2	Knowledge and understanding of security mechanisms and protocols in wireless communication systems, such as the topical technologies of WLAN IEEE 802.11, WAN 802.16, GSM/UMTS/LTE, Ad-hoc and sensor networks.				<b>2</b>				2	
			CO3	Knowledge about some of the models, design principles, mechanisms and solutions used in wireless network security to obtain authentication and key transport protocols.				<b>2</b>				2	
			CO4	Students will gain an understanding of wireless networking, protocols, and standards and security issues.				<b>3</b>				2	
			CO5	Develop implementations for some of the common cryptographic algorithms.				<b>2</b>				2	
15-CS-5214	Wireless Network & Mobile Computing	4	CO1	To have a fundamental understanding of the objectives of cryptography and network security.	1	☒			2		2		

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			CO2	To become familiar with the cryptographic techniques that provides information and network security.	1					2			2	
			CO3	To impart knowledge on Encryption techniques, Design Principles and Modes of operation.	1					2			2	
			CO4	To analyze a given system with respect to security of the system.	1					2			2	
			CO5	To understand the Key Management techniques and Number Theory.	1					2			2	
15-CS-51F2	ADHOC NETWORKS	3	CO1	Describe the unique issues in adhoc/sensor networks.	2	2							2	
			CO2	Describe current technology trends for the implementation and deployment of wireless	2	2	2					2		
			CO3	Discuss the challenges in designing MAC, routing and transport	2	2	2					2		
15-CS-51E1	Network Routing	3	CO1	describe the basis and structure of an abstract layered protocol model									2	
			CO2	describe, analyse and compare a number of datalink, network, and transport layer protocols	2	1	2	2					2	

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			CO3	design and implement datalink or network layer protocols within a simulated networking environment				2			2
			CO4	describe and analyse various related technical, administrative and social aspects of specific computer network protocols from standards documents and other primary materials found through research	1		2	2			2
15-CS-52G4	Cyber Forensics	3	CO1	Demonstrate an understanding of the core concepts, tools, and methods used to secure computer systems.	1			2			1
			CO2	Identify and present indicators that a cybersecurity incident has occurred.		1		2			1
			CO3	Apply criminal justice methods to cybersecurity and computer forensic investigations.			1	2			1
			CO4	Plan, implement, and evaluate penetration testing and ethical hacking of computer systems.			1	2	2		1
15-CS-52H2	INTRUSION DETECTION AND PREVENTION SYSTEM	3	CO1	Detect privilege escalation, remote control, keyloggers, rootkits, etc.				2			2
			CO2	Discover rogue wireless access points, sniffers, or VPNs on network	1						2

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			CO3	Monitor and evaluate audit logs and set administrative alerts	1							2				
			CO4	Deploy, implement and test IDS security plan	1							2				
15-CS-5215	Network and Cyber Security	3	CO1	Determine which network systems are alive (reconnaissance)						2		2				
			CO2	Discover which operating system software is used on a network, which patches have not been updated, etc. (enumeration)	1								2			
			CO3	Identify which TCP and UDP services are running, listening, or established on the network (port scan)	1									2		
			CO4	Create IDS sensors and attach them to network (snort)	1									2		
15-CS-51E2	Network Optimization	3	CO1	describe and explain the basics of linear, non linear, and discrete optimization						2		2				
			CO2	analyze in depth key network optimization problems	1									2		
			CO3	give detailed descriptions of applications of network optimization to practical engineering problems	1										2	
			CO4	develop a research project and contribute	1										2	

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				to research frontiers in the area								
15-CS-51E3	Simulations of Computer Networks	3	CO1	Understand the foundations of computer network simulations					<b>2</b>			3
			CO2	Use simulations tools to analyse computer networks and data communications	1							3
			CO3	Understand the interaction between simulation, planning, dimensioning, design	1							3
			CO4	implementation of computer networks	<b>1</b>							3
15-CS-51F1	Storage Area Networks	3	CO1	Classify the components of a SAN infrastructure					<b>2</b>			2
			CO2	Appraise the Fibre Channel architecture and terms	1							2
			CO3	Classify the three major components of a SAN	1							2
			CO4	Differentiate the features of the IBM Storage System b-type switch offerings	<b>1</b>							2
15-CS-51F3	Cognitive Radio Networks	3	CO1	Gain knowledge on multirate systems.					<b>2</b>			2
			CO2	Develop the ability to analyze, design, and implement any application using FPGA.	1							2
			CO3	Be aware of how signal processing concepts can be used for efficient FPGA based system	1							2

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			design.									
			CO4	Understand the rapid advances in Cognitive radio technologies.	1						2	
			CO5	Explore DDFS, CORDIC and its application.				2		2		
15-CS-51F4	Sensor Networks	3	CO1	Understand the foundations of computer network simulations				2		1		
			CO2	Use simulations tools to analyse computer networks and data communications	1					1		
			CO3	Understand the interaction between simulation, planning, dimensioning, design	1					1		
			CO4	implementation of computer networks	1					1		
15-CS-52G1	Secure Protocol Design	3	CO1	Describe and analyze the hardware, software, components of a network and the interrelations				2		1		
			CO2	Explain networking protocols and their hierarchical relationship hardware and software.	1					1		
			CO3	Develop solutions for networking and security problems	1					1		
			CO4	Students will be able to infer Slot-and-filler structures and architecture of neural	1					1		

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				networks as connectionist models								
15-CS-52G2	Distributed System Security	3	CO1	Determine which network systems are alive (reconnaissance)					<b>2</b>		2	
			CO2	Discover which operating system software is used on a network, which patches have not been updated, etc. (enumeration)	1						2	
			CO3	Identify which TCP and UDP services are running, listening, or established on the network (port scan)	1						2	
			CO4	Create IDS sensors and attach them to network (snort)	<b>1</b>						2	
15-CS-52G3	Eliptic Curve Cryptography	3	CO1	Determine which network systems are alive (reconnaissance)					<b>2</b>		2	
			CO2	Discover which operating system software is used on a network, which patches have not been updated, etc. (enumeration)	1						2	
			CO3	Identify which TCP and UDP services are running, listening, or established on the network (port scan)	1						2	
			CO4	Create IDS sensors and attach them to network (snort)	<b>1</b>						2	

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15-CS-52H1	Information Systems Controland Audit	3	CO1	Detect privilege escalation, remote control, keyloggers, rootkits, etc.						<b>2</b>			2
			CO2	Discover rouge wireless access points, sniffers, or VPNs on network	1								2
			CO3	Monitor and evaluate audit logs and set administrative alerts	1								2
			CO4	Deploy, implement and test IDS security plan	<b>1</b>								2
15-CS-52H3	Cryptanalysis	3	CO1	Demonstrate an understanding of the core concepts, tools, and methods used to secure computer systems.						<b>2</b>			2
			CO2	Identify and present indicators that a cybersecurity incident has occurred.	1								2
			CO3	Apply criminal justice methods to cybersecurity and computer forensic investigations.	1								2
			CO4	Plan, implement, and evaluate penetration testing and ethical hacking of computer systems.	<b>1</b>								2
15-CS-52H4	Cyber Security	3	CO1	Determine which network systems are alive (reconnaissance)						<b>2</b>		2	

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			CO2	Discover which operating system software is used on a network, which patches have not been updated, etc. (enumeration)	1								2	
			CO3	Identify which TCP and UDP services are running, listening, or established on the network (port scan)	1								2	
			CO4	Create IDS sensors and attach them to network (snort)	1								2	
			CO5	Demonstrate the basic concepts of artificial intelligence in the Laboratory					2				2	
15IE5149	Seminar	2												1
15-IE-5251	Term Paper	2												3
15-IE-6052	Project	36												3
				TOTAL	42	9	9	8	61	55	46	7		

### M.Tech CSDF R16 Batch

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**Vision statement of K L University**

To be a globally renowned university.

**Mission statement of K L University**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**Vision statement of CSE department**

To be a department of International repute through continuous research, innovation and industry led curriculum.

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To Impart Quality Education with social consciousness and make them Globally Competent.

M1	Provide quality undergraduate and graduate education in both the theoretical and practical aspects of computer science
M2	Train students to effectively apply this education to solve real-world problems

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M3	Give students a competitive advantage in the ever-changing and challenging global work environment
M4	Conduct research to advance the state of the art in theoretical computer science and integrate results, innovations into other scientific disciplines

#### Programme Educational Objectives

PEO1	I. Develop technologically competent computer professionals in today's IT centric scenario by training them in the contemporary software engineering principles and paradigms.
PEO2	II. Provide students a deep insight into various cutting edge technologies & tools and thereby creating diverse career opportunities.
PEO3	III. Improve analytical, logical and presentation skills of the students by applying evolving technologies of software engineering in developing practical solutions to complex problems in consonance with the legal and ethical responsibilities.
PEO4	IV. Provide the students with project engineering and management skills catering to the changing industry needs and constraints across the advancing domains of computing

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## PROGRAM OBJECTIVES

PO1	1. Apply the knowledge of computer engineering principles and paradigms in the design of system components and processes that meet the specific needs of the industry
PO2	2. Identify, analyze and formulate solutions to complex engineering problems using innovative and emerging technologies.
PO3	3. Effectively communicate technical information in speech, presentation and documentation.
PO4	4. Extract information relevant to novel problems and apply appropriate research methodology to develop scientific knowledge.
PO5	5. Self-learn and pursue higher studies to upgrade qualifications and attain constructive growth in profession

## PROGRAM SPECIFIC OBJECTIVES

PSO1	1. Make valuable contributions to design, development, and production in the practice of computer science and related engineering or application areas, particularly in software systems and algorithmic methods.
PSO2	2. Provide exposure of latest software tools and technologies in the area of engineering and technology.
PSO3	3. Publish a research paper on the findings of research conducted in the domain of

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	specialization.
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Mapping of Mission statements with program educational objectives

	M1	M2	M3	M4
PEO1	✓	✓		
PEO2	✓			✓
PEO3		✓	✓	✓
PEO4			✓	

Mapping of PEOs with Pos and PSOs

	PEO1	PEO2	PEO3	PEO4
PO1	✓	✓		
PO2	✓	✓		
PO3			✓	✓
PO4				✓
PO5	✓			✓
PSO1	✓			
PSO2			✓	
PSO3				✓

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**COURSE ARTICULATION MATRIX FOR CSDF**

**for R16**

Course Code	Course Title	CREDITS	CO NO	Description of the Course Outcome	Programe Outcomes					Program Specific Outcomes(PSO)		
					1	2	3	4	5	1	2	3
15 CS 5113	Introduction to Cyber Security & ICS	4	CO1	understand Privacy, Cyber Laws and Ethics	2				2	3		
			CO2	apply Cyber Security Threats	2				2	3		
			CO3	understand Malware Fundamentals	2				2	3		
			CO4	apply BCP, DR planning & Audit	2				2	3		
15 CS 5134	Digital Forensics	4	CO1	understand Digital Forensics and Investigations	2				2	3		
			CO2	apply Computing Device Forensics	2				2	3		
			CO3	apply Mobile Phone Forensics	2				2	3		
			CO4	apply Artifact analysis & Anti Forensics	2				2	3		
15 CS	Advance	4	CO1	understand Network		1	1			2		

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5135	Network Security & Investigations			Connectivity								
			CO2	apply Network Protocols & Email Forensics	1		2			2		
			CO3	analyse Network Attacks			2		1	2		
			CO4	apply Network Penetration Testing	1					2		
			CO5	analyse Network Investigation						2		
15 CS 5136	Software Security	4	CO1	understand Web Security	1				1	2		
			CO2	understand Web Hacking	2				2	2		
			CO3	understand Protocol based Attacks	2				2	2		
			CO4	understand Web Investigation	1				1	2		
15 CS 5237	Cryptography for Cyber Defense	4	CO1	understand Encryption & Decryption	1					3		
			CO2	apply cryptographic algorithms	2					3		
			CO3	apply Security engineering principles					2	3		
			CO4	Apply RFID systems in public transportation					2	3		

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15 CS 5238	Malware Analysis & Reverse Engineering	4	CO1	understand Introduction to Malware	1					3		
			CO2	understand Introduction to RE					2	3		
			CO3	analyse Malware Analysis					2	3		
			CO4	apply Malware Handling					3	3		
15 CS 5239	Cyber Incident Response & Resilience	4	CO1	understand Incident Response	1	?				2	2	
			CO2	understand Incident Response and Handling Process	1					2	2	
			CO3	understand Incident Response and Handling Process	1					2	2	
			CO4	understand Incident Response Team Members Roles and Responsibilities	1					2	2	
15 CS 5240	Cyber Law, Governance & Compliance	4	CO1	understand Computer ethics, Privacy & Legislation	?	2					2	
			CO2	understand Intellectual property issues in cyberspace	?	?	2				2	
			CO3	understand Cyber Forensics legal aspects	?	2	?				2	
			CO4	understand Compliances &	1	?	?				2	

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				Standards								
15 CS 51Q1	Mobile Device Threats & Investigation	3	CO1	understand Mobile Application Functions								2
			CO2	understand Mobile Hacking & Investigation	?	1	?	?				2
			CO3	understand Securing smart OS				?	2			2
			CO4	understand Mobile Device Management	1		?	?	?			2
15 CS 51Q2	Fundamentals of E-Discovery	3	CO1	understand General framework of e-Discovery	1				2			2
			CO2	understand E-Discovery Data Collection		1		2				2
			CO3	understand The role of sampling in ESI production disputes			1	2				2
			CO4	understand Enterprise class e-mail vs. private e-mail systems			1	2	2			2
15 CS 51Q3	Introduction to SCADA System	3	CO1	understand SCADA cyber security					2			2
			CO2	understand SCADA Remote Access	1							2
			CO3	understand Virtualization for	1							2

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				SCADA									
			CO4	understand Security Standards and Protocols	1							2	
15 CS 51Q4	Networking Concepts & Security	3	CO1	understand Networking Device								3	
			CO2	understand Attacking the Network	2	1	2	2				3	
			CO3	understand Network Security				2	2			3	
			CO4	understand Network Forensics	1		2	2	2			3	
15 CS 51R1	Introduction to Big Data Analytics	3	CO1	understand Big Data and Database Evolution in Big Data	1					2		3	
			CO2	understand Comparison between SQL and NoSQL		1		2				3	
			CO3	understand Basics for Data Analytics			1	2				3	
			CO4	understand Using R			1	2	2			3	
15 CS 51R2	Social Media Forensics	3	CO1	understand Social Networking					2			2	
			CO2	understand Graph Theory and Social Networks	1							2	
			CO3	understand Intelligence gathering	1							2	

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			CO4	understand Semantic markup and common sense collide	1							2	
15 CS 51R2	Social Media Forensics	3	CO1	understand different types of SCADA control systems								2	
			CO2	understand SCADA Physical and Logical Security	2	1	2	2				2	
			CO3	understand SCADA Remote Access				2				2	
			CO4	understand Understanding SCADA protocols	1		2	2				2	
15 CS 51R4	Forensics of Distributed Systems Environment	3	CO1	understand High Performance Computing	1				2			2	
			CO2	understand Threats and Vulnerabilities		1		2				2	
			CO3	understand Basics of Cloud Computing			1	2				2	
			CO4	understand Cloud Forensics			1	2	2			2	
15 CS 52S1	Infrastructure Attacks and Defense	3	CO1	understand Operating System Internals					2			3	
			CO2	understand Mobile Operating System	1							3	

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			CO3	understand Introduction to Network Security and Wireless Attacks	1							3	
			CO4	understand Introduction to Cloud	1							3	
15 CS 52S2	Software Vulnerability Analysis	3	CO1	understand Basics of Software Engineering								2	
			CO2	understand Introduction to Security & Authentication	2	1	2	2				2	
			CO3	understand Application Security & Malicious Code				2				2	
			CO4	understand Programming Security fundamentals	1		2	2	2			2	
15 CS 52S3	Parallel & Cloud Computing	3	CO1	understand High Performance Computing	1					2		2	
			CO2	understand Threats and Vulnerabilities		1		2				2	
			CO3	understand Basics of Cloud Computing			1	2				2	
			CO4	understand Cloud Forensics			1	2	2			2	
15 CS 52S4	Principles of	3	CO1	understand OS Internals					2		2		

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	Operating Systems		CO2	understand Scheduling & Architecture	1							3		
			CO3	understand Memory	1							3		
			CO4	understand File Systems	1							3		
15 CS 52T1	Applied Cryptography	3	CO1	understand Application of Cryptographic Concepts								2		
			CO2	understand Cryptosystem	?	1	?	?				2		
			CO3	understand Basic Steganography and Fundamentals of Steganalysis				?	2				2	
			CO4	understand Applied Steganography	1		?	?	?				2	
15 CS 52T2	Software Modeling	3	CO1	understand UML & Testing	1					2		3		
			CO2	understand Feasibility Analysis		1		2				3		
			CO3	understand Java			1	2				3		
			CO4	understand Python			1	2	2			3		
15 CS 52T3	Digital Image Processing	3	CO1	understand Image Enhancement in Spatial Domain						2		2		
			CO2	understand Image Restoration	1							2		

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			CO3	understand Morphological Image Processing	1						2		
			CO4	understand Segmentation	1						2		
15 CS 52T4	Embedded Systems & Forensics	3	CO1	understand Embedded Systems fundamentals					2		2		
			CO2	understand Forensic Analysis	1						2		
			CO3	understand Smart Devices Forensics	1			1				2	
			CO4	understand Simulation & Research	1							2	
15 IE 5149	Seminar	2									1		
15 IE 5250	Term Paper	2									3		
15 IE 6050	Dissertation	36									3		
				<b>TOTAL</b>	<b>61</b>	<b>15</b>	<b>17</b>	<b>31</b>	<b>84</b>	<b>82</b>		<b>7</b>	

**M.Tech CSE R16 Batch**

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----	---

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M2	Train students to effectively apply this education to solve real-world problems
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#### Programme Educational Objectives

PEO1	I. Develop technologically competent computer professionals in today's IT centric scenario by training them in the contemporary software engineering principles and paradigms.
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## PROGRAM OBJECTIVES

PO1	1. Apply the knowledge of computer engineering principles and paradigms in the design of system components and processes that meet the specific needs of the industry
PO2	2. Identify, analyze and formulate solutions to complex engineering problems using innovative and emerging technologies.
PO3	3. Effectively communicate technical information in speech, presentation and documentation.
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PSO3	3. Publish a research paper on the findings of research conducted in the domain of specialization.
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Mapping of Mission statements with program educational objectives

	M1	M2	M3	M4
PEO1	✓	✓		
PEO2	✓			✓
PEO3		✓	✓	✓
PEO4			✓	

Mapping of PEOs with Pos and PSOs

	PEO1	PEO2	PEO3	PEO4
PO1	✓	✓		
PO2	✓	✓		
PO3			✓	✓
PO4				✓
PO5	✓			✓
PSO1	✓			
PSO2			✓	
PSO3				✓

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**Department of Computer Science &  
Engineering**

**COURSE ARTICULATION MATRIX-  
M.Tech(CSE)**

**for R16**

S NO	course code	Course Title	Credit s	CO NO	Description of the Course Outcome	Program Outcome (PO)					Program Specific Outcomes(PS O)			
						1	2	3	4	5	1	2	3	
1	15 CS 5103	Data Structures & Algorithms	4	CO1	Apply measures of efficiency to algorithms and Compare various linear data structures like Stack ADT, Queue ADT, Linked lists.	1						3		
				CO2	Analyze and compare linear data structures and analyze different searching and hashing techniques.		2					3		
				CO3	Analyze and compare various non – linear data structures like Trees and Graphs.	2						3		
				CO4	Analyze and compare various sorting algorithms, to select from a range of possible options, to provide justification for that selection, and to implement the algorithm in a particular context.		2					3		

