



Koneru Lakshmaiah Education Foundation

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Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA

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XXVII Academic Council - Annexure 3.5

Date: 20 June 2019

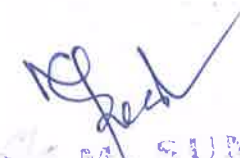
Department of Electronics and Communication Engineering

Minutes of 17th BOS Meeting

The Department BOS Meeting held on 20th June 2019 (Offline mode) at F-008 from 10:00 Am onwards

Following Members were present in the meeting

1. Dr. M. Suman, Professor and HoD, BoS Chair,
2. Dr. Vinay Kumar Mittal, Professor & Dept. Chair, Member
3. Mr. V. Ramani Kumar, Advisor & Adj. Professor, Member
4. Dr. L. Koteswara Rao, Professor & HOD-ECE, KLH, Member
5. Dr. V. Anil Kumar, Asst. Professor, IIIT Hyderabad, Member
6. Dr. Habibullah Khan, Professor & Dean Student Affairs, Member
7. Dr. K.Sarat Kumar, Professor, Member
8. Dr. K.Ch. Sri Kavya, Professor, Member
9. Dr. M Venkata Narayana, Professor & DHOD, Member
10. Dr. M.Siva Ganga Prasad, Professor & DHOD, Member
11. Dr. Lakshman Pappula, Assoc. Professor & DHOD, Member
12. Dr. I. Govardhani, Professor & RPAC, Member
13. Dr. M Sridhar, Professor, Member
14. Dr. S Koteswara Rao, Professor, Member
15. Dr. G V Subbarao, Professor & RPAC, Member
16. Dr. M Venugopal Rao Professor & Assoc. Dean IQAC, Member
17. Dr. BTP Madhav, Professor & Assoc. Dean R&D, Member
18. Dr. D Venkat Ratnam, Professor, Member
19. Dr. K Srinivas Rao, Professor, Member
20. Dr. K Kumar Naik, Professor, Member
21. Dr. V. S. V. Prabhakar, Professor & Director IC, Member
22. Dr. Madhukar Deshmukh, Professor & Assoc. Dean, Member
23. Dr. T.V.Rama Krishna, Professor & Director (E- resources) , Member
24. Dr. K.S.Kamesh, Professor, Member
25. Dr. Md. Z Rehman, Professor, Member
26. Dr. B. Polaiah, Professor, Member
27. Dr. Raja Chandrasekaran, Professor, Member
28. Dr. D. Sree Phani Kishore, Professor, Member
29. Dr. Fazal Noorbasha, Assoc. Professor & Assoc. Dean, Member
30. Dr. G. Naveen Kishore, Assoc. Professor, Member
31. Mr M. Ravi Kumar, Asst. Professor, Member
32. Dr. M. Goutham, Asst. Professor, ECE, KLH, Member
33. Dr. V S Bhagavan, Professor, Mathematics, Special Invitees
34. Dr. M. Venkateswarlu, Asst. Professor Physics, Special Invitees
35. Dr. V Shanmukha Kumar, Professor, Chemistry, Special Invitees
36. Dr. GS Krishna Santosh, Assoc. Professor, ECE Dept, Special Invitees
37. Dr. C. Sandeep Reddy, Asst. Professor, ECE, KLH, Special Invitees
38. Dr KS. Ramesh, Special Invitees


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Following Members were absent in the meeting

1. Dr. T. Kishore Kumar, Professor, NIT Warangal, Member
2. Dr. V Rajesh, Professor & Dean P & D, Member
3. Dr. A.S.C.S.Sastry, Professor & COE, Member
4. Dr. P Satyanarayana, Professor & HOD ECM, Member
5. Dr. PVV Kishore, Professor, Member
6. Dr. K. Hari Kishore, Professor, Member
7. Dr. P.Pardhasaradhi, Professor, Member
8. Dr. N VenkatRam, Professor & Dean Academics, Special Invitees
9. Dr. Subba Rao, Head Budget, P&M division, NRSC, Bengaluru, Special Invitees
10. Mr. Visweswaran Jagadeesan, National Instruments, Bengaluru, Special Invitees
11. Dr. MR Narasinga Rao, Professor, CSE, Special Invitees
12. Dr. Kalyan Chakravarthy, Professor, Mech, Special Invitees
13. Dr. J Somlal, Professor, EEE, Special Invitees
14. Dr. K Giridhar, Assoc. Professor Biotechnology, Special Invitees
15. Dr. CV Ramani, Asst. Professor, CSS, Special Invitees

AGENDA and RESOLUTIONS

AGENDA ITEM-1

Approval of DAC minutes of meeting	Recommended and forwarded to AC for approval
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The minutes of the DAC meeting held on 18th June 2019 were discussed among the members. The minutes were approved.

[Annexure I & II]

AGENDA ITEM-2

To approve the course structure and curriculum of Y19 regulation	Recommended and forwarded to AC for approval
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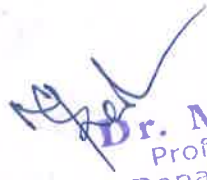
- All the BOS members approved the Y19 course and semester structure, as per the AICTE guidelines and it was forwarded to Dean Academics for further approval.
- The members approved the list of Flexi core courses, professional electives

[Annexure-III]

It is resolved to introduce Flexi Core for Y17 batch students and professional Electives under 9 sub-streams.

The following are the list of sub-streams

- ESS1: IoTs and Smart Cities
- ESS2: VLSI
- ESS3: Robotics and Automation
- ESS4: Signal Processing
- ESS5: Wireless Communication
- ESS6: Data Networks
- ESS7: RF & Microwave
- ESS8: Data Computing
- ESS9: Biomedical Instrumentation


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[Annexure-III]

AGENDA ITEM-3

List of value-added courses for AY 2019-2020	Recommended and forwarded to AC for approval
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Resolved to approve of value-added course for odd and even semester AY 2019-20 under B.Tech. program for Y18, Y17 regulation students

[Annexure-IV]

AGENDA ITEM-4

Inviting suggestions for M. Tech. specialization for A.Y. 2019	Recommended and forwarded to AC for approval
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Members suggested to retain the M. Tech. specialisations on VLSI and Radar and Communications.

[Annexure-V and VI]


AGENDA ITEM-5

Propose to introduce "Biomedical Electronics & IOT for Healthcare" and "Next Generation Wireless Technologies (WCDMA, GPRS, GSM, UMTS)" courses for B. Tech ECE from AY 2019-20 based on stake holder feedback	Recommended and forwarded to AC for approval
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Proposed to introduce the "Biomedical Electronics & IOT for Healthcare" and "Next Generation Wireless Technologies (WCDMA, GPRS, GSM, UMTS)" courses for B.Tech. ECE from AY 2019-20 based on feedback received from the stakeholder. Consolidated report from stake holders is shown below.

- Based on the feedback received from Dr. G. V. Subba Rao, Professor, KLEF, Vijayawada, "Biomedical Electronics & IOT for Healthcare (19EC3018)" is introduced as a flexi core for B. Tech ECE to provide diverse options in core areas. The global healthcare landscape faces new challenges, and technology is often a key solution. Introducing the syllabus allows educators to address emerging health issues and equip students with the knowledge and skills needed to contribute to solving current and future healthcare challenges through biomedical electronics and IoT solutions.
- Based on the feedback received from Mr. R Nagesh, Associate Director, CDAC, Bengaluru, "Next Generation Wireless Technologies (WCDMA, GPRS, GSM, UMTS) (19EC3095)" is introduced as a professional elective for B. Tech ECE. The field of wireless communications is continually evolving with the introduction of new standards and technologies. Regularly updating the syllabus ensures that students are exposed to the latest developments in the field of wireless communications, such as 5G and beyond, enabling them to stay current with industry trends.

S. No.	Course Code	Course Title	Course Type	Remarks
1.	19EC3018	BIOMEDICAL ELECTRONICS & IOT FOR HEALTHCARE	Flexi core	This course is introduced as elective based on


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				stake holders feedback
2.	19EC3095	NEXT GENERATION WIRELESS TECHNOLOGIES (WCDMA, GPRS, GSM, UMTS)	Professional elective	This course is introduced as elective based on stake holders feedback

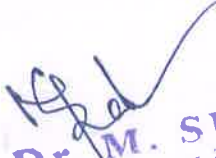
The detailed syllabus is shown in Annexure VII and VIII.

[Annexure VII and VIII]

AGENDA ITEM-5

Proposed to revise the syllabus for few core and electives courses of B. Tech ECE 2019-20 curriculum based on the stakeholder's feedback.	Recommended and forwarded to AC for approval
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- Based on the feedback received from Mr. Srinivas Vedala, Apple Inc., Bengaluru, "Communication Signals & System Design (19EC2104)" syllabus is revised for B. Tech ECE with added the topic "ARMA model, DFT of standard sequences-Graph". Rapid advancements in communication technologies may necessitate updates to the syllabus to ensure that students are exposed to the latest industry-relevant knowledge and skills.
- Based on the feedback received from alumni, KLEF Vamsi.Ch, Thirdleap, Hyderabad, Basic engineering course "Electronic Workshop-II (Electronic System Design Workshop) (19EC2111)" syllabus is revised for B. Tech ECE by added the topic "Data Generators Applications and Product making, testing". Regularly reviewing and updating the content ensures that students are equipped with skills and knowledge that are directly applicable in the workplace. This can involve incorporating industry-standard software, hardware, and methodologies into the curriculum.
- Based on the feedback received from Dr. Satya Srinivasa Babu Patcha, Professor, KLEF, Vijayawada, Basic engineering course "IT Workshop (HTML, XML, WEB DESIGN) (19EC2112)" is revised for B. Tech ECE by adding the topic "HTML, XML, Web Design and App development". The field of web development is dynamic, with continuous advancements in technologies, frameworks, and tools. Updating the syllabus allows students to learn the latest techniques, libraries, and best practices, ensuring that they are well-prepared for the current industry standards.
- Including of real-world case studies in the syllabus enhances the practical relevance of the course. Analysing and solving problems from actual scenarios allow students to apply theoretical concepts to practical situations, preparing them for the challenges they may face in their careers. Based on the feedback received from Dr. Venkata Ratnam Devanaboyina, Professor, KLEF, Vijayawada, Flexi core course "System Engineering, Operation Research & Designing (19EC3020)" syllabus is revised for B.Tech ECE with added the topic "Design Thinking of product interfaces and user interface, integration of small, medium, large-scale UI & UX project development training module. Web design-based UI."
- Based on the feedback received from Dr. Karthik Kiran, Assistant Professor, VIT Chennai, Flexi core course "Advance Course in Soft-Computing (AI, ANN, Fuzzy Logic & Genetic Algorithms) (19EC3022)" is revised for B. Tech ECE with added the topic "Adaptive Fuzzy Logic: Fuzzy logic and fuzzy sets". The field of soft computing is dynamic, and new advancements in AI and related technologies are frequent. Regular updates to the syllabus ensure that students are exposed to the latest


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algorithms, methodologies, and tools used in soft computing, keeping them abreast of cutting-edge developments.