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				CO5	Understand and execute lab experiments and develop a small project along with his/her team members.	2						3		
2	15 CS 5102	Computer Organization & Architecture	4	CO1	Student will be able to Understand the Overview of von Neumann architecture and Pipelining	1						3		
				CO2	Student will be able to Demonstrate Hierarchical Memory Technology		2					3		
				CO3	Student will be able to Explain the Instruction level parallelism	2						3		
				CO4	Student will be able to Analyze the Multiprocessor Architecture		2					3		
				CO5	Student will be able to Analyze the Multiprocessor Architecture	2						3		
3	15 CS 5205	Operating System Design	4	CO1	Understand the basic concepts of operating system, OS structure and process concepts.	1						2		
				CO2	Apply the concepts Process Scheduling algorithms and Process Synchronization Problems.		2					2		
				CO3	Solve the concept of the Deadlock, Memory Management and Virtual Memory Concepts.	2						2		
				CO4	Demonstrate file system interface, structure,		2					2		

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				file allocation methods, free space management and threads.									
				CO5 Create and develop a project along with his/her team members.	2						2		
4	15 CS5104	Distributed Database Management	4	CO1 Understand the fundamentals of query optimization and database recovery protocols.	1		<b>1</b>				3		
				CO2 Analyze emerging database technologies and distributed databases.		2				3			
				CO3 Discriminate object oriented and relational database systems.	2					3			
				CO4 Analyze multimedia databases.		2				3			
5	15 CS 5101	Mathematical Foundations of Computer Science	4	CO1 In this course, students should develop mathematical thinking and problem-solving skills associated with writing proofs.		2					2		
				CO2 construction different of truth table		2	1			2			
				CO3 Students should also be exposed to a wide variety of mathematical concepts that are used in the Computer Science discipline,		2				2			
				CO4 which may include concepts drawn from the areas of Number Theory		2				2			

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6	15 CS 5206	Computer Networks & Security	4	CO1	Understand OSI and TCP/IP Models and basics of physical layer and their issues	1	2					3		
				CO2	Demonstrate Data Link layer issues and medium access control sub layers concepts	1						3		
				CO3	Analyze and implement the algorithms of network and transport layers and concerned services	2	1		1			3		
				CO4	Evaluate and execute the concepts of TCP ,UDP and the application layer conceptions		2					3		
7	15 CS 5207	Object Oriented Analysis and Design	4	CO1	Understanding the concepts of UML (Unified Modeling Language)and UP(Unified Processing)	1	2						3	
				CO2	Analyze the requirements using UML		2						3	
				CO3	Create class and objects using UML.		2						3	
				CO4	Design and implement the software using UML.	1	2						3	
8	15 CS 5208	Enterprise Programming	4	CO1	Learn the basic concepts of ObjectOrientation and how they are handled in Java	1							3	
				CO2	Understand Exceptions. How and when they should be handled	2	2						3	

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				CO3	Learn how to use Servlet and JSP and XML with JSP	2	2	2			3		
				CO4	A presentation of Enterprise JavaBeans and how to use it	1	2	2			3		
9	15 CS 52D2	VISUAL PROGRAMMING	3	CO1	Contrast forward and backward rendering	1		1			3		
				CO2	Construct CSG models from simple primitives, such as cubes and quadric surfaces.	2	2	2	2		3		
				CO3	Analyze affine and vector geometry	2	2		2		3		
				CO4	Understand Bezier and B-Spline Curves	1	2	2	2	2	3		
10	15 CS 52C2	MOBILE COMPUTING	3	CO1	Define Mobile Computing and look at current trends	1						2	
				CO2	Distinguish between types of Mobility	2	2					2	
				CO3	Examine Theory Research in Mobility	2	2					2	
				CO4	Examine Systems Research in Mobility	1	2					2	
11	15 CS 51A3	DATA MINING	3	CO1	Student should be able to Understand the necessity of data preprocessing in construction of data warehouse.	1						2	
				CO2	Student should be able to Analyze	2	2		1			2	

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					multidimensional data using OLAP tools to facilitate effective data mining.										
				CO3	Student should be able to Apply the concepts of data analysis and clustering to postulate accurate classification model for a given problem.		2	1						2	
				CO4	Student should be able to Recommend a methodology forming complex data types and detection of anomaly for the given Application.		2							2	
12	15 CS 52D3	DIGITAL IMAGE PROCESSING	3	CO1	Describe the uses of Digital Image Processing and its Applications, Image Acquisition and Image Enhancement	1	1							2	
				CO2	Analyze image enhancement algorithms such as histogram modification, contrast manipulation, edge detection and restoration	1	1							2	
				CO3	Inspect how Wavelet, Multi-resolution, Compression and Morphological Image Processing are realized	1	1							2	
				CO4	Illustrate Image Segmentation, Representation and Description and Object Recognition process	1	1							2	

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13	15 CS 51A1	Soft Computing	3	CO1	Explain soft computing differentiating hard and soft computing and enumerate briefly overview of fuzzy systems , neural networks and genetic algorithms	1	1							2	
				CO2	Demonstrate a fuzzy controller using fuzzy logic systems	1	1							2	
				CO3	Interpret pattern recognition using artificial neural network	1	1							2	
				CO4	Interpret Genetic algorithms and operations,.	1	1							2	
14	15 CS 51A2	Machine Learning and pattern Classification	3	CO1	Understand and apply the differences among the styles of learning: supervised, reinforcement, unsupervised and parametric methods	1	1							2	
				CO2	Comprehend probabilistic methods for learning and for classification	1	1							2	
				CO3	Analyze the non parametric methods and decision trees to take the proper decision making.	1	1							2	
				CO4	Understand rule based knowledge and Kernel machines to reduce the cost of various statistical methods , Bayesian Estimation, HMM models	1	1							2	

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15	15 CS 51A4	Natural Language Processing	3	CO1	Understand the concept of Essential Information Theory , Linguistic Essentials and Statistical Inference n-gram models	1	1						2	
				CO2	Analyze Word Sense Disambiguation ,HMM and CFG	1	1						2	
				CO3	Illustrate Text and Sentence Alignment, Clustering in detail.	1	1						2	
				CO4	Explain Information Retrieval and Text Categorization , Perceptron in detail.	1	1						2	
16	15 CS 51B1	Requirements Engineering	3	CO1	This module aims to provide students comprehensive details to software engineering	1							2	
				CO2	It gives an introduction to basic concepts, principles and techniques used in software engineering	2	1						2	
				CO3	It discusses the nature of software and software projects, review of object orientation,	2							2	
				CO4	software development on reusable technology, developing requirements, modelling with classes, design patterns,		2						2	
17	15 CS	Principles of Programming	3	CO1	To introduce the major programming paradigms, and the principles and	1				1	3			

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	51B2	Languages		techniques involved in design and implementation of modern programming languages.									
			CO2	To introduce notations to describe syntax and semantics of programming languages.		2					3		
			CO3	To introduce the concepts of ADT and object oriented programming for large scale software development.	1		?				3		
			CO4	To introduce the concepts of concurrency control and exception handling		2					3		
18	15 CS 51B3	Compiler Design	3	CO1	Understand the overall compiler architecture and design of Lexical Analyzer	1						3	
				CO2	Construct the parser using the Yacc tool		2			?		3	
				CO3	Analyze Syntax directed definition and its translations schemes, intermediate code	1				?		3	
				CO4	Apply the code optimization and generation techniques in the development of a compiler.		2	?	?	?		3	
19	15 CS 51B4	Software Testing & Quality	3	CO1	Develop methods and procedures for software development that can scale up for large systems and that can be used to	2						3	

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		Assurance		consistently produce high-quality software at low cost and with a small cycle time										
			CO2	Student learn systematic approach to the development, operation, maintenance, and retirement of software		2							3	
			CO3	Methods and tools of testing and maintainance of software's.	1			1					3	
			CO4	Student learn how to use available resources to develop software, reduce cost of software and how to maintain quality of software		2							3	
20	15 CS 52C1	Cryptography & Network Security	3	CO1	Understand the classic ciphers and world war II ciphers	2							2	
				CO2	Understand the Stream Ciphers and Block Ciphers		2						2	
				CO3	Illustrate and Examine Hash Functions	1							2	
				CO4	Describe the Public Key System and analyze the Attacks on Public Key System		2						2	
21	15 CS 52C3	High Performance Computing	3	CO1	fundamental concepts and techniques in parallel computation structuring	1							2	
				CO2	including parallelization methodologies and paradigms, parallel programming models,		1						2	

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					their implementation, and related cost models												
				CO3	architectures of high performance computing systems,		1									2	
				CO4	including shared memory multiprocessors, distributed memory multicomputers, clusters, and others.	1										2	
22	15 CS 52C4	Network management Systems	3	CO1	Understand general concepts and architecture behind standards based network management	1										2	
				CO2	Understand concepts and terminology associated with SNMP and TMN		1									2	
				CO3	Appreciate network management as a typical distributed application	1	2									2	
				CO4	Understand Advanced Information Processing Techniques		2									2	
23	15 CS 52D1	Service Oriented Architecture	3	CO1	introduce the concepts and design principles of SOA,	1										2	
				CO2	Non-technical aspects such as governance, impact on culture and organization,		1									2	
				CO3	various interoperability standards, technology infrastructure	1	1									2	

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				CO4	security considerations associated with SOA implementations.		1						2	
24	15 CS 52D4	Big Data Analytics	3	CO1	Explain the big data that is emerging from multiple big data sources in terms of velocity, variety and veracity	1							3	
				CO2	Illustrate the technologies, processes and methods for analyzing big data		1					3		
				CO3	Demonstrate the key principles of data analysis using the R tool	1					3			
				CO4	Examine advanced Graphs, Regression, Forecasting and Time Series models using R analytical platform.	1	1				3			
25	15IE5149	Seminar	2					2	2	2				1
26	15IE5250	Term Paper	2					2	2	2				3
27	15IE6051	Major Project	36					2	2	2				3
						71	102	10	9	7	108	136	7	

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**Department of ECE**

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**Academic Year 2016**

**M. Tech Program VLSI**

**Mapping of ECE Department M.Tech (VLSI) Mission Statement with POs, PSOs and PEOs**

**Program Outcomes**

**Mission statement of K L University**

**Vision**

To be a globally renowned university.

**Mission**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**Vision and Mission statement of ECE department**

**VISION**

- To evolve into a globally recognized department in the frontier areas of Electronics & Communication Engineering (ECE).

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## **MISSION**

**M1-** To produce graduates having professional excellence.

**M2-** To carry out quality research having social & industrial relevance.

**M3-** To provide technical support to budding entrepreneurs and existing

## **PROGRAM EDUCATIONAL OBJECTIVES (PEOS):**

- **PEO1:** Employability in the diversified sectors of core industry, public sector or multinational corporations, in the domain of Semiconductor Technology, ASIC Design and Verification, Embedded Systems - Hardware and Software Development.
- **PEO2:** Ability to pursue higher education in technologies related to VLSI and Embedded Systems at institutes of repute and high standard leading to contributions to technology.
- **PEO3:** Attitude of lifelong learning and skills of effective inter-person communication resulting in leading diverse teams, with ethical and social behavior.

## **Programe Outcomes**

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PO1	a	Apply the knowledge of science, mathematics, and engineering principles for developing problem solving attitude.
PO2	b	Identify, formulate and solve engineering problems in the broad areas like System Design using VLSI and Embedded Platforms and tools, Semiconductor Technologies, Applications in Signal Processing, Machine Vision and Communication Networks.
PO3	c	Use different software tools in the domain of VLSI and Embedded Systems Design, Analysis and Verification such as Design entry, Synthesis, Functional and Timing Simulation, Floor-planning, Place and route, Layout editors, RTL schematic, Platform specific EDA sets, MATLAB.
PO4	d	Design and conduct experiments, analyze and interpret data, imbibe programming skills for development of simulation experiments.
PO5	e	Function as a member of a multidisciplinary team with sense of ethics, integrity and social responsibility.

#### Mapping of Mission statements with program educational objectives

	M1	M2	M3
PEO1	✓	✓	
PEO2		✓	✓
PEO3	✓		

#### Mapping of PEOs with Pos and PSOs

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	PEO1	PEO2	PEO3
PO1	✓		
PO2	✓	✓	
PO3	✓		
PO4		✓	✓
PO5			✓

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2016-17 (Semester I)									
S.NO	COURSE CODE	COURSE NAME	Cos	COURSE OUTCOME	P01	P02	P03	P04	P05
1	15 EC 5131	IC Fabrication	1	Ability to understand the Concepts of fabrication and steps following for fabrication	1				
			2	Understand different modelling technologies and materials used for fabrication		2			
			3	Ability to understand the concepts of lithography and deposition		2			
			4	Analyze the various etching technologies for preparation of ICs		2			
2	15EC5130	HDL & PLD Architectures	1	Understand the basics concepts of digital system design, their modeling techniques in Verilog HDL.			1		
			2	Design of various Combinational & Sequential Logic realizations using Verilog HDL.			2		
			3	Compare and analysis of different PLD's and CPLD's architectures.			2		
			4	Memorize and analysis of different FPGA architectures.			2		
			5	Create and Analysis of digital modules through project oriented approach					3
3	15 EC 5128	MOS CIRCUIT DESIGN	1	Understand the basics concepts of digital system design, their modeling techniques in Verilog HDL.		1			
			2	Design of various Combinational & Sequential Logic realizations using Verilog HDL and design flow		2			
			3	Characteristics of inverter and calculation of different delays		2			
			4	Design of different combinational and sequential circuits		2			
			5	Create and Analysis of digital modules through project oriented approach					3
4	15 EC 5129	ALGORITHMS FOR VLSI	1	Ability to understand the Concepts of design methodologies in routing and layout	2				
			2	Understand different levels of modelling of digital circuits and scheduling	2				

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		DESIGN	3	Ability to understand the FPGA Technologies for development of physical design				2	
			4	Analyze the routing and distribution of cells in ICs				2	
5	15 EC 51Q4	Nano Electronics	1	Ability to understand the Concepts nano Electronics	2				
			2	Understand different Architectures and equipment for nano electronics	2				
			3	Ability to understand the spintronics		2			
			4	Analyze the various memory devices and sensors in nano electronics		2			
6	15EC 51R3	Semicond uctor Device Modeling	1	Understand the basics concepts of MOS transistors		2			
			2	Calculation of threshold voltage, delay, sensitivity		2			
			3	Characteristics Bipolar devices		2			
			4	Design of different combinational circuits		2			
<b>2016-17 (Semester II)</b>									
1	15 EC 5232	Advanced Analog IC Design	1	Understand the operation of different current mirrors	2				
			2	Analyze the frequency response of different Amplifiers.				2	
			3	Design of two stage Op-Amp using single stage Op-Amp				2	
			4	Describe the various Feedback topologies.	2				
			5	Understand and apply the concepts of Non Linear Analog circuits.	2				
2	15 EC 5233	Low Power VLSI Circuits	1	Understand power dissipations concepts related to VLSI circuits		2			
			2	Evaluate the performance of different circuits using simulation & probabilistic power analysis.		2			
			3	Analyze low power techniques at logical, circuit, architectural and systems level		2			
			4	Analyze Clock Distribution techniques, Special techniques		2			
			5	Project based lab					2
3	15 EC	VLSI	1	Ability to understand the importance Programmable devices in VLSI			2		

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	5234	System Design	2	Understand difference between Data path sub system and array subsystem			2		
			3	Ability to understand the methodology of interconnects				2	
			4	Analyze synchronization of clock and synthesis of different designs				2	
4	15 EC 5235	Testing of VLSI Circuits	1	Understanding and application user-defined primitives in Fault dominance, understanding various simulation and Gate level event-driven simulation for digital circuits.		2			
			2	Understanding, Test generation for various Combinational logic circuits and ability to design its Testable Combinational circuits.		2			
			3	Design for Testability, Generic scan based design and Classical scan based design			2		
			4	Analyze and ability to Testable various BIST– MBIST, LBIST. Fault Diagnosis of digital circuits and Diagnosis by UUT reduction.			2		
5	15 EC 52S3	ADVANCED VLSI DESIGN		UNDERSTAND THE CONCEPTS OF MOS CIRCUIT DESIGN	1				
				Analyze different types of buffers in mos circuits		2			
				Analyze the layouts of MOS circuits		2			
				Analyze total circuit design of MOS circuits			2		
6	15 EC 52T4	ASIC Design Flow		Develop Program of different logic circuits using Verilog Programming and analyze different types of Faults in logic circuits.	2				
				Analyze different types of ASIC design methodologies and Different CPLD		2			
				Analyze ASIC design flow of customized ASICs		2			
				Analyze Physical design flow of ASIC, Extraction the final circuit		2			

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Professor incharge

Head of the department



### **KL University Vision**

To be a globally renowned university.

### **K L University Mission :**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

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# K L University

(Koneru Lakshmaiah Education Foundation)

Deemed to be University, Estd. u/s 3 of UGC Act, 1956

Accredited by NAAC as 'A' Grade University ❖ Approved by AICTE ❖ ISO 9001-2008 Certified

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## KLUBS BUSINESS SCHOOL

### KLUBS VISION

To be a Centre of excellence for value based management education.

### KLUBS MISSION

1. To attain leadership in management education, research and consultancy.
2. To nurture the students industry ready and
3. To make them responsible citizens of nation.

### OBJECTIVES

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- i. To nurture young students to be effective managers capable of contributing value to organizations.
- j. To contribute to the body of knowledge through research and publications.
- k. To provide consultancy to industry for value creation by applying contemporary management concepts, theories and practices.
- l. To be a socially responsible business management and commerce education provider.

**KLUBS VISION & MISSION MAPPING**

<b>KL University Vision</b>	<b>KLUBS Vision</b>	
	To be a Centre of excellence	To impart value based management education
To be a globally renowned university	✓	✓

<b>KL University Mission</b>	<b>KLUBS MISSION</b>				
	To attain leadership in management education	To attain leadership in Research	To attain leadership in Consultancy	To nurture the students industry ready	To make the students as a responsible citizen of nation.

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To impart quality higher education	✓				
To undertake research and extension with emphasis on application and innovation		✓			
To cater the emerging societal needs through all-round development of students of all sections			✓	✓	
To enable students to be globally competitive and socially responsible citizens with intrinsic values					✓

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## **KLU BUSINESS SCHOOL**

### **MBA PEO'S & PO'S**

#### **PROGRAM EDUCATIONAL OBJECTIVES (PEOS) :**

To be a globally renowned university, as per our vision, we need to produce quality products (graduates) into the market who have potential strengths to meet all the professional and personal challenges prevailing at global levels and who can serve in all the possible positions of their respective job domains and contribute towards holistic growth of their respective employment providers as well as the nation, world. The graduates must also possess cutting edge R&D skills in their domain areas.

This, is exactly what has been framed into the University's Mission and thereby the Mission has converged into the following **Program Educational Objectives (PEOs)** which are best suited to Post-graduate Management program, and are those that compliment the university vision, mission.

#### **PROGRAM EDUCATION OBJECTIVES:**

4. Make students to apply techniques of business analysis, data management and problem-solving skills in order to support business management decision-making in the field of relevance.
5. Inculcate leadership skills needed for implementing and coordinating organizational activities and managing change to explore business problems in depth for developing their functional knowledge to think strategically and to lead, motivate and manage teams across borders.
6. Nurture with abilities to integrate business knowledge and management techniques to aid planning and control in a changing environment and to enhance better career paths.

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These PEOs are designed to be attained by all the post-graduates within 2 years of their education.

**PROGRAM OUTCOMES (PO's)**

<b>PO Number</b>	<b>Description</b>
<b>a. Core Business Knowledge</b>	Able to synthesize the knowledge, management skills, and tools acquired in the program, which will be helpful to shape the organizations effectively.
<b>b. Career Planning and Decision Making</b>	Able to excel in their chosen career paths, by learning on how to live, adapt and manage business environmental change through decision making.
<b>c. Critical Thinking and Leadership</b>	Able to reflect upon and explore business and research problems in depth, to demonstrate leadership skills and to demonstrate ability to pursue new knowledge necessary to succeed in dynamic domestic and international business environments.
<b>d. Manager &amp; Society</b>	Able to emerge as efficient managers equipped with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.
<b>e. Team Building &amp; Business Communication</b>	Able to communicate effectively and to perform different roles efficiently as an individual or in a team in multi-disciplinary streams with entrepreneurial edge.
<b>f. Business perspective and Sustainability</b>	Able to gain an understanding of professional, legal, financial, marketing, production & operational activities, logistics, ethical, social issues and responsibilities

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PO Number	Description
<b>g. Application of Statistical and Analytical tools</b>	Able to gain knowledge of contemporary issues and develops an art of using current techniques, skills and necessary analytical tools for managerial practice.