- Based on the feedback received from Dr. K. Kumar Naik, Professor, KLEF, Vijayawada, Professional core course "Introduction to AI & ANN Tools and Applications (19EC2223)" syllabus is revised for B. Tech ECE with added the topic "Hill Climbing, travelling salesman problem; -Implementation of 2-class pattern recognition". The field of AI is continually evolving with new algorithms, techniques, and tools being developed. Updating the syllabus ensures that students are exposed to the latest advancements in AI, including new machine learning models, deep learning architectures, and other AI-related technologies.
- Based on the feedback received from Mr. Srinivas Vedala, Apple Inc., Bengaluru, Professional elective course "5G Mobile, Wireless Technologies & IEEE 802 Standards (19EC4053)" syllabus is revised for B. Tech ECE with added the topic "802.15.4 (Zigbee), 802.16 (WiMax), BLE, 4G/5G". The telecommunications industry is a key driver of technological innovation. Modifying the syllabus ensures that students are equipped with the skills and knowledge that directly align with the latest industry requirements. This helps graduates to be more competitive and relevant in the job market.
- Based on the feedback received from Mr. K Hari Krishna, Industry Peer, Professional elective course "TCP/IP & Other Protocol Suite (19EC4051)" syllabus is revised for B. Tech ECE with added the topic "EAP: Multicast Listener Discovery (MLD) and IGMP Windows Sockets". With the increasing prevalence of cloud computing, modifications to the syllabus may be necessary to incorporate topics related to cloud networking, virtualization, and cloud-based communication protocols. This ensures that students are familiar with the latest trends in network architecture.

Resolved to revise the core and elective course for B.Tech. ECE from AY 2019-20 based on feedback received from the stakeholder.

S. No.	Course Code	Course Title	% of syllabus revised	Year of offering
1	19EC2104	COMMUNICATION SIGNALS & SYSTEM DESIGN	25 %	2 nd year (II Sem)
2	19EC2111	ELECTRONIC WORKSHOP-II (ELECTRONIC SYSTEM DESIGN WORKSHOP)	25 %	2 nd year (II Sem)
3	19EC2112	IT WORKSHOP (HTML, XML, WEB DESIGN)	25 %	2 nd year (I Sem)
4	19EC3018	BIOMEDICAL ELECTRONICS & IOT FOR HEALTHCARE	25 %	2 nd year (II Sem)
5	19EC3095	NEXT GENERATION WIRELESS TECHNOLOGIES (WCDMA, GPRS, GSM, UMTS)	25 %	2 nd year (II Sem)
6	19EC3020	SYSTEM ENGINEERING, OPERATION RESEARCH & DESIGNING	25 %	3 rd year (II Sem)
7	19EC3022	ADVANCE COURSE IN SOFT-COMPUTING (AI, ANN, FUZZY LOGIC & GENETIC ALGORITHMS)	25 %	3 rd year (II Sem)
8	19EC2223	INTRODUCTION TO AI & ANN TOOLS AND APPLICATIONS	25 %	3 rd year (II Sem)


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9	19EC4053	5G MOBILE, WIRELESS TECHNOLOGIES & IEEE 802 STANDARDS	25 %	3 rd year (II Sem)
10	19EC4051	TCP/IP & OTHER PROTOCOL SUITE	25 %	3 rd year (II Sem)

The detailed syllabus is shown in Annexure VII and VIII.

[Annexure VII and VIII]

AGENDA ITEM-6

Recommendations to approve BOS minutes in Academic Council.	Recommended and forwarded to AC for approval
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The members had a brainstorming discussion and interaction among themselves. Based on the suggestions given by the members, BoS resolved to recommend the following to the Academic Council for further approval.

AGENDA ITEM-7

Any other matter	Recommended and forwarded to AC for approval
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1. Dr. Anil Kumar suggested to include it flexi-course under ESS6.
2. Suggested to offered Block Chain and Cyber Security under ESS8 and ESS6.
3. Suggested to offered Data Base Management system and Operating System courses as open electives.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

KLEF

BOS MEETING

DATE: 20 June 2019

Venue: F-008

Time: 10AM

S. No	Name of the Faculty	Designation	Signature
1	Dr. M. Suman, Professor & HOD	BOS Chair	
2	Dr. Vinay Kumar Mittal, Professor & Dept. Chair	Member	
3	Mr. V. Ramani Kumar, Advisor & Adj. Professor	Member	
4	Dr. L. Koteswara Rao, Professor & HOD-ECE, KLH	Member	
5	Dr. V. Anil Kumar, Asst. Professor, IIT Hyderabad	External Member	V. Anil Kumar
6	Dr. T. Kishore Kumar, Professor, NIT Warangal	External Member	
7	Dr. Habibullah Khan, Professor & Dean Student Affairs	Member	
8	Dr. V. Rajesh, Professor & Dean P & D.	Member	
9	Dr. K. Sarat Kumar, Professor	Member	
10	Dr. A.S.C. S. Sastry, Professor & COE	Member	
11	Dr. K. Ch. Sri Kavya, Professor	Member	
12	Dr. M. Venkata Narayana, Professor & DHOD	Member	
13	Dr. M. Siva Ganga Prasad, Professor & DHOD	Member	
14	Dr. Lakshman Pappula, Assoc. Professor & DHOD	Member	
15	Dr. I. Govardhani, Professor & RPAC	Member	
16	Dr. P. Satyanarayana, Professor & HOD ECM	Member	
17	Dr. P. V. V. Kishore, Professor	Member	
18	Dr. M. Sridhar, Professor	Member	
19	Dr. S. Koteswara Rao, Professor	Member	
20	Dr. G. V. Subbarao, Professor & RPAC	Member	
21	Dr. M. Venugopal Rao, Professor & Assoc. Dean IQAC	Member	
22	Dr. B. T. P. Madhav, Professor & Assoc. Dean R&D	Member	
23	Dr. D. Venkat Ratnam, Professor	Member	
24	Dr. K. Srinivas Rao, Professor	Member	
25	Dr. K. Kumar Naik, Professor	Member	
26	Dr. V. S. V. Prabhakar, Professor & Director IC	Member	
27	Dr. Madhukar Deshmukh, Professor & Assoc. Dean R&D	Member	
28	Dr. T. V. Rama Krishna, Professor & Director (E-resources)	Member	
29	Dr. K. S. Ramesh, Professor	Member	
30	Dr. K. Hari Kishore, Professor	Member	
31	Dr. Md. Z. Rehman, Professor	Member	
32	Dr. P. Pardhasaradhi, Professor	Member	
33	Dr. B. Bolanah, Professor	Member	

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35	Dr. D.Sree Phani Kishore, Professor	Member	<i>[Signature]</i>
36	Dr. Fazal Noorbasha, Assoc. Professor & Assoc. Dean	Member	<i>[Signature]</i>
37	Dr. G. Naveen Kishore, Assoc. Professor	Member	<i>[Signature]</i>
38	Mr. M. Ravi Kumar, Asst. Professor	Member	<i>[Signature]</i>
39	Dr. M. Goutham, Asst. Professor, ECE, KLH	Member	<i>[Signature]</i>
Special Invitees			
1	Dr. N VenkatRam, Professor & Dean Academics	Special Invitee	
2	Dr. Subba Rao, Head Budget, P&M division, NRSC, Bengaluru	Special Invitee	
3	Mr. Visweswaran Jagadeesan, National Instruments, Bengaluru	Special Invitee	
4	Dr. M R Narasinga Rao, Professor, CSE	Special Invitee	
5	Dr. Kalyan Chakravarthy, Professor, Mech	Special Invitee	
6	Dr. J Somial, Professor, EEE	Special Invitee	
7	Dr. V S Bhagavan, Professor, Mathematics	Special Invitee	<i>[Signature]</i>
8	Dr. M. Venkateswarlu, Asst. Professor, Physics	Special Invitee	<i>[Signature]</i>
9	Dr. K Giridhar, Assoc. Professor, Biotechnology	Special Invitee	
10	Dr. C V Ramani, Asst. Professor, CSS	Special Invitee	
11	Dr. B Siva Nagaiah, Assoc. Professor, English	Special Invitee	
12	Dr Bindu Madhavi Narayanam, Asst. Professor, MBA	Special Invitee	
13	Dr. V Shanmukha Kumar, Professor, Chemistry	Special Invitee	<i>[Signature]</i>
14	Dr. Sai Krishna Santosh G, Assoc. Professor, ECE Dept.	Special Invitee	<i>[Signature]</i>
15	Mr. K. SripathRoy, Asst. Professor & Assoc. Dean, ECE Dept.	Special Invitee	
16	Dr. C. Sandeep Reddy, Asst Professor, ECE, KLH	Special Invitee	<i>[Signature]</i>

17 Dr. K. S. Ramoth

[Signature]
K.S. Ramoth

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Annexure I

DAC minutes of meeting is enclosed

Annexure II Stakeholder Feedback

Sl.No.	Name of the resource person	Designation & Affiliation	Recommendation on Curriculum during DAC meeting	Approval by BOS committee	Remarks
1.	Miss Kommuru Sravani Sravani	180040189, Student, KLEF, Vijayawada	She recommended to include the topics of signal representation and analysis in the course Communication signals and system design	Approved	Professional core course helps better employment and skill development
2.	Dr. Satya Srinivasa Babu Patcha	Emp ID - 6303, Professor KLEF, Vijayawada	He suggested to include IT Workshop (HTML,XML,Web design) in the curriculum and include the control of signals in Embedded Controllers	Approved	Professional core course helps better employment and skill development
3.	Dr. Venkata Ratnam Devanaboyina	Emp ID - 2684, Professor, KLEF, Vijayawada	He suggested to include some topics on operations research principles in the course- "System Engineering, Operation Research & Designing"	Approved	Flexi core course helps better employment and skill development
4.	Mr.K.Hari Krishna	180040621, Student, KLEF, Vijayawada	He suggested to add more topics in the topic "application layer protocols in the subject- TCP/IP & Other Protocol Suite"	Approved	Professional elective course helps for better employment and skill development
5.	Mr. Srinivas Vedala	Apple Inc., Bengaluru	He suggested to include the course 5G Mobile, Wireless Technologies &	Approved	Professional core course helps for better employment and


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			IEEE 802 Standards, communication signal and system design in curriculum		skill development
6.	Mr. R Nagesh	Associate Director, CDAC, Bengaluru	He suggested to include Next Generation Wireless Technologies (WCDMA, GPRS, GSM, UMTS) in the curriculum	Approved	Professional elective course helps better employment and skill development
7.	Mr. Vamsi .Ch	Third Leap Hyderabad	He suggested to include Electronic Workshop-II (Electronic System Design Workshop) in the curriculum	Approved	Basic engineering course helps better employment and skill development
8.	Dr. Karthik Kiran	Assistant Professor, VIT Chennai	He suggested to add a course on Advance Course in Soft-Computing (AI, ANN, Fuzzy Logic & Genetic Algorithms) in the curriculum as they are upcoming technologies	Approved	Flexi core course helps better employment and skill development
9.	Dr. Senthil Sivakumar,	Asst. Prof., IIT Tiruchirappalli	He suggested to offer a course called Systems for Smart Cities & Smart Villages	Approved	Flexi core course helps better employment and skill development
10.	Dr. G. V. Subba Rao	Emp ID - 2838, Professor, KLEF, Vijayawada	He suggested to offer a course called Biomedical Electronics & IoT for Healthcare	Approved	Flexi core course helps better employment and skill development
11.	Dr. K. Kumar Naik	Emp ID - 3144, Professor, KLEF, Vijayawada	He suggested to introduce a course called Introduction to AI & ANN Tools and Applications	Approved	Flexi core course helps better employment and skill development


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Annexure-III

B. Tech. Course Structure Y19 Admitted Batch

SNO	COURSE CODE	COURSE NAME	L	T	P	S	Cr	Pre requisites	Course Category (EMPLOYABILITY /SKILL DEVELOPMENT /ENTREPRENEURSHIP)	Activities / Content with direct bearing on Employability / Entrepreneurship/ Skill development	New Course (Yes/No)	Remarks
I			HUMANITIES & SOCIAL SCIENCES									
1	19UC1101	BASIC ENGLISH	0	0	4	0	2	NIL	EMPLOYABILITY / ENTREPRENEURSHIP	Practice based learning	No	
2	19UC1202	ENGLISH PROFICIENCY	0	0	4	0	2	NIL	EMPLOYABILITY / ENTREPRENEURSHIP	Practice based learning	No	
3	19UC2103	PROFESSIONAL COMMUNICATION SKILLS	0	0	4	0	2	NIL	EMPLOYABILITY / ENTREPRENEURSHIP	Practice based learning	No	
4	19UC2204	APTITUDE BUILDER-I	0	0	4	0	2	NIL	EMPLOYABILITY / ENTREPRENEURSHIP	Practice based learning	No	
5	19UC3105	APTITUDE BUILDER-II	0	0	4	0	2	NIL	EMPLOYABILITY / ENTREPRENEURSHIP	Practice based learning	No	
6	19UC3206	CAMPUS TO CORPORATE	0	0	4	0	2	NIL	EMPLOYABILITY / ENTREPRENEURSHIP	Practice based learning	No	
7	19UC0009	ECOLOGY & ENVIRONMENT	2	0	0	0	0	NIL	EMPLOYABILITY	Practice based learning	No	
8	19UC0008	INDIAN CONSTITUTION	2	0	0	0	0	NIL	ENTREPRENEURSHIP	Case Studies based learning	No	
9	19UC0007	INDIAN HERITAGE AND CULTURE	2	0	0	0	0	NIL	ENTREPRENEURSHIP	Case Studies based learning	No	

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10	19UC0010	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS	2	0	0	0	0	NIL	ENTREPRENEURSHIP	Case Studies based learning	No	
11	19UC0011	ENTREPRENEURSHIP	2	0	0	0	0	NIL	ENTREPRENEURSHIP	Case Studies based learning	No	
12	19GN1101	COUNSELLING	0	0	0	4	0	NIL	EMPLOYABILITY	Practice based learning	No	
Total Credits			12									
II			BASIC SCIENCES									
1	19MT1101	MATHEMATICS FOR COMPUTING	3	1	0	4	5	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
2	19MT2102	MATHEMATICS FOR ENGINEERS	3	0	0	0	3	NIL	EMPLOYABILITY	Practice based learning	No	
3	19BT1001	BIOLOGY FOR ENGINEERS	2	0	0	0	2	NIL	EMPLOYABILITY	Practice based learning	No	
			SCIENCE ELECTIVE - 1									
1	19PH1008	PHYSICS FOR ELECTRONICS ENGINEERING	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
2	19PH1004	SOLID STATE PHYSICS	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
3	19PH2101	QUANTUM MECHANICS FOR ENGINEERS	3	1	0	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
			SCIENCE ELECTIVE - 2									
1	19CY1101	ENGINEERING CHEMISTRY	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
2	19CY1002	CHEMISTRY & BIOINFORMATICS FOR ENGINEERS	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
3	19CY1004	ORGANIC ELECTRONICS	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
Total Credits			18									
III			ENGINEERING SCIENCES									

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1	19SC1101	PROBLEM SOLVING AND COMPUTER PROGRAMMING	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
2	19SC1202	DATA STRUCTURES	3	0	2	3	4.75	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
3	19ME1103	DESIGN TOOLS WORKSHOP - I	0	0	4	0	2	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
4	19SC1209	DESIGN TOOLS WORKSHOP - II	0	0	4	0	2	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
5	19SC1106	TECHNICAL SKILLS-1(CODING)	0	0	0	6	1.5	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
6	19SC1203	OBJECT ORIENTED PROGRAMMING	3	0	2	3	4.75	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
7	19EC1101	DIGITAL LOGIC & PROCESSORS	3	0	2	0	4	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
8	19EC1213	BASIC ELECTONICS CIRCUITS	3	0	0	0	3	NIL	EMPLOYABILITY	Practice based learning		
9	19EC2111	ELECTRONIC WORKSHOP-II (ELECTRONIC SYSTEM DESIGN WORKSHOP)	1	0	2	2	2.5	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	Yes	
10	19EC2214	ELECTRONIC WORKSHOP-III (IOT APPLICATIONS)	1	0	0	4	2	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	No	
11	19EC2112	IT WORKSHOP-I (HTML, XML, WEB DESIGN)	1	0	2	0	2	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	Yes	
Total Credits							32.5					

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PROFESSIONAL CORE COURSES												
1	19EC1202	COMPUTER ORGANIZATION & ARCHITECTURE	2	0	0	0	2	19EC1101	EMPLOYABILITY	Practice based learning	No	
2	19EC2103	ANALOG ELECTRONIC CIRCUIT DESIGN	3	0	2	2	4.5	NIL	SKILL DEVELOPMENT	Practice based learning, Problem Solving	YES	
3	19EC2104	COMMUNICATION SIGNALS & SYSTEM DESIGN	3	1	0	0	4	NIL	EMPLOYABILITY	Practice based learning	Yes	
4	19EC2105	ANALOG AND DIGITAL COMMUNICATION	3	0	3	0	4.5	NIL	EMPLOYABILITY	Practice based learning	YES	
5	19EC2106	EMBEDDED CONTROLLERS	2	0	3	2	4	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Practice based learning, Problem Solving	Yes	
6	19EC2207	ELECTROMAGNETIC FIELDS & APPLICATIONS	3	1	0	0	4	NIL	SKILL DEVELOPMENT	Practice based learning, Problem Solving	Yes	
7	19EC2208	DIGITAL SIGNAL PROCESSING	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	No	
8	19EC2209	STATISTICS, AI & ANN-Basic Course	3	0	0	2	3.5	NIL	EMPLOYABILITY / SKILL DEVELOPMENT	Case Studies based learning	No	
9	19EC2210	DATA NETWORKS AND PROTOCOLS	3	0	2	0	4	NIL	EMPLOYABILITY	Practice based learning	Yes	
10	19EC2223	INTRODUCTION TO AI & ANN TOOLS AND APPLICATIONS	3	0	0	0	3	NIL	EMPLOYABILITY	Practice based learning	Yes	
Total Credits							34.5					
SKILLING COURSES												
1	19TS4001	SKILLING FOR ENGINEERS-1	0	0	0	4	1	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
2	19TS4002	SKILLING FOR ENGINEERS-2	0	0	0	4	1	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
3	19TS4003	SKILLING FOR ENGINEERS-3	0	0	0	4	1	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	

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4	19TS4004	SKILLING FOR ENGINEERS-4	0	0	0	4	1	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
5	19TS4005	TECHNICAL PROFICIENCY & TRAINING-1	0	0	0	4	1	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
6	19TS4006	TECHNICAL PROFICIENCY & TRAINING-2	0	0	0	4	1	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
Total Credits							6					
TERM PAPER & PROJECT												
1	19IE2246	INDUSTRIAL TRAINING	0	0	4	0	2	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
2	19IE3247	TERM PAPER	0	0	4	0	2	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
3	19IE4048	PROJECT (PART I)	0	0	0	24	6	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
4	19IE4049	PROJECT (PART II)	0	0	0	24	6	NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
5	19IE4050	PRACTICE SCHOOL	0	0	0	24		NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
6	19IE4051	INTERNSHIP	0	0	0	24		NIL	SKILL DEVELOPMENT	Case Studies based learning	No	
Total Credits							16					
FLEXI-CORE												
1	FC-1	FLEXI-CORE-1	3	0	2	0	4		EMPLOYABILITY	Practice based learning	No	
2	FC-2	FLEXI-CORE-2	3	0	2	0	4		EMPLOYABILITY	Practice based learning	No	
3	FC-3	FLEXI-CORE-3	3	0	2	0	4		EMPLOYABILITY	Practice based learning	No	
Total Credits							12					
OPEN ELECTIVES												
1	OE-1	OPEN ELECTIVE-1	3	0	0	0	3	NIL	EMPLOYABILITY	Practice based learning	No	