**PROGRAM SPECIFIC OUTCOMES – MBA PROGRAM**

1. Graduates will be able to inculcate leadership, managerial and entrepreneurial competencies and strengthen their expertise in implementation of strategies and the management of complex situation.
2. Graduates will develop professional skills that prepare them for immediate employment and for life-long learning in advanced areas of management and related fields

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**MISSION - PEO MAPPING**

**MBA PROGRAM**

<b>PEO</b>	<b>MISSION</b>				
	To attain leadership in Management Education	To attain leadership in Research	To attain leadership in Consultancy	To nurture the students industry ready	To make the students as a responsible citizen of nation.
Make students to apply techniques of business analysis, data management and problem-solving skills in order to support decision-making	✓	✓	✓	✓	
Inculcate leadership skills needed for implementing and coordinating organizational activities	✓			✓	
Managing change to explore business problems in depth for developing their functional		✓		✓	✓

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**K L U BUSINESS  
SCHOOL  
MBA PEO – PO  
MATRIX**

knowledge					
To think strategically and to lead, motivate and manage teams across borders	✓		✓	✓	✓
Nurture with abilities to integrate business knowledge and management techniques	✓	✓	✓	✓	
To aid planning and control in a changing environment and to enhance better career paths.	✓	✓		✓	✓

PO	PEO		
	Make students to apply techniques of business analysis, data management and problem-solving skills in order to support business management decision-making in the field of relevance.	Inculcate entrepreneurial & leadership skills needed for implementing and co-ordinating organizational activities and managing change to explore business problems in depth for developing their functional knowledge to think strategically and to lead, motivate and manage teams across borders.	Nurture with abilities to integrate business knowledge and management techniques to aid planning and control in a changing environment and to enhance better career paths.
<b>a. Core Business Knowledge</b>	✓		✓

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<b>b. Career Planning and Decision Making</b>	✓	✓	✓
<b>c. Critical Thinking and Leadership</b>		✓	
<b>d. Manager &amp; Society</b>			✓
<b>e. Team Building &amp; Business Communication.</b>		✓	
<b>f. Business perspective and Sustainability</b>	✓		

<b>KLU BUSINESS SCHOOL</b>														
<b>MBA PROGRAM</b>														
<b>CO-PO ARTICULATION MATRIX AY 2016-17</b>														
S.No	Course code	Course Name	L-T-P	Cr	Course Outcomes	PO							PSO	
						a	b	c	d	e	f	g	1	2
<b>I</b>														
1	15MB51C0	Quantitative	3-0-0	3	Identify the source of a quantifiable problem, recognize the issues involved	1								

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		Methods			and produce an appropriate action plan.									
					Translate a problem into a simple mathematical model to allow easier understanding and to aid problem solving	1						3		
					Employ appropriate mathematical tools to solve problems							3		
					Calculate and interpret numerous statistical values and appreciate their value to the business Manager.							3		
2	15MB51C1	Indian Business Environment	3-0-0	3	Outline various components of Business Environment,		3							
					Recognize, distinguish, paraphrase, and explain the impact of business environment on business activities		3							
					Apply the knowledge to analyze the current situations and take prudent decisions,			3						
					Identify, distinguish and present the various facts and uniqueness of the			3						

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					any component of the business environment									
3	15MB51C2	Managerial Economics	3-0-0	3	Apply the intuition for analyzing economic problems from a managerial perspective in an organizational & business context.			2	3					
					Analyze the theory of demand ,forecast an estimation of demand for managerial decision making			2						
					Analyze different types of competition that exist in external environment				3					
					Analyze the Macro Economic Environment of the organization				3					
4	15MB51C3	Financial and Management Accounting	2-2-0	4	To understand the accounting process in business	3								
					To gain a knowledge on application of concepts and principles in preparing						3			
					To evaluate the tactical decisions of middle level managers relating to cost and management accounting	1								
					To analyze the financial statements and evaluate the decisions for better						3			

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					investment.											
5	15MB51C4	Marketing Management	3-0-0	3	Apply key marketing concepts, theories and techniques for analyzing a variety of marketing situations.	3										
					Implement marketing planning for STP, product related strategies						3					
					Impart the implications for marketing strategy determination and implementation of price, distribution and promotion.	2										
					Apply conceptual frameworks of advance marketing						3					
6	15MB51C5	Organizational Behavior	3-0-0	3	Ability to manage people with an understanding of Individual behavior.			2								
					Ability to manage groups with an understanding of the Group behavior and leadership.						3					
					Ability to motivate and in competitive business environment.			2			3					
					Ability to perceive organizational culture and implement organization Change and Development interventions						3					

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7	15ES120	IT for Managers	1-2-0	3	Learn the basic use of computer hardware, software and MIS		1									
					Apply the knowledge of networks and information security for effective e-commerce business.		1									
					Manage and analyze business communication with effective use of Word and Excel.								3			
					Create business databases and dashboards using MS-Excel and MS-Access applications.								3			
8	15MB51K7	Business Communication			Write effective drafts for self improvement.	1										
					Prepare effective reports and proposals that help individual development.	1				3						
					Develop professional behaviors in work contexts.					3						
					Perceive organizational culture and accommodate himself/herself in different cultural contexts					3						

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1	15MB52C0	Human Resource Management	3-0-0	3	Integrated perspective on role of HRM in modern business			2							
					Ability to plan human resources and implement techniques of job design					3					
					Competency to recruit, train, and appraise the performance of employees					3					
					Rational design of compensation and salary administration and ability to handle employee issues			2		3					
2	15MB52C1	Financial Management	2-2-0	4	To gain a knowledge on availability of various sources of finance and markets for raising of funds.	2									
					To evaluate the long term and short term investment decisions	2				3					
					To Evaluate the financing decisions by using different techniques of valuation.					3					
					To evaluate the dividend Decisions in relation to wealth maximization.					3					
3	15MB52C2	Business Research Methodology	3-0-0	3	Understand and independently apply the research process to								2		

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				business problems										
				Evaluate different statistical methods that are applicable to specific research problems.								2		
				Take data driven business decisions.			3							
				Analyze organizational data using software packages			3							
4	15MB52C3	International Business Environment	3-0-0	3	Analyze international factors that affect business decisions.		1	2						
					Practice regional economic integration and political integration.		1							
					Analyse issues involved in managing International finance and HR			2						
					Evaluate Cognitive knowledge of global issues, to internationalise business			2						
5	15MB52C4	Operations Management	3-0-0	3	Illustrate the general concepts of overall plant and production management using appropriate	1			2					

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				analysis tools										
				Establish methods for maximizing productivity and understand the purpose of setting and attaining high levels of throughput, quality, and customer service	1			2						
				Optimize the use of resources which include: people, plant, equipment, tools, inventory, premises and information systems						3				
				Make the best use of computers to achieve maximum efficiency, especially in the planning and control of operations.				2		3				
6	15MB52C5	Business Legislation	3-0-0	3	Apply core concepts in the legal structure of business.			1						
					The student will be able to interpret the main statutory provisions relevant to the business organization.			1						
					The student will be able to identify and explain the legal issues arising in some of the main day to day dealings of the business organization and provide advice or					3				

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				remedy for those issues.										
				The student will be able to provide advice or remedy for those legal issues.						3				
7	15MB52C6	Enterprise Resource Planning	3-0-0	3	Make basic use of Enterprise software, and its role in integrating business functions		1							
					Analyze the strategic options for ERP identification and adoption		1							
					Design the ERP implementation strategies.						2			
					Create reengineered business processes for successful ERP implementation		1					2		
8	15HS113	Soft Skills I	1-0-2	3	Participate in the campus selection process with special focus on aptitude and GD.	1								
					Prepare himself/herself for the campus Interviews.	1				3				
					Develop professional behaviour for entry into the professional world.					3				

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				Think logically and solve problems in professional life.					3					
1	15MB61C0	Strategic Management	3-0-0	3	Understand the concepts, components and levels of strategic management	1	2							
					Have proficiency in competitive strategies in different types of types of industries.	1	2							
					Have proficiency in forms of corporate restructuring, mergers			3						
					Become an expert in solving the challenges of e-business strategy.		2	3						
2	15HS114	Soft Skills 2	1-0-2	3	Participate in the campus selection process with special focus on aptitude and GD.	1				3				
					Prepare himself/herself for the campus Interviews.	1				3				
					Develop professional behaviours for entry into the professional world.					3				
					Think logically and solve problems in professional life.					3				

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8	15MB62E8	3 Project	3-0-6	9	CO1		3	3						3				
1	15MB61C1	Management Control Systems	3-0-0	3	The students is able to evaluate corporate and unit strategies in the organization by the end of the semester		1											
					Analyse various types of organizations and evaluation of various plans in the organization		1											
					Design, evaluate, recommend, and submit budget reports to the top management.		1							3				
					Execution and evaluation of projects with the help of Management control system								3					
2	15MB62C1	Business Ethics & Corporate Governance	3-0-0	3	Gain knowledge about differences between ethics and morals, various ethical theories.								3					
					Have proficiency about the definition, objectives, natures and sources of ethics.								3					

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					Have adequate knowledge in ethical issues in corporate governance, the problems of whistle blowing.						3			
					Become an expert in ethical issues in employer-employee relations, ethical issues in marketing.						3			
3	16MB62C2	Entrepreneurship			Understand and explain the key terms, definitions, and concepts used in Entrepreneurship Development			2		3				
			3-0-0	3										
					Apply the techniques of environmental analysis, opportunity assessment, feasibility study and generating business ideas									
					Construct a well structured business plan by including all the necessary elements of the business plan									
					Plan a start up by applying the knowledge of sources of									

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					finance and the supporting schemes offered by state and central governments and other entrepreneurial development organisations												
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1	15MB61M0	Consumer Behaviour	3-0-0	3	Apply concepts used in the study of consumer behavior.				1	2	3						
					Apply the knowledge of consumer behavior concepts to analyze changing consumer profiles and factors influencing consumer purchase decision					2	3						
					Apply the knowledge of consumer behaviour to analyse the changing consumer perceptions, attitudes, values and lifestyles and overall behaviour						3						
					Create better marketing programs and strategies basing on the knowledge of				1								

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					consumer behavior.										
2	15MB61M1	Services Marketing	3-0-0	3	Implement the best practices of the Services Marketing			2							
					Apply knowledge of Customer Relationship techniques in the corporate world			2							
					Analyze, interpret and solve problems in service Recovery.					3					
					Perform lifelong learning and professional development to enrich the services marketing strategies.			2		3					
3	15MB61M2	B2B Marketing	3-0-0	3	Implement the applications, challenges and the dynamic environment of B2B marketing, including the unique nature of organizational buying behavior.		2								
					Design strategies and structures to effectively serve the B2B market.		2								

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					Strategize Buyer seller relationships including channel distribution strategies						3			
					Implement product strategies which enables her/he to develop a business marketing plan for a real local company that mainly targets business customers						3			
4	15MB61M3	International Marketing	3-0-0	3	Assess various foreign markets	1								
					Analyze the impact of cultural, social, political and economic factors on marketing strategies	1								
					Determine when to use different market entry and penetration strategies			3						
					Examine the different skills and systems required to implement marketing strategies across country borders			3						
5	15MB62M4	Sales and Distribution	3-0-0	3	Understand basic concepts	1								

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		Management			of sales management									
					Design and implement the strategies for building sales volume.	1								
					Evaluate performance of sales force and develop ability to organize and control sales related activities.					2				
					Design distribution network and analyze the performance of channel members.					2				
6	15MB62M5	Business Analytics in Marketing	3-0-0	3	Understand and analyze customer data.	1	2					3		
					Analyze and interpret marketing data through various methodologies.	1								
					Make data-driven managerial decisions.	1	2							
					Communicate research findings in the language of decision makers		2							
7	15MB62M6	Brand Management	3-0-0	3	Describe and identify all the	3								

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					components of Brand Management.										
					Design, implement and evaluate Branding Strategies.	3									
					Describe and analyze Brand Portfolio and how it can be built and developed.					2					
					Evaluate sources of “Brand equity” as well as outcomes of “Brand equity”.					2					
8	15MB62M7	Customer Relationship Management	3-0-0	3	Apply the concept of CRM, the benefits delivered by CRM, the contexts in which it is used, the technologies that are deployed and how it can be implemented.				2						
					Implement how CRM practices and technologies enhance the achievement of marketing, sales and service objectives throughout the customer life-cycle stages of customer acquisition,			1	2						

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					retention and development whilst simultaneously supporting broader organizational goals.										
					Implement various technological tools for data mining and also successful implementation of CRM in the Organizations				2						
					Design customer relationship management strategies by understanding customers' preferences for the long-term sustainability of the Organizations.				2						
1	15MB61F0	Financial Services and Markets			Understand features of the current structure and regulation of the Indian financial services sector.	1									
			3-0-0	3											
					Demonstrate an awareness of the	1									

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					variety of financial instruments.								
					Critically evaluate the role and function of the financial system in reference to the macro economy.					2			
					Describe the impact that financial innovation, advances in technology, and changes in regulations has had on the structure of the financial firms/industry.					2			
2	15MB61F1	Security Analysis & Portfolio Management	2-2-0	3	Explored to different avenues of investment.		1			2			
					Equipped with the knowledge of security analysis.		1				2		
					Apply the concept of portfolio management for					2			

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					the better investment.										
					Student will be able to invest in less risk and more return securities.							2			
3	15MB61F2	International Financial Management	2-2-0	3	To excel in environment of international finance and its implications on international business.			3	1						
					To perform in the functioning of foreign exchange markets, determination of exchange rates and interest rates and their forecasting.			3							
					To apply the techniques of reducing risks and to identify risk management strategies.				1						
					To explore the sources of long term finance and design financial strategies and to integrate the global developments with the changing business environment in India.			3	1						

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4	15MB61F3	Principles of Taxation	2-2-0	3	Understand the fundamental principles of Income tax	1											
					Find various incomes which are exempted from Income tax.	1											
					Calculate Residential status and incidence of tax.						3						
					Gain Knowledge to compute Income under five heads.						3						
5	15MB62F4	Financial Derivatives (Pre-requisite: Security Analysis)	2-2-0	3	Students will be able to analyze the risks in different financial markets.		1	2									
					Acquire the ability to selection of various options and then can apply them to specific markets.		1	2									
					The student will be able to strategically manage the financial derivatives.						3						

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					The student will be able to analyze various models in order to take wise decisions for improving their wealth			2			3			
6	15MB62F5	Business Analytics in Finance	2-2-0	3	Get better knowledge for implementation of decision trees analytics, cluster analysis and in business organizations.	1	2							
					Equip with required skills to take decisions under Risk and Uncertainty.	1	2							
					Perform sensitivity analysis for business growth and coming out with different decision models.		2					3		
					Analyzing large scale financial data							3		
7	15MB62F6	Planning and Assessment of Income Tax	2-2-0	3	Learn various provisions of set off and carry forward of losses.		2							
					Acquaint with Deductions under Sec 80.		2							

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					Assess the taxable income of individuals, Partnership firms and Hindu Undivided family.						3			
					Apply various principles of tax planning, avoidance and management.						3			
8	15MB62F7	Project Management	2-2-0	3	Understand tools and considerations used in assessing and selecting suitable projects.	1								
					Appraise the usefulness of planning, monitoring and control techniques as means of achieving business improvement and change.	1					3			
					Evaluate a project to provide cost estimates and to plan the various activities						3			
					Develop team building skills required to support successful performance.						3			

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S.No	Course code	Course Name	L-T-P	Cr	Pre-Req.	PSO											
						1	2	3	4	5	6	7	1	2			
1	15MB61H0	Performance Management System	3-0-0	3	Identifying the elements and describe the purpose of a performance management system		2										
					Outline the process of designing and implementing a performance management system		2										
					Identifying different types of reward systems, performance appraisals, analyzing performance through various measuring tools						3						
					Developing and implementing performance consultation.						3						
2	15MB61H1	Training and Development	3-0-0	3	Understand basic concepts associated with learning process, learning theories, training and development;					3	2						

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					Understand training needs, identification of training needs, training processes, training methods, and evaluation of training;						2			
					Analyze emerging trends in training and development; and						3			
					Relevance and usefulness of training expertise in the organizational work environment.						3			
3	15MB61H2	Industrial Relations & Labour Legislation	3-0-0	3	Operate in the changing industrial relations in India		2							
					Handle industrial disputes in Indian organizations		2							
					Interpret legal aspects of employee compensation						3			
					Implement legal aspects of employee benefits						3			
4	15MB61H3	Leadership in Organizations	3-0-0	3	Capacity to apply leadership in changing business environment			3		2				

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					Equip the learners with skills, tactics, styles for leadership roles										
					Understanding of executing leadership in organizations			3		2					
					Ability to develop leaders in organizations			3							
5	15MB62H4	Compensation Management (Pre-requisite: Performance Management Systems)	3-0-0	3	Recognize how pay decisions help the organization achieve a competitive advantage.						3				
					Analyze, integrate, and apply the knowledge to solve compensation related problems in organizations.						3				
					Demonstrate comprehension by constructing a compensation system encompassing; 1) internal consistency, 2) external competitiveness 3) employee contributions, 4) organizational benefit systems, and 5) administration issues.						3				

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					Design rational and contemporary compensation systems in modern organizations.						3			
6	15MB62H5	Strategic Human Resource Management	3-0-0	3	Integrate HR with the business strategy			3						
					Develop competency to enhance employee development						1			
					Gain rational ability to manage performance strategically						1			
					Develop competency to implement global HR practices			3			1			
7	15MB62H6	Human Resource Development(Pre-requisite: Training & Development)	3-0-0	3	Competency to perform HRD functions		1							
					Competency to design and implement and evaluate HRD programs		1							
					Competency to be an expert in organizational climate and						3			

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					development												
					Competency to execute HRD instruments					3							
8	15MB62H7	Business Analytics in HR	3-0-0	3	Gain expertise with HR metrics and analytics.	1											
					Improving HR processes by capability planning translated to practice.	1											
					Use of HCM 21 ® Model for enhanced staffing and retention.								3				
					Leveraging Human Capital Analytics in organizations.								3				
9	15MB62H8	Organizational Change & Development	3-0-0	3	Preparedness to initiate change in organizations		3										
					Trained change agents for modern organizations		3										
					Preparedness to implement OD in organizations		3					2					
					Expertise to implement OD interventions							2					

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RETAILING												
1	15MB61R0	Overview of Retailing	3-0-0	3	Excel in the functions of a retailer. Student will be aware of the role of a retailer in global economy, career opportunities in retail, retail theories and various retail formats.	2					1	
					Gain practical expertise in designing of retail marketing strategies including Retail communication mix and pricing strategies. Further he/she can able to understand role of consumer in retail environment and various factors influencing consumer behavior. Identify consumer motivations, shopping behaviors, loyalty programs and decision processes for a retail consumer and accordingly designing strategies to give a robust experience to consumers	2						
					Apply HR programs and identify initiatives to improve operations and Employee retentions						1	

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					Understand measures of financial performance including strategic profit model							1				
2	15MB62R1	Management of Retail Operations	3-0-0	3	Design the factors influencing store location and location strategies including store layout and space planning.	2	1									
					Understand store environment, the roles and responsibilities of a store manager and build strategies to enhance the store loyalty.	2										
					Source, plan and procure merchandise for a retail organization and also able to design suitable promotion mix strategies for a Retail store.		1									
					Implement trends and practices of supply chain management in retail.	2										
<b>BANKING</b>																
1	15MB61B0	Overview of Banking	3-0-0	3	Understand the basic functions of financial systems & services.	1						2				
					Distinguish the various kinds of	3										

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					banks										
					Appraise the functioning of different types of banks						2				
					Illustrate the basic objectives of Regulating Agencies like SEBI						2				
2	15MB62B1	Banking Service Operations	3-0-0	3	Apply the concepts, theoretical ideas and empirical findings to develop their own views on strategic decision making in Banks.		2								
					Assess the implications of customer relationship management.		2								
					Analyze and evaluate the concepts of service quality metrics of banks						2				
					Apply the concepts, theoretical ideas related to Quality metrics and risk management to prepare risk management strategies in banks						2				