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2	OE-2	OPEN ELECTIVE-2	3	0	0	0	3	NIL	EMPLOYABILITY	Practice based learning	No	
3	OE-3	OPEN ELECTIVE-3	3	0	0	0	3	NIL	EMPLOYABILITY	Practice based learning	No	
4	OE-4	MANAGEMENT ELECTIVE	3	0	0	0	3	NIL	ENTREPRENEURSHIP	Case Studies based learning	No	
5	OE-5	FOREIGN LANGAUGE ELECTIVE	2	0	0	0	2	NIL	EMPLOYABILITY	Practice based learning	No	
Total Credits							14					
PROFESSIONAL ELECTIVES												
1	PE-1	PROFESSIONAL ELECTIVE-1	3	0	0	2	3.5		EMPLOYABILITY	Practice based learning	No	
2	PE-2	PROFESSIONAL ELECTIVE-2	3	0	0	0	3		EMPLOYABILITY	Practice based learning	No	
3	PE-3	PROFESSIONAL ELECTIVE-3	3	0	0	0	3		EMPLOYABILITY	Practice based learning	No	
4	PE-4	PROFESSIONAL ELECTIVE-4	3	0	0	0	3		EMPLOYABILITY	Practice based learning	No	
5	PE-5	PROFESSIONAL ELECTIVE-5	3	0	0	0	3		EMPLOYABILITY	Practice based learning	No	
6	PE-6	PROFESSIONAL ELECTIVE-6	3	0	0	0	3		EMPLOYABILITY	Practice based learning	No	
Total Credits							18.5					
Grand Total Credits							163.5					

SNO	COURSE CODE	COURSE NAME	L	T	P	S	Cr	Pre requisites
FLEXI CORE								
1	19EC3015	VLSI DESIGN	3	0	2	0	4	NIL

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2	19EC3016	WIRELESS COMMUNICATIONS	3	0	2	0	4	NIL
3	19EC3017	RF SYSTEM DESIGN	3	0	2	0	4	NIL
4	19EC3018	BIOMEDICAL ELECTRONICS & IOT FOR HEALTHCARE	3	0	2	0	4	NIL
5	19EC3019	ELECTRONICS INSTRUMENTS & AUTOMATION	3	0	2	0	4	NIL
6	19EC3020	SYSTEM ENGINEERING, OPERATION RESEARCH & DESIGNING	3	0	2	0	4	NIL
7	19EC3021	ELECTRICAL TECHNOLOGIES & SOLAR POWER SYSTEMS	3	0	2	0	4	NIL
8	19EC3022	ADVANCE COURSE IN SOFT-COMPUTING (AI, ANN, FUZZY LOGIC & GENETIC ALGORITHMS)	3	0	2	0	4	NIL

LIST OF OPEN ELECTIVES

SNO	COURSE CODE	COURSE NAME	L	T	P	S	CREDITS	
1	19BT40A1	IPR & PATENT LAWS	3	0	0	0	3	NIL
2	19CE40A2	ENVIRONMENTAL POLLUTION CONTROL METHODS	3	0	0	0	3	NIL
3	19CE40A3	SOLID AND HAZARDOUS WASTE MANAGEMENT	3	0	0	0	3	NIL
4	19CE40A4	REMOTE SENSING & GIS	3	0	0	0	3	NIL
5	19CE40A5	DISASTER MANAGEMENT	3	0	0	0	3	NIL
6	19CS40A6	FUNDAMENTALS OF DBMS	3	0	0	0	3	NIL
7	19CS40A7	FUNDAMENTALS OF SOFTWARE ENGINEERING	3	0	0	0	3	NIL
8	19CS40A8	FUNDAMENTALS OF INFORMATION TECHNOLOGY	3	0	0	0	3	NIL
9	19EC40A9	IMAGE PROCESSING	3	0	0	0	3	NIL
10	19EM40B1	LINUX PROGRAMMING	3	0	0	0	3	NIL
11	19EM40B2	E-COMMERCE	3	0	0	0	3	NIL
12	19EE40B3	RENEWABLE ENERGY SOURCES	3	0	0	0	3	NIL

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13	19ME40B4	ROBOTICS	3	0	0	0	3	NIL
14	19ME40B5	MECHATRONICS	3	0	0	0	3	NIL
15	19ME40B6	OPERATIONS RESEARCH	3	0	0	0	3	NIL
16	19PH40B7	NANO MATERIALS & TECHNOLOGY	3	0	0	0	3	NIL
17	19PE40B8	SUBSEA ENGINEERING	3	0	0	0	3	NIL
18	19PE40B9	OIL AND GAS MANAGEMENT	3	0	0	0	3	NIL
19	19GN40C1	SELF-DEVELOPMENT	3	0	0	0	3	NIL
20	19GN40C2	INDIAN CULTURE AND HISTORY	3	0	0	0	3	NIL
21	19GN40C3	EMOTIONAL INTELLIGENCE	3	0	0	0	3	NIL
22	19GN40C4	PROFESSIONAL ETHICS AND VALUES	3	0	0	0	3	NIL
23	19GN40C5	BEHAVIOURAL SCIENCES	3	0	0	0	3	NIL
24	19GN40C6	GENDER SENSITIZATION	3	0	0	0	3	NIL

LIST OF MANAGEMENT ELECTIVES							
SNO	COURSE CODE	COURSE NAME	L	T	P	S	CREDITS
1	19MB4051	PARADIGMS IN MANAGEMENT THOUGHT	3	0	0	0	3
2	19MB4052	INDIAN ECONOMY	3	0	0	0	3
3	19MB4053	MANAGING PERSONAL FINANCES	3	0	0	0	3
4	19MB4054	BASICS OF MARKETING FOR ENGINEERS	3	0	0	0	3
5	19MB4055	ORGANIZATION MANAGEMENT	3	0	0	0	3
6	19MB4056	RESOURCES SAFETY AND QUALITY MANAGEMENT	3	0	0	0	3

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7	19MB4057	ECONOMICS FOR ENGINEERS	3	0	0	0	3	NIL
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LIST OF FOREIGN LANGUAGES

SNO	COURSE CODE	COURSE NAME	L	T	P	S	CREDITS	
1	19GN3051	ARABIC LANGUAGE	3	0	0	0	3	NIL
2	19GN3052	BENGALI LANGUAGE	3	0	0	0	3	NIL
3	19GN3053	CHINESE LANGUAGE	3	0	0	0	3	NIL
4	19GN3054	FRENCH LANGUAGE	3	0	0	0	3	NIL
5	19GN3055	GERMAN LANGUAGE	3	0	0	0	3	NIL
6	19GN3056	HINDI LANGUAGE	3	0	0	0	3	NIL
7	19GN3057	ITALIAN LANGUAGE	3	0	0	0	3	NIL
8	19GN3058	JAPANESE LANGUAGE	3	0	0	0	3	NIL
9	19GN3059	KANNADA LANGUAGE	3	0	0	0	3	NIL
10	19GN3060	RUSSIAN LANGUAGE	3	0	0	0	3	NIL
11	19GN3061	SIMHALI LANGUAGE	3	0	0	0	3	NIL
12	19GN3062	SPANISH LANGUAGE	3	0	0	0	3	NIL

SNO	COURSE CODE	COURSE NAME	L	T	P	S	Cr	Pre requisites
LIST OF PROFESSIONAL ELECTIVES								
IOTs & Smart Cities								
1	19EC3051	Wireless sensor Networks & IOT Applications	3	0	0	0	3	NIL
2	19EC3052	Solar Photo-Voltaic cells & Solar Power Arrays	3	0	0	0	3	NIL
3	19EC3053	Electronic Systems for Renewable Energy & Smart Grid	3	0	0	0	3	NIL

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4	19EC3054	IOT Applications & Smart Cities	3	0	0	0	3	NIL
5	19EC3055	Systems for Smart Cities & Smart Villages	3	0	0	0	3	NIL
VLSI								
1	19EC3061	Low Power VLSI	3	0	0	0	3	NIL
2	19EC3062	Algorithms for VLSI Design Automation	3	0	0	0	3	NIL
3	19EC3063	ASIC & FPGA Chip Design	3	0	0	0	3	NIL
4	19EC3064	VLSI Sub-system Design and Design for Testability	3	0	0	0	3	NIL
5	19EC3065	Semiconductor Memories & MEMS	3	0	0	0	3	NIL
6	19EC3066	Analog & Digital IC Applications	3	0	0	0	3	NIL
Robotics & Automation								
1	19EC3071	Control Systems & Introduction to Robotics	3	0	0	0	3	NIL
2	19EC3072	Autonomous Vehicles & Automotive Electronics	3	0	0	0	3	NIL
3	19EC3073	Advanced Robotics	3	0	0	0	3	NIL
4	19EC3074	Computer Vision & Applications	3	0	0	0	3	NIL
5	19EC3075	Human Machine Interface & Brain Machine Interface	3	0	0	0	3	NIL
6	19EC3076	Designing Automation Systems & Assistive Robotic Systems	3	0	0	0	3	NIL
Signal Processing								
1	19EC3081	Speech Signal Processing	3	0	0	0	3	NIL
2	19EC3082	Digital Image Processing	3	0	0	0	3	NIL
3	19EC3083	Bio Medical Image Analysis	3	0	0	0	3	NIL
4	19EC3084	Statistical Signal Processing	3	0	0	0	3	NIL
5	19EC3085	Adaptive Signal Processing	3	0	0	0	3	NIL
6	19EC3086	Detection and Estimation of Signals	3	0	0	0	3	NIL
7	19EC3087	Bio Medical Signal Analysis	3	0	0	0	3	NIL
Wireless Communication								

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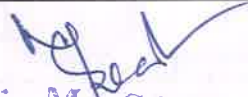
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1	19EC3091	Information Theory & Coding	3	0	0	0	3	NIL
2	19EC3092	4G Wireless Technologies & Cellular Communications	3	0	0	0	3	NIL
3	19EC3093	Satellite Communications	3	0	0	0	3	NIL
4	19EC3094	Optical Communication & Network	3	0	0	0	3	NIL
5	19EC3095	Next Generation Wireless Technologies (WCDMA, GPRS, GSM, UMTS)	3	0	0	0	3	NIL
Data Networks								
1	19EC4051	TCP/IP & Other Protocol Suite	3	0	0	0	3	NIL
2	19EC4052	VoIP Systems & Broad Band Networks	3	0	0	0	3	NIL
3	19EC4053	5G Mobile, Wireless Technologies & IEEE 802 Standards	3	0	0	0	3	NIL
4	19EC4054	Cloud-Computing & Network Security	3	0	0	0	3	NIL
5	19EC4055	IP Multimedia Sub-System & Emerging Technologies	3	0	0	0	3	NIL
RF & Microwave								
1	19EC4061	Microwave Engineering	3	0	0	0	3	NIL
2	19EC4062	Antenna Design & Wave Propagation	3	0	0	0	3	NIL
3	19EC4063	Radar Engineering & Navigational Aids	3	0	0	0	3	NIL
4	19EC4064	Modern Antennas, Millimetre Waves & Applications	3	0	0	0	3	NIL
5	19EC4065	Electronic Warfare, EMI & EMC	3	0	0	0	3	NIL
Data Computing								
1	19EC4071	Machine Learning	3	0	0	0	3	NIL
2	19EC4072	Data Sciences & Big-Data	3	0	0	0	3	NIL
3	19EC4073	Pattern Recognition	3	0	0	0	3	NIL
4	19EC4074	Block-Chain & Cyber Security	3	0	0	0	3	NIL
5	19EC4075	Video Surveillance	3	0	0	0	3	NIL
Biomedical Instrumentation								


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1	19EC4081	AUTOMATED VEHICLES & AVIONICS	3	0	0	0	3	NIL
2	19EC4082	Calibrations and Designing Advanced Instruments	3	0	0	0	3	NIL
3	19EC4083	Biological & Cyber-Physical Systems	3	0	0	0	3	NIL
4	19EC4084	Electronic Instruments & Biomedical Applications	3	0	0	0	3	NIL

Percentage of Syllabus Revision = $(10/68) * 100 = 14.70\%$

Percentage of Courses focusing on Employability = $(48/68) * 100 = 70.58\%$

Percentage of Courses focusing on Entrepreneurship = $(11/68) * 100 = 16.17\%$

Percentage of Courses focusing on Skill Development = $(26/68) * 100 = 38.23\%$


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Annexure IV

Certification Courses AY: 2019-20

S.No	Specialization	Course Name	Level	Year and Sem	Category
1	VLSI	NI CLAD	I	2 (2)	Employability / Career Advancement / Entrepreneurship
2	Robotics and Automation	ARC ROBOTICS	I	3 (1 & 2)	Employability / Career Advancement / Entrepreneurship
3	Embedded and IoT	CDAC - IOT TECHNOLOGIES	I	3 (1 & 2)	Employability / Career Advancement / Entrepreneurship
4	Embedded and IoT	EMBEDDED SYSTEM APPLICATION & IOT PROGRAMMING	I	3 (1 & 2)	Employability / Career Advancement / Entrepreneurship
5	Embedded and IoT	EMBEDDED SYSTEM APPLICATIONS & IOT CONCEPTS	II	3 (1 & 2)	Employability / Career Advancement / Entrepreneurship
6		FUNDAMENTALS OF UVM (UNIVERSAL VERIFICATION METHODOLOGY)	I	3 (1 & 2)	Employability / Career Advancement / Entrepreneurship
7	Computer, communication and 5G Technologies	HUAWEI CERTIFIED ICT ASSOCIATE ARTIFICIAL INTELLIGENCE (HCIA-AI)	I	3 (1 & 2)	Employability / Career Advancement / Entrepreneurship
8	Robotics and Automation	INDUSTRIAL ROBOTICS & AUTOMATION	I	3 (1 & 2)	Employability / Career Advancement / Entrepreneurship

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19	Computer Communication and 5G Technologies	Huawei Certified ICT Associate Routing and Switching (HCIA-R&S)	II	4 (1)	Employability / Career Advancement / Entrepreneurship
20	Computer Communication	HUAWEI CERTIFIED ICT CLOUD COMPUTING	II	4 (1)	Employability / Career Advancement / Entrepreneurship
21	All	PEGA	NA	4 (1)	Employability / Career Advancement / Entrepreneurship
22	All	SERVICE NOW	NA	4 (1)	Employability / Career Advancement / Entrepreneurship
23	VLSI	VLSI-ADVANCED DESIGN & VERIFICATION- SYSTEM VERILOG AND UVM	II	4 (1)	Employability / Career Advancement / Entrepreneurship
24	All	MICROSOFT - AZURE AI FUNDAMENTALS	I	4 (1)	Employability / Career Advancement / Entrepreneurship
25	All	MICROSOFT AZURE DATA FUNDAMENTALS	I	4 (1)	Employability / Career Advancement / Entrepreneurship
26	All	PCCET: PALO ALTO NETWORKS CERTIFIED CYBERSECURITY ENTRY-LEVEL TECHNICIAN	I	4 (1)	Employability / Career Advancement / Entrepreneurship
27	All	WTN	I	4 (1)	Employability / Career Advancement / Entrepreneurship


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Annexure V

M. Tech – VLSI Course Structure Y19 - Admitted Batch

First Year (First Semester):


S. No.	Course Code	Course Title	Periods				Credits
			L	T	P	S	
1	20 EC 5128	MOS Circuit Design	3	1	2	0	5
2	20 EC 5129	Analog IC Design & Design for Testability	2	2	2	0	5
3	20 EC 5130	ASIC & FPGA Design	3	0	2	0	4
4	20 EC 5131	IC Fabrication Technology	3	0	0	0	3
5		Elective – 1	3	0	0	0	3
6		Elective - 2	3	0	0	0	3
7	20 IE 5149	Seminar	0	0	4		2
8	20 TS 5101	Technical Skilling-I (HDL)	0	0	0	8	2
Total			17	3	10	8	27

First Year (Second Semester):

S. No.	Course Code	Course Title	Periods				Credits
			L	T	P	S	
1	20 EC 5232	RF IC Design & Introduction to mm RADAR	3	1	2	0	5
2	20 EC 5233	Low power VLSI System Design	3	0	2	0	4
3	20 EC 5234	Algorithm for VLSI Design Automation	3	1	2	0	5
4	20 EC 5235	Testing of VLSI Circuits	3	0	0	0	3
5		Elective – 3	3	0	0		3
6		Elective - 4	3	0	0		3
7	20 IE 5250	Term Paper	0	0	4	0	2
8	20 TS 5102	Technical Skilling-II (Design for Testability)	0	0	0	8	2
Total			18	2	10	8	27

Second Year (First & Second Semester):

S.No	Course code	Course Title	Periods				Credits
			L	T	P	S	
1	20 IE 6050	Dissertation	0	0	2	0	36
Total Program Credits							.90


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ELECTIVE COURSES

S.No	Course code	Course Title	Periods				Credits
			L	T	P	S	
Elective-1							
1	20 EC 51Q1	Embedded System Design	3	0	0	0	3
2	20 EC 51Q2	VLSI Signal Processing	3	0	0	0	3
3	20 EC 51Q3	CMOS Mixed Signal Circuits	3	0	0	0	3
4	20 EC 51Q4	Nano Electronics	3	0	0	0	3
5	20 EC 51Q5	CAD Tools for VLSI	3	0	0	0	3
Elective-2							
1	20 EC 51R1	Deep learning with Artificial Intelligence	3	0	0	0	3
2	20 EC 51R2	Bi-CMOS Technology & Applications	3	0	0	0	3
3	20 EC 51R3	Semiconductor Device Modeling	3	0	0	0	3
4	20 EC 51R4	Memory Design and Testing	3	0	0	0	3
5	20 EC 51R5	VLSI Circuits for Biomedical Applications	3	0	0	0	3
Elective-3							
1	20 EC 52S1	System on Chip Design	3	0	0	0	3
2	20 EC 52S2	VLSI Data Converters	3	0	0	0	3
3	20 EC 52S3	MEMS System Design	3	0	0	0	3
4	20 EC 52S4	VLSI for Wireless Communication	3	0	0	0	3
5	20 EC 52S5	Reconfigurable Computing	3	0	0	0	3
Elective-4							
1	20 EC 52T1	Optimization Techniques and Applications in VLSI Design	3	0	0	0	3
2	20 EC 52T1	Advanced Digital IC Design	3	0	0	0	3
3	20 EC 52T3	Network on Chip	3	0	0	0	3
4	20 EC 52T4	Cryptography and Network Security	3	0	0	0	3
5	20 EC 52T5	Advanced Computer Architecture Design	3	0	0	0	3


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Annexure VI

M. Tech. – R&C Course Structure Y19 Admitted Batch

First Year (First Semester):


S. No.	Course Code	Course Title	Periods				Credits
			L	T	P	S	
1	20 EC 5101	Modern Digital and Wireless Communication	3	1	2	0	5
2	20 EC 5102	Microwave and Millimetric wave Circuits	3	1	2	0	5
3	20 EC 5103	RADAR Engineering & mm Radar	3	0	0	0	3
4	20 EC 5104	RF System and Antenna Design	3	1	0	0	4
5		Elective - 1	3	0	0	0	3
6		Elective - 2	3	0	0	0	3
7	20 IE 5149	Seminar	0	0	4	0	2
8	20 TS 5101	Technical Skillling-I	0	0	0	8	2
Total			18	3	8	6	27

First Year (Second Semester):

S. No.	Course Code	Course Title	Periods				Credits
			L	T	P	S	
1	20 EC 5205	4G, 5G, and Modern Wireless Technologies	3	1	2	0	5
2	20 EC 5206	Advanced Communication Systems & Networks	3	1	0	0	4
3	20 EC 5207	Modern Radar Systems and Autonomous Vehicles	3	0	2	0	4
4	20 EC 5208	Optical Networks & Satellite Communications	3	0	0	0	3
5		Elective - 3	3	0	0	2	3.5
6		Elective - 4	3	0	0	2	3.5
7	20 IE 5250	Term Paper	0	0	4	0	2
8	20 TS 5102	Technical Skillling-II	0	0	0	8	2
Total			18	2	8	10	27

Second Year (First & Second Semester):

S.No	Course code	Course Title	Periods				Credits
			L	T	P	S	
1	20 TE 6050	Dissertation	0	0	0	0	36
Total Program Credits							90