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S.No.	Course code	Course Name	L- T-P	Cr	Pre-Req.	PSO											
						1	2	3	4	5	6	7	1	2			
<b>FOREIGN TRADE</b>																	
1	15MB61T0	International Logistics Management	3-0-0	3	To understand the concepts Global supply chain	2											
					To analyze the role and components of International Logistics system							1					
					Analyze Ocean Transport and Chartering	2											
					Evaluate the problems and prospects of Fright Stations	2											
2	15MB62T1	Export, Import Documentation & Insurance	3-0-0	3	Understand the process of documentation in International business	1						1					

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					Evaluate the basic documents required for export and import	1										
					Understand the insurance procedure for export and import		2					1				
					Analyze the challenges of documentation and insurance for international Business Organizations		2									

HEALTH CARE																
1	15MB61D0	Overview of Healthcare Management	3-0-0	3	Understand basics of Healthcare Sector	1										
					Analyze the role of clinical and diagnostic services	1										
					Evaluate the impact of hospital operations							3				

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					management												
					Evaluate the components and process of maintaining medical records									3			
2	15MB62D1	Management of Healthcare Operations	3-0-0	3	Implement the best practices of the health care Services									3			
					Apply knowledge of financial management techniques in the corporate hospitals									3			
					Analyze, interpret and solve HR related issues in the hospitals									3			
					Perform lifelong learning and professional development to enrich the professionalism by learning production functions and store management functions									3			
	<b>DIGITAL MARKETING</b>																
	16MB61M0	Overview of Digital Marketing	3-0-0	3	Apply Key Email Marketing Concepts	1											2

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					Assess the benefits of Digital Display	1													
					Understand Key concepts of Social Media	1													
					Analyze the components of Social Media.	1												2	
	16MB62M1	Advanced Digital Marketing		3	Outline the key concepts of digital marketing														1
				3-0-0	Apply the SEO to a website														1
					Use the key PPC concepts to draw visitors to a business's websites														2

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					Use Campaign Management to manage the marketing concepts														2
<b>RURAL &amp; AGRICULTURAL MARKETING</b>																			
	16MB61G0	Overview of Agriculture & Rural Sectors in India	3-0-0	3	Understand and explain the concepts of agriculture and rural sector.	1													
					Evaluate the contribution of Agriculture and Rural sectors for the development of Indian economy	1													
					Apply the knowledge of developmental theories to discuss the degree of development														2
					Identify the determinants of rural														2

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					development in India												
	16MB62G1	Management of Agricultural & Rural Development in India	3-0-0	3	Understand and explain the important areas of management for the development of Agricultural sector in India	1											
					Understand and explain the important areas of management for the development of Rural sector in India	1											
					Apply the knowledge of managerial function like planning, organizing, controlling to discuss the management model for the development	2											

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					of agriculture and rural sector												
					Evaluate the role of Government in Agriculture and Rural development			2									
<b>PHARMACEUTICAL MARKETING</b>																	
	16MB61P0	Pharmaceutical Marketing Management		3-0-0	3	Apply key marketing concepts, theories and techniques for analysing a variety of marketing situations in pharmaceutical Industry.		2									
						Implement marketing planning for STP, product related strategie for Pharmaceutical		2									

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					products												
					Impart the implications for marketing strategy determination and implementation of price, distribution and promotion										1		
							2								1		
	16MB62P1	Advanced Pharmaceutical Marketing Management	3-0-0	3	Apply advanced marketing practices to physicians in pharmaceutical industry.		2								1		
					Apply advanced marketing practices to Patients in pharmaceutical industry		2										
					Identify the demand for pharmaceutical products based on marketing research										1		

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						product become an expert Ethical considerations in the marketing of pharmaceutical Products													1
	<b>BUSINESS ANALYTICS</b>																		
	16MB61A0	Overview of Business Analytics	3-0-0	3	Apply quantitative modeling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques	1	1												
					Apply ethical practices in everyday business activities and make well-reasoned ethical business and data management decisions.	1	1												
					Demonstrate knowledge of statistical data analysis techniques utilized in business														2

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					decision making.												
					Apply principles of Data Science to the analysis of business problems and also Use data mining software to solve real-world problems.		1								2		
	16MB62A1	Advanced Business Analytics	3-0-0	3	Compute the regression model for time series data that has correlation within itself.		1		1								
					Optimise business situations where two variables do not move in a linear fashion.		1										
					Test hypothesis for experiments involving different treatments				1						3		
					Group data points dynamically based on the similarities among the members of each group										3		

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**K L UNIVERSITY  
DEPARTMENT OF BIOTECHNOLOGY  
PROGRAM DEVELOPMENT DOCUMENT  
M.TECH BIOTECHNOLOGY  
2015**

**Vision of University:**

To be a globally renowned university.

**Mission of University:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**Vision of Department:**

To be a globally renowned leader in education, research and extension activities in emerging areas of biological engineering and related fields.

**Mission of Department:**

To train the leaders and innovators of tomorrow to establish as successful professionals to address global biotechnological requirements.

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### **Program Educational Objectives**

1. Illustrate the importance of techniques in bioengineering.
2. Illustrate practical application of various instrumentation methods in bioengineering sciences.
3. Understand the importance of professional and ethical issues in human and animal health.
4. Demonstrate the ability to work independently and in groupin projects related to biosciences.

### **ProgramOutcome's**

- a. Knowledge of basic and advanced concepts and techniques in bioengineering sciences.
- b. Practical and hands-on-training in various instrumentation methods and tools used in bioengineering.
- c. Knowledge of the applications of specific technologies or approachesleading to the design of a method or formulation.
- d. Knowledge of professional, ethical and societal issues in industry and research fields.
- e. Knowledge of work plan and management strategies related to the Science and Technology which includes data interpretation, preparing report, compilation and submission.

### **MAPPING OF PEOs with MISSION OF THE DEPARTMENT:**

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S.No	Description of PEOs	Key Components of Mission	
		M 2	M 3
		Training future professionals and innovators of tomorrow	Conducting fundamental and advanced research
PEO 1	Illustrate the importance of techniques in bioengineering.	✓	✓
PEO 2	Illustrate practical application of various instrumentation methods in bioengineering sciences.	✓	✓
PEO 3	Understand the importance of professional and ethical issues in human and animal health.		✓
PEO 4	Demonstrate the ability to work independently and in group in projects related to biosciences.	✓	✓

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**MAPPING OF POs/PSOs with PEOs:**

	Key Components of POs and PSOs	Description of PEO			
		PEO 1	PEO 2	PEO 3	PEO 4
		Illustrate the importance of techniques in bioengineering.	Illustrate practical application of various instrumentation methods in bioengineering sciences.	Understand the importance of professional and ethical issues in human and animal health.	Demonstrate the ability to work independently and in group in projects related to biosciences.
a	Knowledge of basic and advanced concepts and techniques in bioengineering sciences.	✓	✓	✓	✓
b	Practical and hands-on-training in various instrumentation methods and tools used in bioengineering.	✓	✓		✓
c	Knowledge of the applications of specific technologies or approaches leading to the design of a method or	✓	✓		✓
d	Knowledge of professional, ethical and societal issues in industry and research fields.	✓		✓	✓

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e	Knowledge of work plan and management strategies related to the Science and Technology which includes data interpretation, preparing report, compilation and submission	✓	✓		✓
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M.TECH. BIOTECHNOLOGY									
2016									
Course Code	Course Title	Credits	CO Number	Description of the course outcomes	a	b	c	d	e
15BT5101	MATHEMATICS AND BIO STATISTICS	4	CO1	Analyze the importance of numerical methods	2				
			CO3	Illustrate the role of various data interpretation					1
			CO5	Illustrate about RDB, ANOVA in agriculture and Hospital cases					
15BT5102	BIOCHEMICAL ENGINEERING	4	CO1	Knowledge about the importance of biochemical reactions in biological systems.	1				
			CO2	Interpret various designs and operations of bioreactors.	2				
			CO3	Illustrate various mass-transfer studies.		1			
			CO4	Analyze various kinetic models of heterogeneous systems.		1			
			CO5	Evaluate various RTD methods and models		2			
15BT5103	MOLECULAR BIOLOGY AND rDNA TECHNOLOGY	4	CO1	Understand and analyze the role of biochemical reactions in biological systems.	1				
			CO2	Interpret the role of transcription factors	2				
			CO3	Identify the role of Gene regulation in prokaryotes and eukaryotes		1			
			CO4	Identify the role of YAC, BAC in gene cloning		2			
			CO5	Demonstrate PCR and other molecular methods.		2			
15BT5104	APPLIED BIOINFORMATICS	4	CO1	Knowledge about SNPs, ESTs and GSS	1		2		

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			CO2	Illustrate the role of 3D models of protein structures and their modeling	1				
			CO3	Computational understanding of MASCOT, GFS and other tools			2		
			CO4	Illustrate the role of microarray processing and analysis			2		
			CO5	Computational methods on metabolic networks and SBML			2		
15BT51B1	FOOD BIOTECHNOLOGY	3	CO1	Understand the role of microbes in food technology	2				
			CO2	Understand the food processing and preservation methods					
			CO3	understand the concept of food preservation					
			CO4	Identify various methods involved in food storage and preservation					
			CO5	Demonstrate growth characteristics and rheological properties of microbes in food technology					
15BT51A1	PROTEIN ENGINEERING	3	CO1	Understand different methods of purification and isolation of proteins	2			1	
			CO2	Understand the role of DNA binding proteins and other immunological proteins					
			CO3	Knowledge about protein folding and models					
			CO4	Understand various methods for protein targeting and translocation					
15BT5205	PLANT AND ANIMAL BIOTECHNOLOGY	4	CO1	Importance of tissue culture and media		2		2	
			CO2	Analyze the role of micropropagation and secondary metabolites					

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			CO3	Knowledge about gene transfer methods					
			CO4	Analyze animal cell culture and growth kinetics					
			CO5	Demonstrate plant and animal cell culture methods					
15BT5206	IMMUNOTECHNOLOGY	4	CO1	Understand the concept of immune responses	2	2			
			CO2	Understand various immunological disorders					
			CO3	Understand various animal models in immunological methods					
			CO4	Analyze the importance of disease diagnosis and vaccines					
			CO5	Understand the role of chimeric antibodies in disease prevention					
15BT5207	BIOREACTOR MODELING AND SIMULATION	4	CO1	Knowledge about empirical and modeling approaches	2		3		
			CO2	Understand the role of MM Kinetics					
			CO3	Analyze batch modeling studies					
			CO4	Interpret structured and unstructured kinetic models					
			CO5	Evaluate various bioprocess simulation studies					
15BT5208	DOWNSTREAM PROCESSING	4	CO1	Acquire the knowledge of bioseparation		2	2		
			CO2	Acquire the knowledge of cell disruption methods					
			CO3	Analyze the role of different chromatographic separations					

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			CO4	Understand the importance of various formulation strategies					
			CO5	Acquire the knowledge about polishing and techniques					
15BT52C3	ENVIRONMENTAL BIOTECHNOLOGY	3	CO1	Understand types of environmental pollution, bioremediation			1		
			CO2	Analyze the importance of water and air purification systems to prevent water and air pollution			1		
			CO3	Understand the importance of heavy metals in environmental pollution			1		
			CO4	Understand and analyze the importance of renewable energy resources			2		
15BT52D2	BIOPROCESS ECONOMICS AND PLANT DESIGN	3	CO1	knowledge of economic analysis of bioprocesses				1	
			CO2	Analyze process design models				2	
			CO3	Analyze various procedures in design of instrumentation				2	
			CO4	Understand and analyze basic design problems.				1	

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**K L UNIVERSITY**  
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**Department of Civil Engineering**

**K L UNIVERSITY:**

**Vision**

- To be a globally renowned university

**Mission**

- To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**VISION, MISSION, LONG TERM GOALS, SHORT TERM GOALS, PEO's PO's and GA's OF DEPARTMENT:**

**Vision**

- To impart knowledge and excellence in Civil Engineering with global perspectives to the student community and to make them ethically strong engineers to build our nation.

**Mission**

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- Our mission is to provide holistic development of student community to meet the ever changing needs of civil engineering industry and to be involved in forward looking research and consultancy useful to society.

### **M. Tech. (Construction Technology and Management) - Civil Engineering Programme**

#### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs):**

- Demonstrate knowledge in broad areas of Construction Technology and Management
- Demonstrate a depth of knowledge in a chosen/focus area of Construction Technology and Management
- Demonstrate knowledge of contemporary issues in their chosen/ focused area
- Demonstrate the ability to complete a technical project independently

#### **PROGRAMME OUTCOMES (POs):**

On completing the M. Tech. (Construction Technology and Management)–Civil Engineering Programme successfully the students will exhibit the following capabilities:

1. Knowledge of a broad range of Construction Technology methodologies and underlying civil engineering, commonly used in the development and analysis of Construction Technology and Management systems
2. Knowledge of fundamental design issues relevant to Construction Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts
3. In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques
4. Knowledge of basic research and development principles and practices relevant to main stream engineering industry
5. Knowledge of key professional, safety and ethical issues arising in modern engineering industry
6. Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects

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**PROGRAMME SPECIFIC OUTCOMES (PSOs) - M. Tech. (Construction Technology and Management)**

1. Function as design consultants in construction industry for the design of civil engineering structures.
2. Provide sustainable solutions to the Civil Engineering Problems.

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DEPARTMENT OF CIVIL ENGINEERING MAPPING OF PEOs vs. Mission Statement (Construction technology and Management)

		<b>Mission Statement</b>		
		To provide holistic development of student to meet the ever changing needs of civil engineering industry	To be involved in forward looking research	To be involved in consultancy useful to society
	<b>Programme Educational Objectives</b>	<b>√</b>	<b>√</b>	<b>√</b>
1	Demonstrate knowledge in broad areas of Construction Technology and Management	<b>√</b>	<b>√</b>	<b>√</b>
2	Demonstrate knowledge in broad areas of Construction Technology and Management	<b>√</b>	<b>√</b>	<b>√</b>
3	Demonstrate knowledge in broad areas of Construction Technology and Management	<b>√</b>		<b>√</b>
4	Demonstrate knowledge in broad areas of Construction Technology and Management	<b>√</b>	<b>√</b>	<b>√</b>

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DEPARTMENT OF CIVIL ENGINEERING MAPPING OF POs vs. PEOs (Construction Technology and Management)

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		<b>Programme Educational Objectives</b>			
		Demonstrate knowledge in broad areas of Construction Technology and Management	Demonstrate a depth of knowledge in a chosen/focus area of Construction Technology and Management	Demonstrate knowledge of contemporary issues in their chosen/ focused area.	Demonstrate the ability to complete a technical project independently
<b>Program Out Comes</b>					
1	Knowledge of a broad range of Construction Technology methodologies and underlying civil engineering, commonly used in the development and analysis of Construction Technology and Management systems	√	√		√
2	Knowledge of fundamental design issues relevant to Construction Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts	√	√		√
3	In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modelling techniques	√	√		√
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4	Knowledge of basic research and development principles and practices relevant to main stream engineering industry.	√	√		√
5	Knowledge of key professional, safety and ethical issues arising in modern engineering industry.	√	√		√
6	Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects.	√	√		√
PSO1	Function as design consultants in construction industry for the design of civil engineering structures.	√	√		√
PSO2	Provide sustainable solutions to the Civil Engineering Problems.			√	

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## DEPARTMENT OF CIVIL ENGINEERING

### MAPPING OF Courses & Cos vs. POs (Construction Technology and Management)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	PSO 1	PSO 2
15CE5121	Green Buildings	Understanding the concept of green buildings and practices	1							1
		Understanding the Green Building Opportunities And Benefits and Green Building Design	1							1
		Understanding the concept of optimal air conditioning	1							1
		Understanding the concept of Material Conservation and Indoor Environment Quality And Occupational Health:	1							1
15CE5122	Construction Materials & Concrete Technology	Understanding and knowing about the different construction materials properties	1						1	
		Knowing about the special concretes	1						1	
		Knowing about the Tests on Concrete	1						1	
		Understanding the concept of Precast Concrete structures	1						1	
		Site visit and preparation of report	1					2	1	
15CE 5119	Construction Planning Scheduling and Control	Understand the Project Management, Project manager, organization structures, organizing and staffing the project office and team	1	1					1	
		Understand the Management functions, Directing, controlling, project authority, interpersonal influences, barriers, team building, communication, time management, conflicts	1	1						1

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		Understand and explain Construction Planning milestone schedules, WBS, Network Techniques, CPM, PERT and Prima Vera, Resources leveling and smoothing.	2	2					1	
		Understand Cost Control, operating cycles, cost account codes, Job cost report, Projected Cost Estimates, status reporting, variance and earned value and Project Management System, MIS reporting, Daily, Weekly and monthly reporting, Actual vs. Planned cost reports, Planning & Cost control document, Quality & Safety	1	1					1	
15CE 5120	Statistical Methods for Management	Understanding the concept of One Dimensional Random Variable		2					1	
		Understanding the Estimation Theory and Testing of Hypothesis		2				1		
		Design of Experiments		2				1		
		Understanding the Queueing Models		2				1		
15CE 5221	Mechanized Construction and Machinery	Understanding the Standard types of Equipment	2					1		
		Knowing the Earthmoving Equipment-I	2				1			
		Knowing the Earthmoving Equipment- II	2				1			
		Knowing the Pumping Equipments	2				1			
		Preparation of report on Different equipment types and their usage	2				1			
15CE 5222	Project Formulation Appraisal	To study elements of project formulation and appraisal	1					1		
		Gain knowledge on project costing and appraisal	2			2	1			
		To understand the financial aspects of projects.	1				1			
		To study the scope and applications of private sector participation in construction projects.	1				1			
15CE 5223	Construction Laws	Understanding the Construction Contracts	1					1		

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	and Regulations	Understanding the Tenders		2					1		
		Understanding the concept of Arbitration		2					1		
		Understanding the Legal Requirements and Labour Regulations		2					1		
15CE 5224	Quality Management and Safety Management Systems in Construction	Understand concepts of quality management, system requirements and documentation.	1						1		
		Understand quality planning and programs in construction industry.	1						1		
		Understand objectives, techniques for testing and analysis and application of tools for improvement of quality	2							1	
		Understand the fundamentals of safety management systems in construction industry	1							1	
		Demonstrate procedures and quality assurance systems and safety management systems in construction projects.		2						1	
15CE 5111	High Performance Buildings	Introduction to High Performing Buildings	2						1		
		Understanding the High Performance Building Concepts and Practices	2						1		
		Understanding the High Performance Building Design and Air Conditioning	2							1	
		Understanding the Material Conservation and Indoor Environment Quality and Occupational Health	2							1	
15CE 5112	Precast Concrete Structure	Introduction to Precast Concrete Structures	3						1		
		Knowing about the Prefabricated components	3						1		
		Understanding the Design Principles	3							1	
		Understanding the Joint in Structural Members and Design for abnormal loads	3							1	

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15CE 5113	Special Concrete	Understand the manufacturing process and additional ingredients of concrete	1						1
		Recognize different types of special concretes	1						1
		Calculate the different mix designs of concrete	2			2			1
		Thoroughly know the mechanical properties and durability of concrete	1						1
15CE 5114	Structural Health Monitoring	Understanding the Static Field Testing				2			1
		Dynamic Field Testing				2			1
		Understanding the Periodic and Continuous Monitoring of structures				2			1
		Understanding the different types Structural Cracks				2			1
15CE 5111	Construction Personnel Management	Understanding about Manpower Planning						1	1
		Understanding about the Organisation						1	1
		Understanding about Human Relations and Organizational Behaviour						1	1
		Understanding the Welfare Measures, Management and Development Methods						1	1
15CE 5112	Building Services, Maintenance Management	Understanding the Water Supply and Electric Services	2						1
		Understanding the Drainage and Solid Waste Disposal methods	2						1
		Understanding the Fire Fighting Services, Plumbing and Firefighting Layout of simple building	2						1
		Understanding the Illumination and lighting design	2						1
15CE 5113	Infrastructure Valuation	Understand the fundamentals of Value, worth and value engineering and also understand the general techniques in infrastructure valuation.	1				1		1
		Gain knowledge on the various special techniques in infrastructure valuation.	1				1		1

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		Understand the different numeric analysis techniques in value engineering and study life cycle cost.	2				2		1	
		Recognize the applications of value engineering	1				1		1	
15CE 51J4	Construction Economics & Finance	Understanding the Construction accounting	1						11	
		Understanding the Benefit-cost analysis	1						1	
		Understanding the Turnkey activities	1						1	
		Understanding the International finance	1						1	
15CE 52K1	Environmental Impact Assessment on built Environment	To acquire the Knowledge of Environmental Technology.	1							2
		To attain Strong base of knowledge of EIA		2						2
		To obtain the Knowledge of EIA Methodologies		2						2
		To know the Risks to Environment and Human, Health to solve societal problems			1					2
15CE 52K2	Deep Excavations and ground water control methods	Understanding about the Deep Excavation	2						1	
		Understanding about the Roads, Tunnels and Dewatering	2						1	
		Understanding about the Grouting Methods	2						1	
		Understanding about the Piling & Cofferdams and Caisson	2						1	
15CE 52K4	Form Work for Construction Structures	Understanding about Planning, site equipment and plant for form work	1						1	
		Understanding about Materials accessories proprietary products and pressures	1						1	
		Understanding the Design of forms and shores	1						1	
		Understanding the building and erecting the form work methods and forms for domes and tunnels, slip forms and scaffoldings	1						1	

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15CE 52L1	Emerging construction Technologies	Knowing and understanding about the emerging construction technologies	1							1
		Knowing and understanding about the Modular FRP Composite Bridge Deck construction procedures	1							1
		Understanding the Post-tensioned Steel Structure construction procedure	1							1
		Understanding the behaviour of Low Temperature Concrete Admixture	1							1
15CE 52L2	Building Envelopes	Understanding the Building envelop systems	1						1	
		Understanding about foundation construction	1						1	
		Understanding about wall construction and roof construction	1						1	
		Understanding about window, door installation and ventilation system; building envelope best practices	1						1	
15CE 52L3	Construction and fire safety	Understanding about the Classification of fire					1		1	
		Understanding about the Site planning and housekeeping					1		1	
		Understanding about the Safety in scaffolding					1		1	
		Understanding about the Road work and pilling operation					1		1	
15CE 52L4	Resource Management and Control In Construction	Understanding about the Resource Planning				2			1	
		Understanding about the Labour Management				2			1	
		Understanding about the Materials and Equipment				2			1	
		Understanding about the Time Management, Resource Allocation and Leveling				2			1	
15 IE 5148	Seminar						2	2		
15 IE 5250	Term Paper						2	2		

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15 IE 6050	Dissertation									2	2	
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**SCHOOL OF CIVIL AND MECHANICAL SCIENCES**  
**Department of Civil Engineering**

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**Vision**

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Signature of Head of the Institution

- To impart knowledge and excellence in Civil Engineering with global perspectives to the student community and to make them ethically strong engineers to build our nation.