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ELECTIVE COURSES

S.No	Course code	Course Title	Periods				Credits
			L	T	P	S	
Elective - 1							
1	20 EC 51A1	EMI/EMC & Electronic Warfare	3	0	0	0	3
2	20 EC 51A2	Microwave Semi-Conductor Devices	3	0	0	0	3
3	20 EC 51A3	Smart Antennas	3	0	0	0	3
4	20 EC 51A4	Embedded Systems & VLSI for Wireless Communication	3	0	0	0	3
Elective - 2							
1	20 EC 51B1	Phased Array Systems	3	0	0	0	3
2	20 EC 51B2	GPS & Global Navigation Satellite System	3	0	0	0	3
3	20 EC 51B3	Next Generation Networking & Communication Technologies	3	0	0	0	3
4	20 EC 51B4	Deep learning with Artificial Intelligence	3	0	0	0	3
Elective-3							
1	20 EC 52C1	Estimation & Detection Theory	3	0	0	0	3
2	20 EC 52C2	Radar Signal Processing & System	3	0	0	0	3
3	20 EC 52C3	High Performance Communication Networking	3	0	0	0	3
4	20 EC 52C4	Cryptography & Networking Security	3	0	0	0	3
Elective-4							
1	20 EC 52D1	Machine Learning & Soft Computing Applications in Communication	3	0	0	0	3
2	20 EC 52D2	Cloud Computing & Cyber Security	3	0	0	0	3
3	20 EC 52D3	Remote Sensing & Sensors	3	0	0	0	3
4	20 EC 52D4	Automotive Electronics & Avionics	3	0	0	0	3


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VII. Syllabus New / Revision

1. Program structure (with all Courses) containing the following categorization

Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requisite	New / Revised / Retained	Stakeholder Category	Justification for considering the feedback
19EC2104	COMMUNICATION SIGNALS & SYSTEM DESIGN	Practice based learning	3	1	0	0	4	NIL	Revised	Mr. Srinivas Vedala, Apple Inc., Bengaluru	Rapid advancements in communication technologies may necessitate updates to the syllabus to ensure that students are exposed to the latest industry-relevant knowledge and skills.
19EC2111	ELECTRONIC WORKSHOP-II (ELECTRONIC SYSTEM DESIGN WORKSHOP)	Practice based learning, Problem Solving	1	0	2	2	2.5	NIL	Revised	Vamsi.Ch Third Leap Hyderabad (Alumni)	Regularly reviewing and updating the content ensures that students are equipped with skills and knowledge that are directly applicable in the workplace. This can involve incorporating industry-standard software, hardware, and methodologies into the curriculum.
19EC2112	IT WORKSHOP (HTML, XML, WEB DESIGN)	Practice based learning, Problem Solving	1	0	2	0	2	NIL	Revised	Dr. Satya Srinivasa Babu Patcha Emp ID - 6303, Professor KLEF, Vijayawada	The field of web development is dynamic, with continuous advancements in technologies, frameworks, and tools. Updating the syllabus allows students to learn the latest techniques, libraries, and best practices, ensuring they are well-prepared for the current industry standards.
19EC3018	BIOMEDICAL ELECTRONICS & IOT FOR HEALTHCARE	Practice based learning	3	0	2	0	4	NIL	New	Dr. G. V. Subba Rao, Professor, KLEF, Vijayawada	The global healthcare landscape faces new challenges, and technology is often a key solution. Modifying the syllabus allows educators to address emerging health issues and equip students with the knowledge and skills needed to contribute to solving current and future healthcare challenges through biomedical electronics and IoT solutions.
19EC3095	NEXT GENERATION WIRELESS TECHNOLOGIES	Practice based learning	3	0	0	0	3	NIL	New	Mr. R Nagesh, Associate Director, CDAC, Bengaluru	The field of wireless communications is continually evolving with the introduction of new standards and technologies. Regularly updating the syllabus ensures that students are exposed to the latest developments in wireless

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19EC4051	TCP/IP & OTHER PROTOCOL SUITE	Practice based learning	3	0	0	0	3	NIL	Revised	K Hari Krishna 180040621, Student, KLEF, Vijayawada	With the increasing prevalence of cloud computing, modifications to the syllabus may be necessary to incorporate topics related to cloud networking, virtualization, and cloud-based communication protocols. This ensures that students are familiar with the latest trends in network architecture.
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19EC3018 – Biomedical Electronics & IOT for Healthcare

Course code: 19EC3018

L-T-P-S: 3-0-2-0

Pre-requisites : NIL

Credits: 4

Mapping of Course Outcomes to Program outcomes:

CO#	Course Outcome	PO/PSO	BTL
CO1	Apply the bio- signal characteristics, measure the electrical activity of heart, brain, muscles and determine the non-electrical parameters.	1,2	2
CO2	Demonstrate the working and significance of Medical Instruments in health care applications.	1,2	2
CO3	Analyze various IOT sensors for healthcare as a next generation boon for Electronics.	1,2	1
CO4	Analyze the various IOT health care monitoring devices.	2,4	2
CO5	Design, simulate and test bio signal characteristics and IoT applications for health care.	3,4	2

Syllabus

Bio potential recordings and measurements: The origin of Bio-potentials, bio-potential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics, Non electric parameter measurements, pH, PO₂, PCO₂, colorimeter, Auto analyser, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood Cell Counters.


Medical Instrumentations: Cardiac pacemakers, DC Defibrillator, Dialyser, Heart lung machine, Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radio-pill, electrical safety, Recent Trends in Medical Instrumentations, Thermograph, endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine

IOT for Healthcare: Internet of Things Promises–Definition–Scope–Sensors for IoT Applications–Structure of IoT– IoT Map Device, Industrial/Healthcare sensors – Description & Characteristics–First Generation – Description & Characteristics–Advanced Generation – Description & Characteristics–Integrated IoT Sensors – Description & Characteristics– Polytronics Systems – Description & Characteristics–Sensors' Swarm – Description & Characteristics–Printed Electronics – Description & Characteristics–IoT Generation Roadmap

Application of IOT In Healthcare: smart-wearables, smart-clothing, elderly fall-detection, infant care system, Monitor an aging family member, Scalable, continuous, heart rate monitoring

Text Books

1. Hemalatha Rengasmy & Jeganathan, "Biomedical Techniques and IoT Applications in Health Care", LAP LAMBERT Academic Publishing, 2019.


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Web References

- 1 <https://www.udemy.com/course/iot-based-emergency-health-care-system/>
- 2 https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105195/lec51.pdf
- 3 <https://www.youtube.com/watch?v=OOCHWFc-gO8>
- 4 https://www.youtube.com/watch?v=thCFMeB8pHM&list=PLKcIQ_UFkrd7zbPHRkDpB7i113wDG_Rb3
- 5 <https://www.youtube.com/watch?v=dSRWgyXzZeA>
- 6 <https://www.youtube.com/watch?v=8qgWwLc4e44>


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Next Generation Wireless Technologies (WCDMA, GPRS, GSM, UMTS)

Course code: 19EC3095

L-T-P-S: 3-0-0-0

Pre-requisites : NIL

Credits : 3

Mapping of Course Outcomes to Program outcomes:

CO#	Course Outcome	PO/PSO	BTL
CO1	Apply wireless communication techniques to analyze 5G New Radio	1,2/1	3
CO2	Apply Massive MIMO for 5G and Beyond 5G	1,2/1	3
CO3	Analysis of Millimeter wave Communications	1/1	4
CO4	Design and Evaluate Vehicular Communications and other Advanced Topics	1,2/1	1

Syllabus:

5G New Radio: Historical Trends in Wireless Communications, 1G, 2G, 3G, 4G, Evolution of LTE to Beyond 4G, Introduction to 5G-NR, 5G Road map, Pillars of 5G, 5G use cases-eMMB, mMTC, URLLC, Spectrum of 5G mobile systems, Frequency bands for new radio, New Multicarrier Modulation schemes, (FBMC, GFBM, BFDm, UFMc, and TFP), Waveform Pulses – RRC pulse, PHYDYAS pulse, DC pulse.

Massive MIMO for 5G and Beyond 5G: Introduction to MIMO, Massive MIMO theory- (Downlink, Linear pre-coding schemes, Uplink, Linear detection schemes, Channel estimation), Massive MIMO channels- (Existing conventional MIMO models, Necessary model extensions, MIMO extension of the COST2100 channel model), Beyond 5G-Non orthogonal multiple access (NOMA), Machine type communications, Device to device communications.,

Millimetre wave Communications: Millimetre wave characteristics, Development of millimetre wave standards, Modulations of millimetre wave communications-(OOK, PSK, FSK), Millimetre wave link budget, Transceiver Architecture, Millimetre wave antennas- Path Loss, Antenna directivity and Antenna beam width, Advanced diversity over MIMO channels for millimetre wave systems-(Spatial and Temporal diversity, Spatial and Frequency diversity), Preamble design.


Vehicular Communications and other Advanced Topics: Introduction to Vehicular communication, Applications of Vehicular communications- (Safety, Resource efficiency, Infotainment), Communication Regimes- (Bi-directional, position based, Multi hop position based), Architectures for intelligent vehicles- (protocol architectures in communications, architectures for platoon, architectures for sensors)

Overview of Cognitive Radio technology in 5G wireless networks, Spectrum optimization using Cognitive Radio, Dynamic spectrum access, Cognitive Radio and Carrier Aggregation, Key requirements and challenges for 5G 10Cognitive terminals.

RAN architectures for GSM/GPRS, EDGE, UMTS

Text Books

1. 5G NR: The Next Generation Wireless Access Technology, Erik Dahlman, Stefan Parkvall and Johan Skold, Academic Press, 1 edition (17 August 2018).
2. Fundamentals of 5G Mobile Networks, Jonathan Rodriguez Wiley, 1 edition (27 April 2015).


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Reference text books

- 1 Signal Processing for 5G: Algorithms and Implementations, Fa-Long Luo and Charlie Jianzhong Zhang, Wiley-Blackwell, 1 edition (14 October 2016).
- 2 A Comprehensive Survey of RAN Architectures Toward 5G Mobile Communication System, Mohammad Asif Habibi, Meysam Nasimi, Bin Han, May 28, 2019, date of current version June 11, 2019.
- 3 Emerging wireless lans, wireless pans, and wireless mans, yang xiao yi pan, a john wiley & sons, inc., publication, 2009
- 4 Wireless communication standards, Todor cooklev, IEEE press,2004

Web References

- 1 Vehicular 2xcommunications, Radu Popescu Zeletin, iljaradusch, Mihai Adrial, Springer Verlag Berlin and Heidelberg GmbH & Co.KG

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Annexure VIII.

Course wise Syllabus revision of approved structure as mentioned in point 1(Program structure (with all Courses) containing following categorization).

Course Code	Course Name	Course Category	Existing Syllabus	New Syllabus	Topics Added / Removed / Replaced	Change in Outcome	Justification for the Modification	*Overall Revision Percentage
19EC2104	Communication Signals & System Design	Core	<p>Gist: (a) Basic: LTI, Convolution, correlation, Laplace T. (b) Fourier Transform, Hilbert Transform (c) Sampling, Quantization and Reconstruction, Z-transform (d) ARMA model, poles, zero's, DTFT.</p> <p>Syllabus: Basics of Analog Signals and Systems: World view of signals, Classification of signals, Mathematical representation of classifications, Basic signals, Operations on signals, Build complex signals from basic signals, Correlation. Introduction to Systems concept, Properties of systems, LTI system, impulse response,</p>	<p>Gist: (a) Basic: LTI, Convolution, correlation, Laplace T. (b) Fourier Transform, Hilbert Transform (c) Sampling, Quantization and Reconstruction, Z-transform (d) ARMA model, poles, zero's, DTFT.</p> <p>Syllabus: Basics of Analog Signals and Systems: World view of signals, Classification of signals, Mathematical representation of classifications, Basic signals, Operations on signals, Build complex signals from basic signals, Correlation. Introduction to Systems concept, Properties of systems, LTI system, impulse response,</p>	<p>ARMA model, DFT of standard sequences-Graph, magnitude and phase spectrum, Properties.</p>	CO4 is modified	Professional core course helps better employment and skill development	25 %

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		convolution, Properties of LTI system.	convolution, Properties of LTI system.			
		<p>Signal Transformations and Translations: Laplace Integral, LT of basic signals, Inverse Transfer function, Transfer function of LTI system, ROC. Fourier Integral, FT of basic signals, from F.S to F.T, Properties of FT, Frequency translation, Dirichlet conditions, Parseval's theorem, Frequency response. Power spectrum-Graph. Hilbert integral, applications. Weiner-Khinchin Theorem (optionally).</p> <p>Analog to Discrete World: Basics of Sampling-Graphical, Nyquist-Shannon Theorem, Graphical proof for band limited signals, Band pass sampling, Reconstruction of signal from its samples, effect of under sampling - Aliasing, Quantization and</p>	<p>Signal Transformations and Translations: Laplace Integral, LT of basic signals, Inverse Transfer function, Transfer function of LTI system, ROC. Fourier Integral, FT of basic signals, from F.S to F.T, Properties of FT, Frequency translation, Dirichlet conditions, Parseval's theorem, Frequency response. Power spectrum-Graph. Hilbert integral, applications. Weiner-Khinchin Theorem (optionally).</p> <p>Analog to Discrete World: Basics of Sampling-Graphical, Nyquist-Shannon Theorem, Graphical proof for band limited signals, Band pass sampling, Reconstruction of signal from its samples, effect of</p>			

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		<p>Quantization error. Cauchy Integral theorem (optionally), Z-Transform and its ROC, Inverse Z-Transform, Properties.</p> <p>Systems Design and Analysis: Poles & Zeros, Stability, DTFT, Analysis and synthesis, Differences between FT, DTFT, DFT - Graphically. DTFT of standard sequences.</p>	<p>under sampling – Aliasing, Quantization and Quantization error. Cauchy Integral theorem (optionally), Z-Transform and its ROC, Inverse Z-Transform, Properties.</p> <p>Systems Design and Analysis: ARMA model, Poles & Zeros, Stability, DTFT, Analysis and synthesis, Differences between FT, DTFT, DFT - Graphically. DTFT of standard sequences. DFT of standard sequences- Graph, magnitude and phase spectrum, Properties.</p>			
<p>Electronic Workshop-II (Electronic System Design Workshop)</p> <p>19EC2111</p>	<p>Basic engineering course</p>	<p>Design Process and Its Fundamentals; Product Life Cycle, Electrical/RF safety; Technical Drawings, Circuit Diagrams; Electronic Systems and Classifications: Examples and case studies; Heat Management and Cooling</p>	<p>Design Process and Its Fundamentals; Product Life Cycle, Electrical/RF safety; Technical Drawings, Circuit Diagrams; Electronic Systems and Classifications: Examples and case studies; Heat Management and Cooling</p>	<p>Data Generators Applications and Product making, Circuit testing, Packaging, manufacturing, and recycling, and Environmental Compliance.</p>	<p>CO4 is modified</p>	<p>Basic engineering course helps better employment and skill development</p> <p>25%</p>

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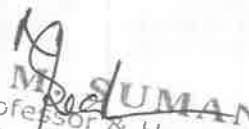
		<p>by using Heat Sinks, Soldering Techniques. PCB Making: PCB Artwork using PC software, Design and of Multilayer PCBs, SMDs and mounting techniques. Protection: Grounding, shielding; Balancing and Filtering; EMI / EMC/ ESD Protections; Cabling and Connectors; Panel Layout Ergonomics. Introduction to Raspberry Pi microcontroller board, developing applications using Raspberry Pi microcontroller board Electronic System Design implementations analog, digital (TTL/ CMOS) and Microcontroller systems; Opto isolators, Relays and Displays, A to D and D to A converters, RAM Data Storage and retrieval, Design for: Low noise, EMI/EMC compatibility, High frequency designs, PTH, CAD Packages</p>	<p>by using Heat Sinks, Soldering Techniques. PCB Making: PCB Artwork using PC software, Design and of Multilayer PCBs, SMDs and mounting techniques. Protection: Grounding, shielding; Balancing and Filtering; EMI / EMC/ ESD Protections; Cabling and Connectors; Panel Layout Ergonomics. Introduction to Raspberry Pi microcontroller board, developing applications using Raspberry Pi microcontroller board Electronic System Design implementations analog, digital (TTL/ CMOS) and Microcontroller systems; Opto isolators, Relays and Displays, A to D and D to A converters, RAM Data Storage and retrieval, Data Generators Applications and Product making, testing, Packaging, manufacturing, recycling and Environmental</p>			
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				Compliance, Design for: Low noise, EMI/EMC compatibility, High frequency designs, PTH, CAD Packages.				
19EC2112	IT Workshop (HTML, XML, WEB DESIGN)	Basic engineering course	Develop Home Page – HTML/ XML – Word Press – Arduino Interfacing – Mobile for Android Phone – Raspberry Pi API basics – Raspberry pi Interfacing – Mobile Apps, Development using Raspberry pi – Project Development.	Gist: HTML, XML, Web Design and App development Develop Home Page – HTML/ XML – Word Press – Arduino Interfacing – Mobile for Android Phone – Raspberry Pi API basics – Raspberry pi Interfacing – Mobile Apps, Development using Raspberry pi – Project Development.	Gist: HTML, XML, Web Design and App development	CO 1 is modified	Basic engineering core course helps better employment and skill development	25 %
19EC3020	System Engineering, Operation Research & Designing	Flexi core	Introduction to system Design: Systems Engineering – Basic Definitions - System Life cycles -Phases-Steps, Formulation of Issues: Problem Identification – Scoping – Bounding, Problem definition – Identification of needs.	Introduction to system Design: Systems Engineering – Basic Definitions - System Life cycles -Phases-Steps, Formulation of Issues: Problem Identification – Scoping – Bounding, Problem definition – Identification of needs,	Design Thinking of product interfaces and user interface, integration of small, medium, large-scale UI & UX project development training module. Web design-based UI	CO 4 is modified	Flexi core course helps better employment and skill development	25 %


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		<p>alterable, constraints; Value System Design: Objectives and objective measures; Functional decomposition and analysis Tools: Objectives hierarchies – trees, cross interaction matrix; Functional analysis approaches – Node tree, Context diagram, system decomposition; Decision Making : Types of decisions – descriptive, prescriptive, normative; Decision assessment efforts types – under certainty, probabilistic uncertainty Basics of Operation Research: Introduction to Operation Research; operations Research Models; Characteristics of operations research; Structure of the Mathematical Model, Limitations of Operations Research; Solving the OR Model; Queuing and Simulation Models,</p>	<p>alterable, constraints; Value System Design: Objectives and objective measures; Functional decomposition and analysis Tools: Objectives hierarchies – trees, cross interaction matrix; Functional analysis approaches – Node tree, Context diagram, system decomposition; Decision Making : Types of decisions – descriptive, prescriptive, normative; Decision assessment efforts types – under certainty, probabilistic uncertainty Basics of Operation Research: Introduction to Operation Research; operations Research Models; Characteristics of operations research; Structure of the Mathematical Model, Limitations of Operations Research; Solving the OR Model; Queuing and Simulation Models,</p>				
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			<p>objective of operations research; Introduction to Foundation mathematics and statistics Linear Programming (LP), LP and allocation of resources, LP definition, Linearity requirement; Objective Functions; Costs; Constraints;</p> <p>Finite Queuing Models: Introduction, Finite Queuing Models; Project Scheduling and PERT-CPM: Introduction, Basic Difference between PERT and CPM, PERT/CPM Network Components and Precedence Relationship, Project Management – PERT; Game Theory: Introduction, Competitive Situations, Characteristics of Competitive Games, Maximin – Minimax Principle, Dominance; Models and Modelling in Operations Research, Advantages and</p>	<p>objective of operations research; Introduction to Foundation mathematics and statistics Linear Programming (LP), LP and allocation of resources, LP definition, Linearity requirement; Objective Functions; Costs; Constraints;</p> <p>Finite Queuing Models: Introduction, Finite Queuing Models; Project Scheduling and PERT-CPM: Introduction, Basic Difference between PERT and CPM, PERT/CPM Network Components and Precedence Relationship, Project Management – PERT; Game Theory: Introduction, Competitive Situations, Characteristics of Competitive Games, Maximin – Minimax Principle, Dominance; Models and Modelling in Operations Research, Advantages and</p>				
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		<p>Applications of Optimization Models.</p> <p>Design objectives: introduction to Design Objectives(DO); types of Design Objectives, operation of product & Services, user interfaces, visual& sensory, technology, environment, design considerations, lightness, design constraints, design to cost, Design-to-value vs Design to Cost; design to value; Strategic Research Agenda (SRA) in Industry, Market forces SRA, Product design strategies: survey, envision, develop, deliver; PDS tactics Discover, Design, Build, And Launch, ATP (Available to Promise) ATP</p> <p>User Interface (UI), User Experience (UE) & Product Design: Definition, principles, and practice of User Interface</p>	<p>Applications of Optimization Models.</p> <p>Design objectives: introduction to Design Objectives(DO); types of Design Objectives, operation of product & Services, user interfaces, visual& sensory, technology, environment, design considerations, lightness, design constraints, design to cost, Design-to-value vs Design to Cost; design to value; Strategic Research Agenda (SRA) in Industry, Market forces SRA, Product design strategies: survey, envision, develop, deliver; PDS tactics Discover, Design, Build, And Launch, ATP (Available to Promise) ATP</p> <p>User Interface (UI), User Experience (UE) & Product Design: Definition, principles, and</p>				
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			(UI) / User Experience (UX); Elements of User Experience Design. Designing parameters of User Experience (UX), lifecycle of design—the process, purpose, and tools, architectural operations on (UX), human centered design, product design, UI/UX design, Usability Test process of UI & UX, Product Designer (PD): Evolution of UI/UX Designers into Product Designers, product design and development of UI and UX.	practice of User Interface (UI) / User Experience (UX); Elements of User Experience Design. Designing parameters of User Experience (UX), lifecycle of design—the process, purpose, and tools, architectural operations on (UX), human centered design, product design, UI/UX design, Usability Test process of UI & UX, Product Designer (PD): Evolution of UI/UX Designers into Product Designers, product design and development of UI and UX. Design Thinking of product interfaces, user interface and integration of small, medium, large scale UI & UX project development training module. Web design-based UI					
19EC3022	Advance Course in Soft-Computing (AI,	Flexi core	(i) Advanced topics in AI BFS, DFS Search Techs	(i) Advanced topics in AI BFS, DFS Search Techs	Intro to Computing Methods:	Other	CO4 is modified	Flexi core course helps better	25 %