### **Mission**

- Our mission is to provide holistic development of student community to meet the ever changing needs of civil engineering industry and to be involved in forward looking research and consultancy useful to society.

### **M. Tech. (Geospatial Technology) - Civil Engineering Programme**

#### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs):**

- Demonstrate knowledge in broad areas of Geospatial Technology
- Demonstrate a depth of knowledge in a chosen/focus area of Geospatial Technology
- Demonstrate knowledge of contemporary issues in their chosen/ focused area
- Demonstrate the ability to complete a technical project independently

#### **PROGRAMME OUTCOMES (POs):**

On completing the M. Tech. (Geospatial Technology)–Civil Engineering Programme successfully the students will exhibit the following capabilities:

1. Knowledge of a broad range of Geospatial Technologymethodologies and underlying civil engineering, commonly used in the development and analysis of geo spatial systems.
2. Knowledge of fundamental design issues relevant to Geospatial Technologyand an understanding of how to formulate and analyse design solutions in various engineering contexts

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3. In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques
4. Knowledge of basic research and development principles and practices relevant to main stream engineering industry
5. Knowledge of key professional, safety and ethical issues arising in modern engineering industry
6. Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects

**PROGRAMME SPECIFIC OUTCOMES (PSOs) - M. Tech. (Geospatial Technology)**

1. Function as design consultants in construction industry for the design of civil engineering structures.
2. Provide sustainable solutions to the Civil Engineering Problems.

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(Dr G Chakravarthi)

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# K L UNIVERSITY

## DEPARTMENT OF CIVIL ENGINEERINGPING OF PEOs Vs Mission Statement (Geospatial Technology)

		<b>Mission Statement</b>		
		To provide holistic development of student to meet the ever changing needs of civil engineering industry	To be involved in forward looking research	To be involved in consultancy useful to society
	<b>Programme Educational Objectives</b>	<b>√</b>	<b>√</b>	<b>√</b>
1	Demonstrate knowledge in broad areas of Geospatial Technology	<b>√</b>	<b>√</b>	<b>√</b>
2	Demonstrate a depth of knowledge in a chosen/focus area of Geospatial Technology	<b>√</b>	<b>√</b>	<b>√</b>
3	Demonstrate knowledge of contemporary issues in their chosen/focused area	<b>√</b>		<b>√</b>
4	Demonstrate the ability to complete a technical project independently	<b>√</b>	<b>√</b>	<b>√</b>

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(Dr V Suresh Babu, Assoc. Professor)

(Dr G Chakravarthi)

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**K L UNIVERSITY**  
**DEPARTMENT OF CIVIL ENGINEERING**  
**MAPPING OF POs vs. PEOs (Geospatial Technology)**

Signature of Faculty In-charge  
(Dr V Suresh Babu, Assoc. Professor)

(Dr G Chakravarthi)

Signature of Head of the Institution

		Programme Educational Objectives			
		Demonstrate knowledge in broad areas of Geospatial Technology	Demonstrate a depth of knowledge in a chosen/focus area of Geospatial Technology	Demonstrate knowledge of contemporary issues in their chosen/ focused area	Demonstrate the ability to complete a technical project independently
Program Out Comes					
1	Knowledge of a broad range of Geospatial Technology methodologies and underlying civil engineering, commonly used in the development and analysis of geo spatial systems.	√	√		√
2	Knowledge of fundamental design issues relevant to Geospatial Technology and an understanding of how to formulate and analyse design solutions in various engineering contexts	√	√		√
3	In-depth knowledge of one or more of the following (depending of selection of option modules and project area): Signature of Faculty In-charge (Dr V Suresh Babu, Assoc. Professor) design specific engineering systems methods,	√	√		√
		(Dr G Chakravarthi)		Signature of Head of the Institution	

	modeling techniques				
4	Knowledge of basic research and development principles and practices relevant to main stream engineering industry	√	√		√
5	Knowledge of key professional, safety and ethical issues arising in modern engineering industry	√	√		√
6	Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects	√	√		√
PSO1	Function as design consultants in construction industry for the design of civil engineering structures	√	√		√
PSO2	Provide sustainable solutions to the Civil Engineering Problems.			√	

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# K L UNIVERSITY

## DEPARTMENT OF CIVIL ENGINEERING

### MAPPING OF Courses & Cos vs. POs (Geospatial Technology)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	PSO 1	PSO 2
15CE5109	Fundamentals of Geospatial Technology	Understanding the fundamentals of geospatial technology		1					1	
		Understanding about physics of remote sensing		1					1	
		Understanding about remote sensing platforms and sensors		1					1	
		Understanding about Visual Image Interpretation and Image Analysis		1					1	
15CE5110	Geographical Information System	Understanding about the Geographical information system	2						1	
		Understanding about GIS data management	2						1	
		Understanding about the GIS data input and data editing	2						1	
		Understanding about data quality of GIS	2						1	
		Report preparation on GIS	2						1	
15CE5111	Advanced Computer Programming & Statistics	Understanding about the Computer basics and Arithmetic operators	2		1				1	
		Understanding about the Constructors	2		1				1	
		Understanding about the Concept of Random variables	2						1	
		Understanding about the Concept of testing of hypothesis critical region	2						1	

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15CE5112	Photogrammetry	Knowing and Understanding about basic concept of Photogrammetry	2						1		
		Understanding about the Stereo Photogrammetry	2						1		
		Understanding about the control for Arial photography	2						1		
		Understanding about the aerial triangulation	2						1		
15CE51E1	Principles of Earth & Environment Sciences	Knowing and understanding the Fundamentals of Earth Sciences	2							1	
		Knowing and understanding the Fundamentals of Geomorphology	2							1	
		Understanding about the Scope of ecology in environmental management	2								1
		Understanding about the Structure and Function of Ecosystem	2								1
15CE51F2	Environmental Geoinformatics	Knowing and understanding about Fundamentals & Management	1							1	
		Understanding about the Rain Water-Harvesting Methods	1							1	
		Understanding the concept of Wetlands	1								1
		Understanding the concept of watershed	1								1
15CE5213	Digital Image Processing	Knowing and understanding about data base management systems		1						1	
		Understanding about database design & data queries		1						1	
		Understanding about forms, reports and applications of Digital Image Processing		1							1
		Understanding the concept of data base administration		1							1
15CE5214	GIS Data Analysis and	Understanding the concept of topographical surveying								1	

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	Modelling	Understanding the concept of Advanced Surveying							1	
		Knowing and understanding about Topographical Surveying							1	
		Understanding the Project Planning concept							1	
15CE5215	Geodesy and GPS	Understanding the basic fundamental of geodesy and GPS							1	
		Understand the concept of computation or ellipsoid							1	
		Knowing and understanding the concept of global positioning system (GPS)							1	
		Knowing and understand about GPS Mathematical and GPS application							1	
15CE5216	Geospatial Applications	Knowing about Plant Sciences				1			1	
		Knowing about Earth Sciences and Hydrosphere Sciences				1			1	
		Understand the concept of Land Use and Land Cover				1			1	
		Understand the concept of Global Remote Sensing				1			1	
15CE52G3	Engineering Survey Methodology and Instrumentation	Understand the basic Fundamentals of engineering drawing				1			1	
		Knowing about techniques of depth sounding and ranging				1			1	
		Understand the concept of Digital Elevation Models				1			1	
		Knowing about Electronic theodolites and levels and their applications				1			1	
15CE52H4	Urban Water Management using Geomatics	knowing and understanding about the urbanization and its effect on water cycle						1	1	
		Knowing and understand about Master drainage plans						1	1	

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		Understand about Elements of drainage systems						1	1	
		Knowing and understand about Best Management Practices						1	1	

**K L UNIVERSITY**  
**SCHOOL OF CIVIL AND MECHANICAL SCIENCES**  
**Department of Civil Engineering**

**K L UNIVERSITY:**

**Vision**

- To be a globally renowned university

**Mission**

- To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

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(Dr V Suresh Babu, Assoc. Professor)

(Dr G Chakravarthi)

Signature of Head of the Institution

**VISION, MISSION, LONG TERM GOALS, SHORT TERM GOALS, PEO's PO's and GA's OF DEPARTMENT:**

**Vision**

- To impart knowledge and excellence in Civil Engineering with global perspectives to the student community and to make them ethically strong engineers to build our nation.

**Mission**

- Our mission is to provide holistic development of student community to meet the ever changing needs of civil engineering industry and to be involved in forward looking research and consultancy useful to society.

**M. Tech. (Structural Engineering) - Civil Engineering Programme**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs):**

- Demonstrate knowledge in broad areas of Structural Engineering
- Demonstrate a depth of knowledge in a chosen/focus area of Structural Engineering
- Demonstrate knowledge of contemporary issues in their chosen/ focused area
- Demonstrate the ability to complete a technical project independently

**PROGRAMME OUTCOMES (POs):**

On completing the M. Tech. (Structural Engineering)–Civil Engineering Programme successfully the students will exhibit the following capabilities:

1. knowledge of a broad range of structural methodologies and underlying civil engineering, commonly used in the development and analysis of Structural Engineering systems.

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2. Knowledge of fundamental design issues relevant to Structural Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts.
3. In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques.
4. Knowledge of basic research and development principles and practices relevant to main stream engineering industry.
5. Knowledge of key professional, safety and ethical issues arising in modern engineering industry.
6. Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects.

**PROGRAMME SPECIFIC OUTCOMES (PSOs) - M. Tech. (Structural Engineering)**

1. Function as design consultants in construction industry for the design of Civil Engineering structures.
2. Provide sustainable solutions to the Civil Engineering Problems.

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**K L UNIVERSITY DEPARTMENT OF CIVIL ENGINEERING MAPPING OF PEOs vs. Mission Statement (Structural Engineering)**

		<b>Mission Statement</b>		
		To provide holistic development of student to meet the ever changing needs of civil engineering industry	To be involved in forward looking research	To be involved in consultancy useful to society
	<b>Programme Educational Objectives</b>	<b>√</b>	<b>√</b>	<b>√</b>
1	Demonstrate knowledge in broad areas of Structural Engineering	<b>√</b>	<b>√</b>	<b>√</b>
2	Demonstrate a depth of knowledge in a chosen/focus area of Structural Engineering	<b>√</b>	<b>√</b>	<b>√</b>
3	Demonstrate knowledge of contemporary issues in their chosen/ focused area.	<b>√</b>		<b>√</b>
4	Demonstrate the ability to complete a technical project independently	<b>√</b>	<b>√</b>	<b>√</b>

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(Dr G Chakravarthi)

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**K L UNIVERSITY**

**DEPARTMENT OF CIVIL ENGINEERING**

**MAPPING OF POs vs. PEOs (Structural Engineering)**

Signature of Faculty In-charge  
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(Dr G Chakravarthi)

Signature of Head of the Institution

		Programme Educational Objectives			
		Demonstrate knowledge in broad areas of Structural Engineering	Demonstrate a depth of knowledge in a chosen/focus area of Structural Engineering	Demonstrate knowledge of contemporary issues in their chosen/ focused area.	Demonstrate the ability to complete a technical project independently
Program Out Comes					
1	knowledge of a broad range of structural methodologies and underlying civil engineering, commonly used in the development and analysis of Structural Engineering systems	√	√		√
2	Knowledge of fundamental design issues relevant to Structural Engineering and an understanding of how to formulate and analyse design solutions in various engineering contexts	√	√		√
3	In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modeling techniques	√	√		√
4	Knowledge of basic research and development principles and practices relevant to main stream	√	√		√
Signature of Faculty In-charge (Dr V Suresh Bahu, Assoc. Professor)			(Dr G Chakravarthi)	Signature of Head of the Institution	

	engineering industry.				
5	Knowledge of key professional, safety and ethical issues arising in modern engineering industry.	√	√		√
6	Knowledge of time management and work planning issues related to the organization implementation and successful completion, including reporting, of an individual, masters level, Engineering based projects.	√	√		√
PSO1	Function as design consultants in construction industry for the design of civil engineering structures.	√	√		√
PSO2	Provide sustainable solutions to the Civil Engineering Problems.			√	

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# K L UNIVERSITY

## DEPARTMENT OF CIVIL ENGINEERING

### MAPPING OF Courses & Cos vs. POs (Structural Engineering)

Course Code	Course Title	Description of the Course Outcome	a	b	c	d	e	f	PSO 1	PSO 2
15 CE 5101	Applied Mathematics	Understand the Laplace Transformations and Fourier Transformations concept	2						1	
		Understand the Elliptic Equation concept for both Laplace Transformations and Fourier Transformations	2						1	
		Understand the concept of Calculus of Variations	2						1	
		Understand the concept of Eigen value problems and numerical integration	2						1	
15 CE 5102	Theory of Elasticity	Analysis of Two-dimensional problems in rectangular coordinates	2						2	
		Analysis of Two-dimensional problems in polar coordinates	2						2	
		Understand the energy principles	2						2	
		Understand and analyse the torsion related problems	2						2	
15 CE 51A2	Design of Offshore Structures	Understand the Wave Theories and Forces On Offshore Structures	2						3	
		Understand the Offshore Soil and Structure Modelling	2						3	
		Analysis of Offshore Structures	2						3	

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		Design of Offshore Structures	2						3
15 CE 51B2	Stability of Structures	Introduction to buckling of columns	2						3
		Analysis of lateral buckling of beams	2						3
		Analysis of lateral buckling of plates and shells	2						3
		Understanding the Mathematical treatment of stability problems	2						3
15 CE 5103	Structural Dynamics	Solve response of free and forced vibrations			2				2
		Solve response to Arbitrary, Step and Pulse Excitations (SDOF)			2				2
		Solve Earthquake Response of Linear Systems (SDOF)			2				2
		Build Generalized Single Degree of Freedom Systems			2				2
		Solve response of Multi -degree of freedom systems (MDOF)			2				2
15 CE 5104	Advanced Prestressed Concrete	Understand the concepts of prestressed concrete and analyze the prestressed concrete beams.	2			2	2		3
		Analyze losses in prestressed concrete and deflection of the prestressed concrete members	2			2	2		3
		Design reinforcement for Ultimate shear, torsion and bending of prestressed concrete members.	3		3	2			3
		Design end blocks as per IS 1343 recommendations.	3		3	2			3
		Design of prestressed members, composite sections ,continuous prestressed beams	3		3	2			3
15 CE 5205	Finite Element Analysis	Understand the Basic Finite Element Concepts	2	2		2			2
		Analysis of Trusses, Beam Bending, Structural Frames and Column buckling	2	2		2			2

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		using Finite Element Methods							
		Analysis of Higher order elements for one dimensional problems and Isometric quadrilateral elements and triangular elements	2	2		2			2
		Analyse the applications based on general two dimensional boundary value problem	2	2		2			2
		Demonstrate the ANSYS software to develop the models using Finite element method				2		2	2
15 CE 5206	Bridge Engineering	Introduction to different types of bridges and codal provisions for designing the bridge components.	1						3
		Analysis and Design of slab Culvert.	2				2		3
		Analysis and Design of T-Beam, sub-structure components and bearings	2				2		3
		Understanding the designing of cable supported bridges.	2				2		3
15 CE 5207	Earthquake Resistant Design of Structures	Understanding the designing of cable supported bridges.	1						3
		Understand the system of base isolation in structures for resistance towards earthquakes and general detailing requirements of ductile structure.	1						3
		Analyze a structure for earthquake forces onto the structure under static and dynamic behavior.		2					3
		Design the structure for earthquake forces on 2 –storey building		2					3
15 CE 5208	Theory of Plates and Shells	Derive the pure bending and curvature of plates	2	2		2			2
		Derive the differential equation for laterally loaded rectangular plates				2		2	2
		Derive the deformation of shells without bending	1						2

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		Understand the general theory of Cylindrical shells	2				2		2	
15 CE 51A1	Repair and Rehabilitation of structures	Understand the concept of Deterioration of structures with aging, Need for rehabilitation	1							2
		Understand the damage level of structures affected due to seismic loads, Damage assessment and evaluation models	1	1						2
		Understand procedure of rehabilitation methods like Grouting; Detailing; Imbalance of structural stability	2	2						2
		Understand the retrofiting methodology and procedure	2	2						2
15 CE 51B1	Geotechnical Earthquake Engineering	Knowledge of the seismic phenomenon, its occurrence, tectonic theories, seismic waves and their motion in different media and measurement of ground motions. Analysis skills of 1-D ground responses using linear and non-linear approaches	1							2
		Ability to analyze the seismic hazard through deterministic and probabilistic approaches. Ability of modifying the actual ground motion records and their time and frequency domain generation.		2						2
		Knowledge of dynamic soil properties and their measurements using field and laboratory tests.	2	2						2
		Knowledge of the liquefaction phenomenon and its effects and the remedial measures to be taken for soil improvement.	1							2
15 CE 52C1	Industrial Structures	Understand the Planning and Functional Requirements of Industrial Building				2		2	2	
		Analysis and Design of different type of Industrial Buildings	1						2	
		Design of Power plant and transmission Structures	2			2		2		
		Design of Auxiliary Structures				2		2	2	

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15 CE 52C2	Design of Tall Structures	Understanding the design criteria of Tall structures	1						3
		Understanding the Loadings On Tall Structures	2				2		3
		Understanding the behaviour of Rigid-Frame Structures and Shear Wall Structures		2					3
		Understanding the behaviour of Tubular Structures		2					3
		Dynamic analysis on Tall structures		2					3
15 CE 52C3	Optimization of Structures	Understanding the Basics of engineering analysis and design	1						2
		Understanding the optimization methods	1						2
		Introduction to variational methods of sensitivity analysis, shape sensitivity		2					2
		Introduction to genetic algorithm and simulated annealing		2					2
15 CE 52D1	Advanced Design of structures	Analysis and design of portal frames, Design example for hinged and fixed frame and Design of Reinforced concrete deep beams	1						3
		Design of Elevated water tanks; Earthquake resistant design	1						3
		Introduction to plastic analysis		2					3
15 CE 52D2	Fracture Mechanics	Understanding the basic concepts of Fracture and Linear Elastic Fracture Mechanics (LEFM)	1						2
		Understanding the concept of Crack Tip Plasticity	1						2
		Understanding the concept Elastic Plastic Fracture Mechanics (EPFM)		2					2
		Understanding the concept of Fatigue Crack Growth and practical problems of fracture mechanics		2					2
15 CE 52D3	Green Buildings	Understanding the concept of green buildings and practices	1						1

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		Understanding the Green Building Opportunities And Benefits and Green Building Design	1							1
		Understanding the concept of optimal air conditioning	1							1
		Understanding the concept of Material Conservation and Indoor Environment Quality And Occupational Health:	1							1
15 CE 5148	Seminar							2	2	
15 IE 5250	Term Paper							2	2	
15 IE 6050	Dissertation							2	2	

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(Dr G Chakravarthi)

Signature of Head of the Institution

**K L University**

**Department of ECE**

**Academic Year 2015**

**M.Tech Atmospheric Science and Space Technology Program:**

**Mapping of ECE Department M.Tech (ASST) Mission Statement with POs, PSOs and PEOs**

**Program Outcomes**

**Mission statement of K L University**

**Vision**

To be a globally renowned university.

**Mission**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**Vision and Mission statement of ECE department**

**VISION**

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(Dr V Suresh Babu, Assoc. Professor)

(Dr G Chakravarthi)

Signature of Head of the Institution

- To evolve into a globally recognized department in the frontier areas of Electronics & Communication Engineering (ECE).

### **MISSION**

**M1-** To produce graduates having professional excellence.

**M2-** To carry out quality research having social & industrial relevance.

**M3-** To provide technical support to budding entrepreneurs and existing industries.

### **PROGRAM EDUCATIONAL OBJECTIVES (PEOS):**

- **PEO1:** To produce M.Tech graduates with enhanced skills in quantitative and scientific reasoning that can be applied to atmospheric and space problems.
- **PEO2:** To produce M.Tech graduates with enhanced knowledge on a range of atmospheric and space phenomena and applications, and to have expertise in one or more program sub-disciplines or related interdisciplinary areas.
- **PEO3:** To produce M.Tech graduates who are better equipped to contribute to solving problems in the atmospheric sciences, Space Technology and related disciplines, through service in business or as educators, researchers, and leaders in academia, government, the private sector, and civil society.
- **PEO4:** To produce highly competent scientists/ engineers/ technologists in the field of atmospheric science and space technology through focusing on specializations in communication Sector, lower and upper atmosphere and satellite navigation systems, weather and climate data mining and applications

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(Dr G Chakravarthi)

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**Programme Outcomes**

PO1	a	Developing the students to understand the impacts of science, engineering and technological solutions in a global, economic, environmental, and societal context.
PO2	b	To create well trained manpower with expertise in computer applications to atmospheric and space problems
PO3	c	Create efficient researchers to understand and predict weather and climate.
PO4	d	To train people in order to take challenging responsibility for addressing issues relating to environment and natural hazards.

**PROGRAMME SPECIFIC OUTCOMES (PSOs) - M. Tech. (Space Technology and Atmospheric Sciences)**

- 3. To provide solutions to Space Technology problems
- 4. To provide analysis, modeling and forecasting of Atmospheric data from Radar and satellite sensors data

Mapping of Mission statements with program educational objectives

	M1	M2	M3
PEO1	✓		
PEO2		✓	
PEO3	✓	✓	✓
PEO4	✓		✓

**Mapping of PEOs with Pos and PSOs**

	PEO1	PEO2	PEO3	PEO4
PO1	✓			✓

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PO2	✓	✓	✓	
PO3			✓	✓
PO4		✓		✓

Signature of Faculty In-charge  
(Dr V Suresh Babu, Assoc. Professor)

(Dr G Chakravarthi)

Signature of Head of the Institution

K L UNIVERSITY

DEPARTMENT OF ECE

MAPPING OF Courses & Cos vs. POs (Space Technology and Atmospheric Sciences)

Course Code	Course Title	Credits		Description of the Course Outcome	a	b	c
15 EC 5117	Microwave and Satellite Communications	4	CO1	Understand the satellite communications concepts	1		
			CO2	Understand the orbital mechanics	1		
			CO3	Design Satellite links	2		
			CO4	Understand the propagation effects on Satellite earth links	1		
15 EC 5118	Foundations of Atmospheric Science & Space Technology	4	CO1	Introduction to Structure of atmosphere	1		
			CO2	Understand the Electrodynamic and radio wave propagation	1		
			CO3	Understand of Remote Sensing techniques	1		
			CO4	Analysis of Signal processing and Communications techniques	2		
15 EC 5119	GLOBAL NAVIGATION SATELLITE SYSTEM	5	CO1	Understand of GNSS fundamentals	1		
			CO2	GPS Signals and Modelling of GPS error Models	3		

			CO3	Analysis of GPS data processing and position fixing	2		
			CO4	Understand of Other satellite Navigation Systems	1		
15 EC 5120	PHYSICS AND DYNAMICS OF LOWER ATMOSPHERE	5	CO1	Introduction to Atmospheric Stability of layers	1		
			CO2	Analysis of Atmospheric motion	2		
			CO3	Characteristics Atmospheric boundary layer (ABL)	3		
			CO4	Modelling of Atmospheric dynamics	3		
15 EC 5111	ATMOSPHERIC AND WEATHER RADARS	3	CO1	Understand of Principles of Radar	1		
			CO2	Analysis of Radar signal processing	2		
			CO3	Analysis of Wind profilers	2		
			CO4	Understand the MST Radars	1		
15 EC 5112	Modern Digital Communication	3	CO1	Under stand Modern Digital Modulation Techniques	1		
			CO2	Analysis Bit Error Performance.	2		

			CO3	Under stand Spread Spectrum Signals for Digital Communication	1		
			CO4	Analysis of Frequency Hopped Spread Spectrum signals	2		
15 EC 51J1	GIS Analysis & Modeling	3	CO1	Understand the fundamentals of GIS	2		
			CO2	Analysis of GIS spatial objects	2		
			CO3	Analysis of overlays	4		
			CO4	Modelling of GIS Data	4		
15 EC 51J2	Dynamical and physical Meteorology	3	CO1	Introduction to Global atmospheric circulation and Monsoon systems	1		
			CO2	Understand of Mesoscale weather systems	1		
			CO3	Analysis of Global and regional Circulation systems	2		
			CO4	Understand of Atmospheric –Ocean phenomena	1		
15 EC 52K1	Aeronomy	3	CO1	Understand the natural and chemical composition of atmosphere	1		
			CO2	Understand the ionospheric layers	1		

			CO3	Analysis of loss process in D,E and F regions	1		
			CO4	Characterization of Ionospheric morphology	1		
15 EC 5221	SATELLITE METEOROLOGY	5	CO1	Introduction to Remote sensing for meteorology	1		
			CO2	Analysis of Radiation measurements and estimation	2		
			CO3	Understand of Radiative Transfer Equation (RTE)	1		
			CO4	Analysis of satellite systems and Satellite meteorological data and products atmospheric parameters	2		
15 EC 5222	ATMOSPHERIC & SPACE INSTRUMENTATION	4	CO1	Understand Observational Techniques of atmospheric parameters	1		
			CO2	Understand of Radar principles and technology	2		
			CO3	Analysis of Radar Measurements	2		
			CO4	Understand of Satellite Sensors	2		

15 EC 5223	ADVANCED SATELLITE NAVIGATION SYSTEMS	4	CO1	Introduction to Differential GPS systems	1		
			CO2	Introduction to Inertial Navigation Systems	1		
			CO3	Understand of GPS/INS Integration	1		
			CO4	Understand of GPS receivers	1		
15 EC 5224	WEATHER AND CLIMATE APPLICATIONS	4	CO1	Introduction to Weather and climate data	1		
			CO2	Applications to hydrology	1		
			CO3	Applications to air quality	1		
			CO4	Applications to agriculture	1		
15 EC 52K1	AERONOMY	3	CO1	Introduction of Neutral Atmosphere	1		
			CO2	Analysis of Chemical concepts in Atmosphere	2		
			CO3	Understand of Ionoized atmosphere	1		

			CO4	Understand Loss process in D, E and F regions: Morphology	1		
15 EC 52K2	DETECTION AND ESTIMATION THEORY	3	CO1	Introduction to Random - Discrete-time signals	1		
			CO2	Analysis of Detection of signals in noise	2		
			CO3	Analysis of Estimation of signals in noise	2		
			CO4	Analysis of Recursive linear mean squared Estimation	2		
15 EC 52L1	WEATHER HAZARDS & RISK ASSESSMENT	3	CO1	Introduction to Weather hazards	1		
			CO2	GIS based Modelling	3		
			CO3	Analysis of Disaster Impact and Damage	2		
			CO4	Understand of Pre-Disaster Risk Assessment:	1		
15 EC 52L2	Climate Change	3	CO1	Introduction to climate change	3		
			CO2	Understand the global warming	3		
			CO3	Analyze the climate change trends	3		
			CO4	Assesment of climate change interms of short term and long term.	3		

Professor incharge

Head of the department

# DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

## M.TECH (EMBEDDED SYSTEMS) 2016-2017

### VISION AND MISSION STATEMENTS

#### UNIVERSITY

##### **Vision**

To be a globally renowned university.

##### **Mission**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

#### DEPARTMENT

##### VISION

To promote innovation centric education and perform cutting edge research in interdisciplinary and multidisciplinary areas.

##### MISSION

To impart **value-based, state-of-art education** and motivate the students to become **socially committed professionals** for **overall development** of students

**M1:** Impart Value –Based Education

**M2:** Impart State of the art –education

**M3:** Motivate Students to become Socially Committed Professionals

**M4:** Overall Development of Students

**PROGRAM EDUCATIONAL OBJECTIVES (PEOS) :**

M. Tech. in Embedded Systems Program, graduates will be able to

**PEO1:** To mould the students to become effective global engineering students in the competitive environment of modern society.

**PEO2:** To develop communication, analytical, decision-making, motivational, leadership, problem solving and human relations skills of the students.

**PEO3:** To pursue lifelong learning as a means of enhancing knowledge and skills necessary to contribute to the betterment of profession.

**PEO'S AND MISSION STATEMENT MAPPING**

	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
<b>PEO1</b>		√		√
<b>PEO2</b>	√	√	√	√
<b>PEO3</b>	√		√	√

**PROGRAM OUTCOMES(PO's)**

M. Tech. in Embedded Systems Program, Graduates will be able to:

**PO1:** To demonstrate the skills to meet the current and future industrial challenges in the field of embedded systems engineering.

**PO2:** Able to create, develop, apply, and disseminate knowledge within the embedded systems development environment.

**PO3:** Ability to communicate effectively and professionally.

**PO4:** Develop professional and ethical attitude and become socially responsible citizens.

**PO5:** Ability to carry out cutting edge research in the emerging areas of Embedded Systems.

**PO6:** Demonstrate their role as engineers or entrepreneurs and contribute to the society.

**MAPPING OF PEO's WITH PROGRAM OUTCOMES (PO'S)**

	<b>PEO1</b>	<b>PEO2</b>	<b>PEO3</b>
<b>PO1</b>	√		√
<b>PO2</b>	√	√	
<b>PO3</b>	√		
<b>PO4</b>		√	
<b>PO5</b>	√		√
<b>PO6</b>	√	√	

**COURSE VS POS & PSO'S MAPPING**

<b>MAPPING OF COs and POs</b>											
	<b>Item Description</b>					<b>Program Outcomes(POs)</b>					
<b>Course Code</b>	<b>Course Title</b>	<b>L-T-P</b>	<b>CRE DITS</b>	<b>CO NO</b>	<b>Description of the Course Outcome</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>
15 EM 510 1	Microcontrollers for Embedded System Design.	3-0-2	4	CO1	Understanding the fundamentals of Embedded Systems and its hardware and software architecture.						1
				CO2	Demonstrate the working principle of 8051 microcontrollers and Processor Architecture & Interfacing					2	
				CO3	Analyze PIC Microcontroller Hardware with its Architecture & Interfacing	2					
				CO4	Analyze the Device Drivers , Interrupt service Mechanism and Devices & Communication Buses for Devices Network.		2				
15 EM 510 2	Real Time Concepts for Embedded Systems	3-2-0	4	CO1	Understand the current trends for Embedded Systems Design. Hard versus soft Real- Time Systems,A Reference Model of Real – Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency etc	1					1
				CO2	Understand and apply Challenges in validating timing constraints in priority –driven systems Off-line versus On-line Scheduling	1				2	
				CO3	Analyze Priority-Driven Scheduling of Periodic Tasks, aperiodic tasks, and sporadic tasks with different scheduling mechanisms	2	2				

				CO4	Understand Real-Time Operating Systems Other Basic Operating System Functions	1						
15 EM 510 3	VLSI Technology & Design	3-0-2	4	CO1	Understand basic concepts of MOSFET, and study the second order effects in MOS technology concepts.	1						
				CO2	Understand various forms of CMOS devices, steps involved in CMOS IC fabrication and also the rules to draw stick & layout of CMOS circuits	1						
				CO3	Apply MOS device concepts for generating transistor level diagrams for digital circuits					2		
				CO4	Analyze CMOS circuits in terms of area, speed and power dissipation by applying the techniques like transistor sizing & design rules.	2					2	
				CO5	Evaluate the design parameters (Area, Speed & Power) & driving capacity of CMOS circuits like Multiplexer, Latch e.t.c.		3					
15 EM 510 4	Wireless Communicat ions & Networks	3-2-0	4	CO1	Understand Mobile and Wireless Landscape, Wireless LAN and IEEE 802.11	1						
				CO2	Discuss Global System for Mobile Communications (GSM) and Medium Access Control (MAC)		1					
				CO3	Describe Mobile IP and Mobile Ad hoc Networks (MANETs)					1		
				CO4	Understand Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP and Mobile TCP.						1	
				CO5	Understand Broadcast systems(DVB and DAB)	1					1	
15 EM 520 5	RSIC processor Architecture and	3-0-2	4	CO1	Understand SoB, SoC & SoP for electronic product in terms of size, cost, performance and reliability	1	1					

	Programmin g			CO2	Analyze design flow in SoC Environment and verification of electronic circuits		2					2
				CO3	Understand embedded memories used for SoC Enviornment							
				CO4	Analyze the bus architectures of NOCs and routing.	2					2	
				CO5	Understand the techniques for designing MPSoCs and its performance.		1				1	
15 EM 520 6	Digital Signal Processors and Architectures	3-2-0	4	CO1	At the end of the course the student will get familiarised with various DSP based Embedded System Applications. Understands the implementation aspects of Computational accuracy of DSP based algorithms	1						
				CO2	Understand the architectural features of programmable DSP devices. Student will be familiarised with development process applications based on DSK5416 development board and various development tools used.		1					
				CO3	To familiarize with Texas Instruments' TMS320C54XX family of fixed-point DSP Processors their architectures in-terms of addressing modes, Programming On-Chip Peripherals', Interrupts and Pipeline operations. Student will be getting familiarised with applications development process based on DSK5416 development board and various software development tools used.						1	
				CO4	Student will demonstrate the ability to implement various DSP algorithms used in different Embedded Systems based on TI's TMS320C54XX family of fixed-point DSP Processors							1

				CO5	Student will demonstrate the ability to implement various DSP based Embedded Systems by interfacing DSPs with Memory, I/O with the help of integration concepts like INTERRUPTS, DMA and CODECs with DSP to use A/D and D/A converters for serial I/O.	1						1
15 EM 520 7	Advanced Embedded Systems Design	3-2-0	4	CO1	To remember and understand the basic concepts of model , Architecture and programming Language	1						
				CO2	To remember and understand the Hardware software synthesis algorithms and software partitioning distributed system co-synthesis		1					
				CO3	To understand Architecture Specialization techniques, Architecture for control dominated systems	1				1		
				CO4	Analyze and apply the techniques of Modern embedded architectures and compilation technologies		2			2		
				CO5	Analyze concurrency coordinating, concurrent computations and verification tools.	2				2		
15 EM 520 8	Linux System Concepts	3-0-2	4	CO1	Apply various various GNU development tools for compiling, debugging and creating libraries.		2					
				CO2	Understand the concepts related to Linux kernel Configuration and kernel modules	1						
				CO3	Understand various concepts related to User and Kernel Space communication, Interrupt Handling and Kernel Debugging.					1		
				CO4	Analyze various types of device drivers that can be build into the kernel .	2				2		
				CO5	Create Networking communication between client and server using SOCKET API	3				3		

15 EM 51A 1	CPLD & FPGA Architecture s and Applications	3-0-0	3	CO1	Understand the architecture and features of ROM,PLA,PAL and CPLD	1					
				CO2	Understand the architecture and features of FPGA.		1				
				CO3	Understand XILINX FPGAs and Design various combinational & sequential logic realization using XILINX FPGAS					1	
				CO4	Analyze the technologies of Actel FPGAs		2				2
				CO5	Analyze different Design Applications	2				2	
15 EM 51B 1	Embedded Real Time Operating Systems	3-0-0	3	CO1	Understanding the concepts of Embedded Networking Communication Standard protocols: RS 232, RS 485, SPI, I2C bus protocols.	1					
				CO2	Analyze the US B& CAN based synchronization Techniques		2				
				CO3	Applying Ethernet communication protocols for Embedded Systems					2	
				CO4	Apply different wireless sensor networks used in embedded systems.						2
15 EM 52C 1	Networking of Embedded Systems	3-0-0	3	CO1	Understanding the concepts of Embedded Networking Communication Standard protocols: RS 232, RS 485, SPI, I2C bus protocols.	1					
				CO2	Analyze the US B& CAN based synchronization Techniques		2				
				CO3	Applying Ethernet communication protocols for Embedded Systems					2	
				CO4	Apply different wireless sensor networks used in embedded systems.						2
15 EM 52D 3	Advanced Computer Networks	3-0-0	3	CO1	Understand Congestion control and techniques to improve Quality of Service (QoS).		1				
				CO2	Identify the different types of network devices and usage of Wireless network.	1					
				CO3	Understand the skills of Cellular Systems and Virtual Private Networks.					1	

			CO4	Familiarity with the ATM Protocol Reference Model and its Service categories.								1
			CO5	Describes the functionality associated with common network applications and Interconnection Networking Algorithms.	1							1

## M.TECH - EMBEDDED SYSTEMS

### First Year (First Semester):

S. No.	Course Code	Course Title	Periods			Credits
			L	T	P	
1	15 EM 5101	Microcontrollers for Embedded System Design.	3	0	2	4
2	15 EM 5102	Real Time Concepts for Embedded Systems	3	2	0	4
3	15 EM 5103	VLSI Technology & Design	3	0	2	4
4	15 EM 5104	Wireless Communications & Networks	3	2	0	4
5		Elective – 1	3	0	0	3
6		Elective - 2	3	0	0	3
7	15 IE 5149	Seminar	0	0	4	2
Total			18	4	8	24

### First Year (Second Semester) :

S. No.	Course Code	Course Title	Periods			Credits
			L	T	P	
1	15 EM 5205	RSIC processor Architecture and Programming	3	0	2	4
2	15 EM 5206	Digital Signal Processors and Architectures	3	2	0	4
3	15 EM 5207	Advanced Embedded Systems Design	3	2	0	4
4	15 EM 5208	Linux System Concepts	3	0	2	4
5		Elective – 3	3	0	0	3
6		Elective - 4	3	0	0	3
7	15 IE 5250	Term Paper	0	0	4	2
Total			18	4	8	24

**Second Year (First & Second Semester) :**

S.No	Course code	Course Title	Periods			Credits
			L	T	P	
1	15 IE 6050	Dissertation	0	0	72	36

**ELECTIVE COURSES**

S.No	Course code	Course Title	Periods			Credits
			L	T	P	
<b>Elective-1</b>						
1	15 EM 51A1	CPLD & FPGA Architectures and Applications	3	0	0	3
2	15 EM 51A2	Robotics	3	0	0	3
3	15 EM 51A3	System Modeling and Simulation	3	0	0	3
<b>Elective-2</b>						
1	15 EM 51B1	Embedded Real Time Operating Systems	3	0	0	3
2	15 EM 51B2	Object Oriented Analysis and Design	3	0	0	3
3	15 EC 51R1	Image and Video Processing	3	0	0	3
<b>Elective-3</b>						
1	15 EM 52C1	Networking of Embedded Systems	3	0	0	3
2	15 EM 52C2	Ad-hoc & Wireless Sensor Networks	3	0	0	3
3	15 EM 52C3	Cryptography and Network Security	3	0	0	3
<b>Elective-4</b>						
1	15 EM 52D1	Embedded Linux and Basics of Device drivers	3	0	0	3
2	15 EM 52D2	SOC Design and Verification	3	0	0	3
3	15 EM 52D3	Advanced Computer Networks	3	0	0	3

**K L UNIVERSITY**  
**DEPARTMENT OF ELECTRONICS AND COMPUTER SCIENCE ENGINEERING**  
**2014**  
**M.TECH (WIRELESS COMMUNICATIONS AND SENSOR NETWORKS )**

**VISION**

To promote innovation centric education and perform cutting edge research in interdisciplinary and multidisciplinary areas.

**MISSION**

To impart **value-based, state-of-art education** and motivate the students to become **socially committed professionals** for **overall development** of students

**M1:** Impart Value –Based Education

**M2:** Impart State of the art –education

**M3:** Motivate Students to become Socially Committed Professionals

**M4:** Overall Development of Students

**PROGRAM EDUCATIONAL OBJECTIVES (PEOS) :**

M. Tech. in Wireless Communications and Sensor Networks Program, graduates will be able to

**PEO1:** To mould the students to become effective global engineering students in the competitive environment of modern society.

**PEO2:** To develop communication, analytical, decision-making, motivational, leadership, problem solving and human relations skills of the students.

**PEO3:** To pursue lifelong learning as a means of enhancing knowledge and skills necessary to contribute to the betterment of profession.

**PEO'S AND MISSION STATEMENT MAPPING**

	M1	M2	M3	M4
PEO1		√		√
PEO2	√	√	√	√
PEO3	√		√	√

### **PROGRAM OUTCOMES(PO's)**

M. Tech. in in Wireless Communications and Sensor Networks Program, Graduates will be able to:

**PO1:** To demonstrate the skills to meet the current and future industrial challenges in the field of Wireless communications and Sensor Networks.

**PO2:** Able to create, develop, apply, and disseminate knowledge within the Wireless Sensor Networks development environment.

**PO3:** Ability to communicate effectively and professionally.

**PO4:** Develop professional and ethical attitude and become socially responsible citizens.

**PO5:** Ability to carry out cutting edge research in the emerging areas of Wireless communications and Sensor Networks.

**PO6:** Demonstrate their role as engineers or entrepreneurs and contribute to the society.

### **MAPPING OF PEO's WITH PROGRAM OUTCOMES (PO'S)**

	PEO1	PEO2	PEO3
PO1	√		√
PO2	√	√	
PO3	√		
PO4		√	
PO5	√		√
PO6	√	√	

**COURSE VS POS & PSO'S MAPPING**

Course Code	Course Title	L-T-P	CREDITS	CO		Program Outcomes(POs)					
						PO1	PO2	PO3	PO4	PO5	PO6
13EM511	Computational Methods and Error Analysis	3-1-0	4	CO1	Analyse the errors in numerical calculations	2					
				CO2	Apply computational methods for curve fitting		2				
				CO3	Understand the Numerical differentiation and Numerical Integration					1	1
				CO4	Understand the Matrices and Linear system of equations and finite difference methods			1			
13EM512	Wireless Communications & Networks	3-1-2	5	CO1	Remember and understand the mobile and wireless networks	1					
				CO2	Understand the concepts of GSM and wireless MAC		1				
				CO3	Understand the concepts of MANETs and Mobile IP					1	
				CO4	Remember the basics of						1

					broadcast systems						
13EM513	Sensors and Sensing Principles	3-1-0	4	CO1	Remember and understand the sensor fundamentals	1					
				CO2	Understand the physical and chemical sensors		1				
				CO3	Illustrate and understand the optical sensors					1	
				CO4	Understand the bio sensors						1
13EM514	Data Acquisition and Hardware Networks	3-1-2	5	CO1	Analyse the various power supplies and filters used	2					
				CO2	Understand sensor signal conditioning circuits		1				1
				CO3	Understand the wired communications					1	
				CO4	Analyse the serial communication process		2				
13EM515	MEMS & NEMS	3-1-0	4	CO1	Overview of MEMS and Micro Systems	1					
				CO2	Understand the Basics of MEMS technology and micro system design		1				
				CO3	Analyse the micro system design					2	
				CO4	Remember and understand the						1

					fabrication methods involved						
13EM516	Communications Protocols and Standards	3-1-2	5	CO1	Remember and understand the networks in process automation	1					
				CO2	Illustrate the various communication protocols		1				
				CO3	Understand wired communication and fieldbus					1	
				CO4	Understand the basics of wireless personal area networks						1
13EM517	Wireless Sensor Networks	3-1-2	5	CO4	Understand different types wireless network their protocols and security issues	1					
				CO4	analysis of difference between wireless networks , hardware devices and disigning issues		2				
				CO4	understand the WSN Gateway and their designing principle					1	
				CO4	understanding of Quality of sensor, Target detection tracking						1
13EM518	Design and Analysis of Algorithms	3-1-0	4	CO1	Understading basics of design and Analysis of Algorithm	1					

				CO2	Analyse the search and sorting methods and greedy methods		2					
				CO3	Design algorithm for shortest path problem and reliable design	2						
				CO4	Analyse NP- Hard and NP- Complete problem					2		
13EM533	Advanced Data Communications	3-0-0	3	CO1	Understanding Digital Modulation Techniques	1						
				CO2	study and Analyse Different protocols of data communication		2					
				CO3	understanding different erroe correcting and error detecting techniues							2
				CO4	Analysis of multiple techniques TDMA, CDMA,SDMA						2	
13EM535	Database management systems	3-0-0	3	CO1	Understand Basic Concepts of DBMS	1						
				CO2	Understanding database Designing models		1					
				CO3	study the States of transaction and locking techniques							
				CO4	analyse Database file storage, recovery and failure issues	2						
13EM541	Advanced Wireless Networks	3-0-0	3	CO1	Remember and Understand the Evaluation of wireless	1						

					network						
				CO2	understanding the wireless network architecture and application level signaling		1				
				CO3	Analyse basic Issues of mobility management					2	
				CO4	Challenges in wireless network Quality of Service						1
13EM546	Advanced Microcontroller and its Applications	3-0-0	3	CO1	Overview of Microprocessor and microcontroller functioning, RISC and CISC processor	1					
				CO2	understanding the architecture of ARM Processor and Instruction set and THUMB Instruction set		1				
				CO3	understaing PIC Microcontroller instruction set and communication models					1	
				CO4	Designing program concept for interfacing devices						1

**K L UNIVERSITY**  
**DEPARTMENT OF ELECTRICAL ENGINEERING**  
**PROGRAM DEVELOPMENT DOCUMENT**  
**M.Tech in Power Electronics Specialization**  
**2016**

**Vision of the University**

To be a globally renowned university.

**Mission of the university:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**VISION of the Department**

To Produce globally renowned leader in education, extension activities and Carrying out research and technology development in frontier areas of electronics and electrical engineering and allied fields

**MISSION of the Department**

To produce quality electrical and electronics engineers having strong theoretical foundation, innovative, good design experience , exposure to research and development and responsible for social needs.

## **Program Educational Objectives**

### Programme Educational Objectives:

1. To produce well trained post graduates in the domain of power electronics and electrical drives, and ensure that at least 50 % of those are employable in the diversified sectors of industry, public sector or multinational corporations.
2. To produce some of these (15-20 %) post graduates will pursue Ph.D.
3. To produce some of these will demonstrate the academic leadership in engineering institutions and serve the education.
4. To inculcate research attitude and lifelong learning among postgraduates

## **Program Outcome's**

- a. apply the knowledge of science and mathematics in designing, analyzing and using the power converters and drives for various applications and problem solving
- b. design the modern electric machines, drives, power converters, and control circuits for specific application
- c. use modern tools, professional software platforms, embedded systems for the diversified applications
- d. Function as a member of a multidisciplinary team and correlate the domain knowledge with global problems.
- e. sense and demonstrates the communication at different levels effectively
- f. explore ideas for inculcating research skills and appreciate, critical and independent thinking and engage in lifelong learning

**MAPPING OF PEOs with MISSION OF THE DEPARTMENT:**

S.No.	Program Educational Objectives(PEOs)	M1 Training the leaders of tomorrow	M2 Training the innovators of tomorrow	M3 Training the outstanding career professionals of tomorrow	Con funda res
1	To produce well trained post graduates in the domain of power electronics drives, and ensure that at least 50 % of those are employable in the diversified sectors of industry, public sector or multinational corporations.	√	√	√	
2	To produce some of these (15-20 %) post graduates will pursue Ph.D.		√	√	
3	. To produce some of these will demonstrate the academic leadership in engineering institutions and serve the education.	√	√	√	
4	To inculcate research attitude and lifelong learning among postgraduates		√	√	√

**MAPPING OF POs/PSOs with PEOs:**

<b>Mapping of POs to PEOs</b>					
<b>S.No.</b>	<b>Program Objectives(POs)</b>	<b>Program Educational Objectives(PEOs)</b>			
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>a</b>	apply the knowledge of science and mathematics in designing, analyzing and using the power converters and drives for various applications and problem solving	√	√	√	√
<b>b</b>	. design the modern electric machines, drives, power converters, and control circuits for specific application	√	√		√
<b>c</b>	use modern tools, professional software platforms, embedded systems for the diversified applications	√	√		√
<b>d</b>	Function as a member of a multidisciplinary team and correlate the domain knowledge with global problems.	√	√	√	√
<b>e</b>	sense and demonstrates the communication at different levels effectively	√		√	√
<b>f</b>	.explore ideas for inculcating research skills and appreciate, critical and independent thinking and engage in lifelong learning	√	√		√

Course Code	Course Title	S NO	CO NO	Description of the Course Outcome	a	b	c	d	e	f
16EE502	Analysis Of Power Converters		CO1	Select and design power electronic converter topologies for a broad range of energy conversion applications.	√	√	√			
			CO2	Analyze and simulate the performance of power electronic conversion systems	√	√				√
			CO3	Ability to model and design controllers for the closed loop operation of power converters	√	√	√			
			CO4	Apply the basic concepts of power electronics to design the circuits in the fields of AC and DC drives, power generation and transmission and energy conversion, industrial applications, extraction of energy from renewable sources			√	√		√
16EE501	Machine Modelling & Analysis		CO1	Design and simulate the modeling concepts of 3-phase synchronous machine and 3-phase Induction machine, Kron's primitive machine equations	√					
			CO2	Analyze the mathematical model of separately excited D.C Motor, D.C Series & shunt motor and its steady state, transient state analysis	√	√				
			CO3	Transform from 3 phase to 2 phase parks transformation of induction machine signal flow graph of the induction machine	√	√				
			CO4	Design the modeling of 1-phase and poly phase Induction machine, cross field theory, modeling of synchronous machine	√	√				
16EE503	Power Electronic Control Of Drives		CO1	To study 1-φ & 3-φ controlled bridge rectifier with motor load on continuous and discontinuous modes of operation and effect of freewheeling diode on converter performance	√	√				
			CO2	To understand the operation of three phase naturally	√	√				

				commutated bridge as a rectifier and inverter						
			CO3	To study the steady state analysis three phase converter controlled and chopper controlled DC Motor drives and design speed current controller	√	√				
			CO4	To know the closed loop operation and dynamic simulation of DC motor drive system with current Controller.	√	√				
16EE514	Modern Control Theory		CO1	this course introduces Z Transforms and analysis of discrete data systems using Z Transforms	√					√
			CO2	in case of multiple input and multiple output systems, this course helps to deal with digital control systems	√	√				√
			CO3	the Non – Linear systems which will come across in most of practical systems, this course deals about Non – Linearity's	√	√				√
			CO4	since stability is most important for everyu systems to give it satisfactory performance, this topic also helps	√					√
16EE532	Modeling & Simulation Of Power Electronics Converters		CO1	Understand the back ground processes related to the numerical solution used in generic simulators	√					
			CO2	Choose the numerical solver to be used for a given type of analysis	√		√			
			CO3	Understand the reason for convergence problems occurring during simulation and to avoid them		√	√			√
			CO4	Simulate the behavior of Power Converters, DC and AC drives			√	√		√
16EE534	Soft Computing Techniques		CO1	Understand the concepts, advantages and disadvantages of the techniques in evolutionary computation		√				
			CO2	Design suitable neural networks, fuzzy systems, genetic representations with appropriate fitness functions for simple problems	√	√				√

			CO3	Know the key issues in using these techniques in Matlab for search of difficult search-spaces		√	√			√
			CO4	Awareness of the different approaches and different applications in the field		√	√			√
16EE505	Advanced Power Converters		CO1	Three Phase AC Voltage regulators-Analysis of 3-phase regulators with star and delta connected R and RL loads – Load voltage harmonic Analysis-numerical problems	√	√				√
			CO2	Three Phase ac-dc Converters- Half controlled and fully controlled Converters with RL load and load voltage and current harmonic analysis, three phase dual converters-PWM control of 3-phase controlled rectifier		√	√			
			CO3	Analysis Single-phase single stage boost power factor corrected rectifier, three phase boost PFC converter, sinusoidal PWM – modified PWM		√	√			
			CO4	Analysis of output voltage for continuous (CC) and discontinuous conduction mode (DCM).		√	√			
16EE506	Advanced Electrical Drives		CO1	Understand the vector control principle of AC motor drives	√					√
			CO2	Evaluate speed control performance of 3-Phase induction motor drive using vector control methods		√	√			
			CO3	Analyze the dynamic behaviour of SRM motor drives under various control methods		√	√			
			CO4	Investigate the performance of BLDC Motor drive using various control techniques	√	√	√			
16EE517	Smart Grids		CO1	Understand basic concepts of smart grid in power network.	√				√	√
			CO2	Analyzing swing equation and equal area criterion	√					
			CO3	Understand synchronous machine modeling	√	√				

			CO4	Understand excitation systems and power system stabilizers	√	√				
16EE508	FPGA Controllers and Applications		CO1	Introduce digital design techniques using various Programmable logic devices	√		√			
			CO2	To introduce FPGA architecture, digital design flow using FPGAs, and other technologies associated with field programmable gate arrays	√		√			
			CO3	To learn about various applications of FPGAs	√		√			√
			CO4	To get to know about the logic and physical designing of an ASIC.	√		√			√
16EE535	Electric Vehicles		CO1	Understand the vehicle mechanics and working of Internal combustion engines used for HEV	√					
			CO2	Analyze the battery and Electric Drive performance for HEV	√	√				
			CO3	Understand the control strategies for HEV	√	√				√
			CO4	Working and matlab model of HEV		√	√	√		
16EE550	EHVAC and HVDC Transmission		CO1	To understand the basic concepts of EHV AC and HVDC transmission	√					
			CO2	To identify the electrical requirements for HVDC lines and identify the components used in AC to DC conversion	√	√				
			CO3	To understand the operation of HVDC conversion technology	√					
			CO4	To understand the fundamental requirements of HVDC transmission line design and To identify factors affecting AC-DC transmission	√	√				

**K L UNIVERSITY**  
**DEPARTMENT OF ELECTRICAL ENGINEERING**  
**PROGRAM DEVELOPMENT DOCUMENT**  
**M.Tech in POWER SYSTEM SPECIALIZATION**  
**2016**

**Vision of the University**

To be a globally renowned university.

**Mission of the university:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**VISION of the Department**

To Produce globally renowned leader in education, extension activities and Carrying out research and technology development in frontier areas of electronics and electrical engineering and allied fields

**MISSION of the Department**

To produce quality electrical and electronics engineers having strong theoretical foundation, innovative, good design experience , exposure to research and development and responsible for social needs.

**Program Educational Objectives**

1. To produce electrical power systems postgraduates, who are employable in public and private industries /institutes /organizations or pursue higher education.

- 2 .To prepare postgraduates who have the ability to identify and address Current and future problems in the domain of power systems, power Electronics and electrical machines.
3. To inculcate research attitude and lifelong learning among postgraduates
4. To produce some of these will demonstrate the academic leadership in engineering institutions and serve the education.

**Program Outcome's**

- a. Acquire in- depth knowledge in the domain of power systems and understanding of engineering principles for project management.
- b.Ability to critically analyze various power system components, models and their operation.
- c.Ability to apply fundamentals and concepts to analyze, formulate and solve complex problems of electrical power systems and its components.
- d.Apply advanced concepts of electrical power engineering to analyze, design and develop electrical components, apparatus and systems to put forward scientific findings at national and international levels.
- e.Ability to use advanced techniques, skills and modern scientific and engineering tools for professional practice.
- f. Preparedness to lead a multidisciplinary scientific research team, communicate and lifelong learning effectively.

**MAPPING OF PEOs with MISSION OF THE DEPARTMENT:**

S.No.	Program Educational Objectives(PEOs)	M1 Training the leaders of tomorrow	M2 Training the innovators of tomorrow	M3 Training the outstanding career professionals of tomorrow	M4 Conducting fundamental research
1	To produce electrical power systems postgraduates, who are employable in public and private industries /institutes /organizations or pursue higher education.		√	√	√
2	To prepare postgraduates who have the ability to identify and address Current and future problems in the domain of power systems, power Electronics and electrical machines.		√	√	√

3	To inculcate research attitude and lifelong learning among postgraduates and pursuing of Ph.D		√	√	√
4	To produce some of these will demonstrate the academic leadership in engineering institutions and serve the education	√	√	√	

**MAPPING OF POs/PSOs with PEOs:**

Mapping of POs to PEOs					
S.No.	Program Objectives(POs)	Program Educational Objectives(PEOs)			
		1	2	3	4
a	Acquire in- depth knowledge in the domain of power systems and understanding of engineering principles for project management.	√	√	√	
b	Ability to critically analyze various power system components, models and their operation	√	√	√	√
c	Ability to apply fundamentals and concepts to analyze, formulate and solve complex problems of electrical power systems and its components.	√	√	√	√

<b>d</b>	Apply advanced concepts of electrical power engineering to analyze, design and develop electrical components, apparatus and systems to put forward scientific findings at national and international levels	<b>√</b>	<b>√</b>	<b>√</b>	
<b>e</b>	Ability to use advanced techniques, skills and modern scientific and engineering tools for professional practice.		<b>√</b>	<b>√</b>	<b>√</b>
<b>f</b>	Preparedness to lead a multidisciplinary scientific research team, communicate and lifelong learning effectively	<b>√</b>		<b>√</b>	<b>√</b>

<b>Course Code</b>	<b>Course Title</b>	<b>S NO</b>	<b>CO NO</b>	<b>Description of the Course Outcome</b>	<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>
16EE512	Advanced Power System Analysis		CO1	Understand power system stability and power angle equations	√	√	√			
			CO2	Analyzing swing equation and equal area criterion	√	√				
			CO3	Understand synchronous machine modeling	√	√		√		
			CO4	Understand excitation systems and power system stabilizers	√	√				√
16EE511	Power System Dynamics & Stability		CO1	Comprehend basic concepts and principles in power system analysis and Formulate and solve power flow problems, economic and environmental dispatch problems	√	√	√			
			CO2	Demonstrate understanding in the theory of power system security analysis, voltage stability analysis, optimal power flow and state estimation	√	√				
			CO3	Develop algorithms as well as to use software tools to solve power system analysis and stability problems	√	√			√	

			CO4	To make sound recommendations and implement as required based on these solutions,analyse for practical power system problems	√	√					
16EE513	Deregulated Operation Of Power Systems		CO1	Describe various types of regulations in power systems and Identify the need of regulation and deregulation	√						
			CO2	Define and describe the Technical and Non-technical issues in Deregulated Power Industry	√					√	
			CO3	Identify and give examples of existing electricity markets	√	√				√	
			CO4	Classify different market mechanisms and to summarize the role of various entities in the market	√		√			√	
16EE514	Modern Control Theory		CO1	this course introduces Z Transforms and analysis of discrete data systems using Z Transforms	√						√
			CO2	in case of multiple input and multiple output systems, this course helps to deal with digital control systems	√	√					√
			CO3	the Non – Linear systems which will come across in most of practical systems, this course deals about Non – Linearity's	√	√					√
			CO4	since stability is most important for everyu systems to give it satisfactory performance, this topic also helps	√						√
16EE543	Power System Reliability		CO1	Understand basic concepts of smart grid in power network	√						
			CO2	Analyzing swing equation and equal area criterion	√		√				
			CO3	Understand synchronous machine modeling		√					

			CO4	Understand excitation systems and power system stabilizers		√		√		
16EE546	Optimization Techniques		CO1	Apply numerical or iterative techniques in power systems for optimal power flow solutions	√					
			CO2	Optimize the parameters in control systems for desired steady state or transient response	√					
			CO3	Optimize the cost function in deciding economic factors of power systems	√	√				
			CO4	Design of electrical systems optimally using suitable techniques like univariate method, steepest descent method etc		√	√	√		
16EE515	Real Time Control of Power System		CO1	Learn various activities of operator	√					
			CO2	Understand about Supervisory control and data acquisition	√					
			CO3	Real time software and state estimation					√	
			CO4	Understand Security management	√	√				
16EE516	AI Techniques in Power Systems		CO1	Differentiate between Algorithmic based methods and knowledge based methods	√					
			CO2	Use the soft computing techniques for power system problems	√	√	√			
			CO3	Use appropriate AI framework for solving power system problems	√	√	√			√
			CO4	Apply GA to power system optimization problems		√	√			√
16EE517	Smart Grids		CO1	Understand basic concepts of smart grid in power network.	√					
			CO2	Analyzing swing equation and equal area criterion	√	√				
			CO3	Understand synchronous machine modeling		√	√			
			CO4	Understand excitation systems and power system stabilizers	√					√

16EE518	Power System Digital Protection	CO1	Understand salient features of protective relaying electromagnetic relays and distance protection schemes	√					
		CO2	Apply the Over current protective schemes and differential protection of alternator and transformer	√		√			
		CO3	Analyse wire pilot and carrier current protection for transmission lines and neutral grounding		√				
		CO4	Understand the principle of operation of static relays and realization of various static relays and Understand current practices in microprocessor based numerical relays and the over voltage protection	√		√			√
16EE547	FACTS Devices	CO1	Learners will be able to refresh on basics of power transmission networks and need for FACTS controllers	√					
		CO2	Learners will be able to explain about static var compensator in detail and series compensation devices		√	√			
		CO3	Learners will understand the significance about different voltage source converter based facts controllers		√	√			
		CO4	Learners will be able to analyze on FACTS controller interaction and control coordination		√	√			
16EE550	EHVAC and HVDC Transmission	CO1	To understand the basic concepts of EHV AC and HVDC transmission	√					
		CO2	To identify the electrical requirements for HVDC lines and identify the components used in AC to DC conversion	√	√				
		CO3	To understand the operation of HVDC conversion technology	√					
		CO4	To understand the fundamental requirements of HVDC transmission line design and To identify factors affecting AC-DC transmission	√	√				

**K L UNIVERSITY**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**PROGRAM DEVELOPMENT DOCUMENT**  
**M.Tech in Mechatronics**  
**2016**

**Vision of University:**

To be a globally renowned university.

**Mission of University:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**Vision of Department:**

To be a globally renowned leader in education, research and extension activities in emerging areas of mechanical engineering and allied fields.

**Mission of Department:**

Training the leaders, innovators and outstanding career professionals of tomorrow and conducting fundamental research to address major technological roadblocks.

### **Program Educational Objectives**

5. Demonstrate a breadth of knowledge of Mechatronics.
6. Demonstrate a depth of knowledge in a chosen focus area, inside or outside of Mechatronics.
7. Demonstrate knowledge of contemporary issues in their chosen focused area
8. Demonstrate the ability to independently complete a technical project

### **Program Outcome's**

- f. Advanced knowledge of a broad range of modelling methodologies, and underlying mechanical science, commonly used in the development and analysis of mechatronic engineering systems.
- g. Knowledge of fundamental design issues relevant to mechatronic engineering, and an understanding of how to formulate and analyse design solutions in various engineering contexts.
- h. Working knowledge of a range of modern mathematical methods and tools used in the development and analysis of mechatronic engineering systems.
- i. In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modelling techniques, mathematical and/or numerical techniques.
- j. Knowledge of basic research and development principles and practices relevant to mainstream engineering industry.
- k. Knowledge of key professional, safety and ethical issues arising in modern engineering industry.
- l. Knowledge of time-management and work planning issues related to the organisation, implementation and successful completion, including reporting, of an individual, Masters level, engineering based project.

### **MAPPING OF PEOs with MISSION OF THE DEPARTMENT:**

S.No	Description of PEOs	Key Components of Mission			
		M 1	M 2	M 3	M 4
		Training the leaders of tomorrow	Training the innovators of tomorrow	Training the outstanding career professionals of tomorrow	Conducting fundamental research
PEO 1	Demonstrate a breadth of knowledge of Mechatronics.			✓	✓
PEO 2	Demonstrate a depth of knowledge in a chosen focus area, inside or outside of Mechatronics			✓	✓
PEO 3	Demonstrate knowledge of contemporary issues in their chosen focused area	✓	✓	✓	✓
PEO 4	Demonstrate the ability to independently complete a technical project	✓	✓	✓	✓

**MAPPING OF POs/PSOs with PEOs:**

	<b>Key Components of POs and PSOs</b>	<b>Description of PEO</b>			
		Demonstrate a breadth of knowledge of Mechatronics	Demonstrate a depth of knowledge in a chosen focus area, inside or outside of Mechatronics	Demonstrate knowledge of contemporary issues in their chosen focused area	Demonstrate the ability to independently complete a technical project
		<b>PEO 1</b>	<b>PEO 2</b>	<b>PEO 3</b>	<b>PEO 4</b>
a	Advanced knowledge of a broad range of modelling methodologies	✓	✓		✓
b	Knowledge of fundamental design issues relevant to mechatronic engineering	✓	✓	✓	✓

c	Working knowledge of a range of modern mathematical methods and tools	✓	✓	✓	✓
d	In-depth knowledge of specific engineering systems, design methods, modelling techniques, mathematical and/or numerical techniques.	✓	✓	✓	✓
e	Knowledge of basic research and development principles and practices	✓	✓	✓	✓
f	Knowledge of key professional, safety and ethical issues			✓	✓
g	Knowledge of time-management and work planning issues related to the organisation				✓

### Course Outcomes vs Program Outcomes

Course Code	Course Title	Credits	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g
15ME5101	Fundamentals of Mechatronics	4	CO1	Analyze mechatronics in manufacturing and distinguish between traditional and mechatronics approaches	2						
			CO2	Be proficient in the use of Data conversion devices and Microprocessors controllers.	1						
			CO3	Be able to analyze and select suitable drives and mechanisms for industrial applications		2					
			CO4	Design and analyze the Hydraulic systems and understand PID controllers and CNC machines.		2					
15ME5102	Advanced Engineering Mathematics	4	CO1	Perform elementary operations on matrices including determination of rank and inverse, demonstrate mastery in using matrix algebra			2	2			
			CO2	Interpret and apply differential calculus on problems involving rate of change			2	2			
			CO3	Illustrate the applications of integral calculus in solving problems on area, volume, displacement, work			2	2			
			CO4	Determine gradient, divergence and curl of vector point functions with their properties			2	2			

15ME5103	Sensors and Actuators	4	CO1	Identify appropriate sensor for a particular Mechatronic system.				2			
			CO2	Analysis of hydraulic and pneumatic actuation systems for selection of appropriate actuation method for a particular Mechatronic system.				2			
			CO3	Analysis of electrical actuation systems for selection of appropriate actuation method for a particular Mechatronic system.				2			
			CO4	Understand micro electro mechanical system and its manufacturing methods					1		
15ME5104	Modeling and Simulation of Mechatronic Systems	4	CO1	Build mathematical models of mechatronic systems comprising of combinations of mechanical, electrical, pneumatic/ hydraulic and thermal systems.			2	2			
			CO2	Analyze systems for their time response to a certain input using transfer function and /or state space approach	3						3
			CO3	Apply system identification techniques to synthesize system models	2			2			
			CO4	Evaluate time and frequency response of systems and control system design	1			2			
15ME51A2	MEMS & NEMS	3	CO1	Introduction to MEMS and Microelectronic technologies used for MEMS	1	2					
			CO2	Microsensors & MEMS applications in Biological, Chemical and Acoustic field.	1	2					

			CO3	Introduction to MEMS based nanotechnology	1	2					
			CO4	NEMS physics and NEMS architecture	1	2					
15ME51B3	Microprocessors and Embedded Systems	3	CO1	Understand the fundamentals of embedded applications		1					
			CO2	Architectural understanding of processors through interfacing (8086)		1					
			CO3	Programming model of microcontroller (8051 family)		1					
			CO4	Interfacing and programming applications using microcontrollers		2					
15ME5205	Robotics: Advanced Concepts and Analysis	4	CO1	Perform Velocity and Static analysis of Manipulators		2					
			CO2	Formulation of equation of motions by computer simulations			3	2			
			CO3	Apply the Planning and control methods for robots					2		
			CO4	Modeling and Controlling of flexible manipulators					2		

15ME5206	Control of Mechatronic Systems	4	CO1	Understanding the basic concepts of Modeling, Testing in terms of time domain and frequency domain			1				
			CO2	Analyze the basic designing concepts of Modern and optimal controllers such as state feedback and state observers.	2						
			CO3	Analyze the basic designing concepts of Digital controller for digital systems			2				
			CO4	Analyze the basic designing concepts of Non-linear controllers for non-linear systems			2				
15ME5207	Mechatronics Product Design	4	CO1	Identify appropriate sensors, Identify appropriate actuation system for a given application.	1		1				
			CO2	Identify appropriate microcontroller for a given application and to build a mathematical Model of system for evaluating open loop system performance and behavior.			2	3			
			CO3	Suggest an appropriate closed loop control strategy to attain the desired system behavior.			1				
			CO4	Suggest a Mechatronic product design for a given application and evaluate its performance.	2	3					
15ME5208	Precision Engineering	4	CO1	To understand concept of accuracy, errors & its causes.					1		

			CO2	To know about geometrical dimensioning and tolerance						2	
			CO3	To understand concept of surface roughness and learn methods to improve surface finish.					1		
			CO4	To understand precision engineering methods					1		
15ME52C2	Non Linear Optimization	3	CO1	Categorize convexity and non-convexity problems	2		2				
			CO2	Apply goal programming methods to solve modals	2						
			CO3	solve problems with positive coefficients using separable and geometric programming				1			
			CO4	Implement search techniques to solve programming problems							3
15ME52D1	Industrial Automation	3	CO1	Apply principles of automation towards material handling and analyze their performance.		2					
			CO2	Analyze performance of storage systems and product flow in different GT methods and cellular manufacturing.		2					
			CO3	Application and analysis of transfer line without internal storage and describe Inspection Technology			2				

			CO4	Describe different manufacturing supporting systems.			2				
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**K L UNIVERSITY  
DEPARTMENT OF MECHANICAL ENGINEERING  
PROGRAM DEVELOPMENT DOCUMENT  
M.Tech in Thermal Engineering  
2016**

**Vision of University:**

To be a globally renowned university.

**Mission of University:**

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

**Vision of Department:**

To be a globally renowned leader in education, research and extension activities in emerging areas of mechanical engineering and allied fields.

**Mission of Department:**

Training the leaders, innovators and outstanding career professionals of tomorrow and conducting fundamental research to address major technological roadblocks.

**Program Educational Objectives**

1. Demonstrate a breadth of knowledge of Thermal Engineering.
2. Demonstrate a depth of knowledge in a chosen focus area, inside or outside of Thermal Engineering.
3. Demonstrate knowledge of contemporary issues in their chosen focused area
4. Demonstrate the ability to independently complete a technical project.

**Program Outcome's**

- a. Advanced knowledge of a broad range of modelling methodologies, and underlying mechanical science, commonly used in the development and analysis of Thermal engineering systems.
- b. Knowledge of fundamental design issues relevant to Thermal engineering, and an understanding of how to formulate and analyse design solutions in various engineering contexts.
- c. Working knowledge of a range of modern mathematical methods and tools used in the development and analysis of Thermal engineering systems.
- d. In-depth knowledge of one or more of the following (depending of selection of option modules and project area): specific engineering systems, design methods, modelling techniques, mathematical and/or numerical techniques.
- e. Knowledge of basic research and development principles and practices relevant to mainstream engineering industry.

- f. Knowledge of key professional, safety and ethical issues arising in modern engineering industry.
- g. Knowledge of time-management and work planning issues related to the organisation, implementation and successful completion, including reporting, of an individual, Masters level, engineering based project.

**MAPPING OF PEOs with MISSION OF THE DEPARTMENT:**

S.No	Description of PEOs	Key Components of Mission			
		M 1	M 2	M 3	M 4
		Training the leaders of tomorrow	Training the innovators of tomorrow	Training the outstanding career professionals of tomorrow	Conducting fundamental research
PEO 1	Demonstrate a breadth of knowledge of Thermal Engineering			✓	✓
PEO 2	Demonstrate a depth of knowledge in a chosen focus area, inside or outside of Thermal Engineering			✓	✓
PEO 3	Demonstrate knowledge of contemporary issues in their chosen focused area	✓	✓	✓	✓
PEO 4	Demonstrate the ability to independently complete a technical project	✓	✓	✓	✓

**MAPPING OF POs/PSOs with PEOs:**

	<b>Key Components of POs and PSOs</b>	<b>Description of PEO</b>			
		Demonstrate a breadth of knowledge of Thermal Engineering	Demonstrate a depth of knowledge in a chosen focus area, inside or outside of Thermal Engineering	Demonstrate knowledge of contemporary issues in their chosen focused area	Demonstrate the ability to independently complete a technical project
		<b>PEO 1</b>	<b>PEO 2</b>	<b>PEO 3</b>	<b>PEO 4</b>
a	Advanced knowledge of a broad range of modelling	✓	✓		✓
b	Knowledge of fundamental design issues relevant to Thermal engineering	✓	✓	✓	✓

c	Working knowledge of a range of modern mathematical methods and tools	✓	✓	✓	✓
d	In-depth knowledge of specific engineering systems, design methods, modelling techniques, mathematical and/or numerical techniques.	✓	✓	✓	✓
e	Knowledge of basic research and development principles and	✓	✓	✓	✓
f	Knowledge of key professional, safety and ethical issues			✓	✓
g	Knowledge of time-management and work planning issues related to the organisation				✓

### Course Outcomes vs Program Outcomes

Course Code	Course Title	Credits	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g
15 ME 5109	Numerical Methods in Thermal Engineering	4	CO1	Realize the importance of Numerical and Experimental Investigations	1						
			CO2	Acquire the knowledge in the behavior of fluid flows and heat transfer		2					
			CO3	Develop the discretization equations to the governing equations			2				
			CO4	Adopt a suitable solution technique to the discretization equations			2				
15 ME 5110	Advanced Thermodynamics	4	CO1	Understanding the concepts of energy, thermodynamic potential and calculation of exergy of a system	3	2					
			CO2	Understanding kinetic theory of gases and intermolecular forces	2		3				
			CO3	Understanding various methods of statistical distribution of particles				2	1		
			CO4	Ability to construct figures for particle allocations depending on various probability distributions				2	2		
15 ME 5111	Design of Thermal Systems	4	CO1	Studying in detail about the Design and Modeling of Thermal Systems.	3	2					
			CO2	Understanding about acceptable design of thermal system and studying its Economic Considerations.				2			2

			CO3	Studying about the problem formulation for optimization and its search methods and understanding Lagrange multiplier.			3		2		
			CO4	Understand about Geometric, linear and dynamic Programming and modeling of thermal equipment.		2		2			
15 ME 5112	Advanced Heat & Mass Transfer	4	CO1	Understand both the physics and the mathematical treatment of one-dimensional, steady-state and Transient conduction heat transfer.	2		2				
			CO2	Analyze free and forced convection problems involving complex geometries with proper boundary conditions			3	3			
			CO3	Apply the concepts of radiation heat transfer for enclosure analysis			3	3			
			CO4	Understand physical and mathematical aspects of mass transfer. Analyze combined heat and mass transfer from plates and in pipes.	3			3			
15 ME 51E1	Heat Exchanger Design	3	CO1	Classify heat exchangers and understand thermo hydraulic fundamentals of the exchangers	1						
			CO2	Apply LMTD and $\epsilon$ - NTU methods in the design of different types of heat exchangers	2		2				
			CO3	Apply different methods in the design of shell and tube heat exchangers	2				2		
			CO4	Design of Compact heat exchangers and study of fouling control techniques	2		2				
15 ME 51F2	IC Engine Combustion and	3	CO1	Estimate the emissions from the I C Engines, Understand the combustion in IC Engines and emissions formation	3				3		

	Pollution		CO2	Understand the SI Engine emission control technology and treatments	2						
			CO3	Understand the CI Engine emission control technology and treatments	2						
			CO4	Calculate the quality of the ignition, Understand the Emission test procedures, standards and fuels quality, emissions	3					3	
15 ME 5213	Incompressible and Compressible Flows	4	CO1	Follow the conservation equations based on control mass system and control volume formulation	1						
			CO2	Familiar with the techniques for analysis of inviscid incompressible flows		2					
			CO3	Familiar with the techniques for the solution of boundary layer equations		2					
			CO4	Understand the formulation of normal and oblique shock waves	2						
15 ME 5214	Computational Fluid Dynamics	4	CO1	Understand the Fundamentals of CFD and deriving governing equations	2		2				
			CO2	Apply different CFD techniques to diffusion problems	2			2			
			CO3	Solving convection-diffusion problems and N-S equations	2			2			
			CO4	Understand numerical grid generation and apply time integration and turbulence methods to complex flows	2			2			
15 ME 5215	Refrigeration and Cryogenics	4	CO1	Apply basic thermodynamic principles to produce low temperature and to the liquefaction systems.	2						

			CO2	Evaluate different types of cryogenic refrigerators and insulations and their applications.	2		2				
			CO3	Examine the properties of matter at low temperature and their measurement.			2				
			CO4	Apply the principle of superconductivity, adiabatic demagnetization and dilution refrigeration etc.to produce low temperatures	2						
15 ME 5216	Measurements in Thermal Engineering	4	CO1	Apply the scientific and engineering methods for field measurement and derived quantities			2	2			
			CO2	Analyze principles of presentation, estimation and data analysis				2	2		
			CO3	Apply the measurement of field quantities with probe and non-instructive techniques		3		2			
			CO4	Evaluate the measurement of derived quantities and analytical methods				2	2		
15 ME 52G2	Gas Turbine Engineering	3	CO1	Analysis of gas turbine cycles	2						
			CO2	Analyze performance characteristics of compressor and turbine	2						
			CO3	Understand material selection and fabrication techniques of gas turbine components	2						
			CO4	Analyze gas turbine power generation and cogeneration systems	2						
15 ME 52H2	Renewable Energy Technology	3	CO1	Understand different types of renewable energy sources and analyze their energy production	2	2					

			CO2	Understand the principle of OTEC, wind power and Analyze their effects in power generation	2	2						
			CO3	Understand different conversion techniques of biomass to useful fuel	3	3						
			CO4	Analyze various types of Geo Thermal energy sources and their extraction techniques and apply them for conversion	3	3						