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	<p>ANN, Fuzzy Logic & Genetic Algorithms)</p>	<p>(ii) Bayes Rule, Logic Progg, Knowledge Systems: Naive Bayes, Linear Regression, Logistic Regression, Objectives of KBS, Components, Categories, Knowledge Based System Architecture Advanced topics in ANN: Non-linear classification, Gradient Descent algorithm, Boltzmann Machine, Recurrent Networks, Associative memories, Hopfield networks Convolutional Neural Networks Deep Learning, Deep Neural NWs: Few Topics in ML: Curse of dimensionality, PCA, Linear Discrimant Analysis, extensions of LDA, clustering, k-Means algorithm, Expectation Maximization algorithm Method, Vector quantitization, suppot vector machine, variations in SVM, Gaussian Mixture</p>	<p>(ii) Bayes Rule, Logic Progg, Knowledge Systems: Naive Bayes, Linear Regression, Logistic Regression, Objectives of KBS, Components, Categories, Knowledge Based System Architecture Advanced topics in ANN: Non-linear classification, Gradient Descent algorithm, Boltzmann Machine, Recurrent Networks, Associative memories, Hopfield networks Convolutional Neural Networks Deep Learning, Deep Neural NWs: Few Topics in ML: Curse of dimensionality, PCA, Linear Discrimant Analysis, extensions of LDA, clustering, k-Means algorithm, Expectation Maximization algorithm Method, Vector quantitization, suppot</p>	<p>Adaptive Fuzzy Logic: Fuzzy logic and fuzzy sets; Membership functions, operations on fuzzy sets, types of fuzzy functions, Fuzzy relationships; Genetic Algorithms: Basic Operations of a Genetic algorithm, Genetic cycles</p>	<p>employment and skill development</p>	
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			models, applications of GMMs.	vector machine, variations in SVM, Gaussian Mixture models, applications of GMMs. Intro Other Computing Methods: Adaptive Fuzzy Logic; Fuzzy logic and fuzzy sets; Membership functions, operations on fuzzy sets, types of fuzzy functions, Fuzzy relationships; Genetic Algorithms: Basic Operations of a Genetic algorithm, Genetic cycles.				
19EC2223	Introduction to AI & ANN Tools and Applications	Flexi core	CO 1: Random Processes and Random Variables - Probability: Coin experiment, Ball experiment, Card experiment, Dice experiment; Combination, Permutation, Random Processes, and random variables; Introduction to Sequence of Coin tossing; Joint probability examples and Hidden Markov Model CO 2: Applications of AI & Tools - Introduction to MATLAB, Python, R tools	CO_1: Random Processes and Random Variables - Probability: Coin experiment, Ball experiment, Card experiment, Dice experiment; Combination, Permutation, Random Processes, and random variables; Introduction to Sequence of Coin tossing; Joint probability examples and Hidden Markov Model CO 2: Applications of AI & Tools - Introduction to MATLAB, Python, R tools	Hill Climbing, travelling salesman problem; Implementation of 2 class pattern recognition; Image using Neural networks; Introduction to CNN	CO4 is modified	Professional core course helps better employment and skill development	25 %

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		<p>for Statistical analysis; -AI for Statistical analysis; -AI Virtual Agents, AI Virtual Agents, AI Chatbots, AI for Chatbots, AI for Personalized Shopping Personalized Shopping Experience; -Artificial Experience; -Artificial Intelligence in Agriculture; Intelligence in Agriculture; - Introduction to 3rd party- Introduction to 3rd party AI tools AI tools CO 3: Basics of AI &ANN CO 3: Basics of AI &ANN -Introduction: Overview-Introduction: Overview and Historical Perspective, and Historical Perspective, Turing Test, Physical Turing Test, Physical Symbol Systems, and the Symbol Systems, and the scope of Symbolic AI. -scope of Symbolic AI. - State Space Search: Depth State Space Search: Depth First Search, Breadth First First Search, Breadth First Search, DFID -Overview of Search, DFID -Overview Artificial Neural Networks, of Artificial Neural Different Learning Networks, Different Methods, and Learning Methods, and Architectures. -Supervised Architectures. -Supervised and Un-supervised learning and Un-supervised concepts: Activation learning concepts: functions and its Activation functions and classification, Perceptron; its classification, Neural Network Perceptron; Neural Classifiers: Multi-Layer Network Classifiers: Feedforward Neural Multi-Layer Feedforward networks, Multi-Layer Neural networks, Multi- Feedback Neural Layer Feedback Neural Networks. Networks.</p>			
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(Signature)
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			CO 4: AI, ANN Models, Implementation and Case Studies -Implementation of AI: Programming implementation with Artificial Intelligence; - Implementation of Search techniques for pattern recognition.	CO 4: AI, ANN Models, Implementation and Case Studies -Implementation of AI: Programming implementation with Artificial Intelligence; - Implementation of Search techniques for pattern recognition; Hill Climbing, travelling salesman problem; Implementation of 2-class pattern recognition; Image recognition using Feedback Neural networks; Introduction to CNN					
	19EC4053	5G Mobile, Wireless Technologies & IEEE 802 Standards	Professional elective	5G Evaluation & Applications: MTC, D2D Communication, Multi-hop D2D, Multi-carrier D2D: Machine-type communications: Fundamental techniques for MTC – Massive MTC – Ultra-reliable low-latency MTC – Device-to-device (D2D) communications – multi-	5G Evaluation & Applications: MTC, D2D Communication, Multi-hop D2D, Multi-carrier D2D: Machine-type communications: Fundamental techniques for MTC – Massive MTC – Ultra-reliable low-latency MTC – Device-to-device (D2D) communications – multi-	802.15.4 (Zigbee), 802.16 (WiMax), BLE, 4G/5G: Frame Structures and applications.	CO4 is modified	Professional elective course helps better employment	25 %

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			hop D2D communications – multi-operator D2D communication – Simulation methodology: Evaluation methodology – Calibration – New challenges in the 5G modelling IEEE802Std: 802.11 (WiFi), 802.15.1 (Bluetooth).	hop D2D communications – multi-operator D2D communication – Simulation methodology: Evaluation methodology – Calibration – New challenges in the 5G modelling IEEE802Std: 802.11 (WiFi), 802.15.1 (Bluetooth), 802.15.4 (Zigbee), 802.16 (WiMax), BLE, 4G/5G: Frame Structures and applications.				
19EC4051	TCP/IP & Other Protocol Suite	Professional elective	Internet Address Architecture Basics: Architecture: Brief History, Protocols and Standards, Standard Organizations, Internet Standards, Internet Administration, Architectural Evolution of TCP/IP TCP/IP Protocol Suite: Comparisons between OSI/ISO & TCP/IP Protocol Suite, Layers in the TCP/IP Protocol Suite, Addressing: Physical,	Internet Address Architecture Basics: Architecture: Brief History, Protocols and Standards, Standard Organizations, Internet Standards, Internet Administration, Architectural Evolution of TCP/IP TCP/IP Protocol Suite: Comparisons between OSI/ISO & TCP/IP Protocol Suite, Layers in the TCP/IP Protocol Suite, Addressing: Physical,	EAP: Multicast Listener Discovery (MLD) and IGMP Windows Sockets. Position of UDP in the TCP/IP protocol suite, User Datagram format, Basics of IP Fragmentation, Reassemble Header Format of IP Fragmentation, TCP Segmentation, Difference Between IP Fragmentation and TCP Segmentation,	CO 4 is modified	Professional elective course helps better employment and skill development	25 %

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		<p>Logical, Port and Application Specific Address. IP Addressing: (IPv4 and IPv6): Class full, Classless, CIDR, Special and Network Address Translation (NAT) The Address Resolution Protocol ARP: Packet Formats, Encapsulation, Operation, Proxy ARP, ARP in LAN and WANATM ARP: ARP Package: Catch Table, Queues, Input Output Module, Multi-Protocol Over ATM (MPOA)</p> <p>System Configuration & Details</p> <p>DHCP Theory of Operation: Introduction, Operation, Allocation of DHCP: Remote, Automatic and Manual. DHCP Architecture: DHCP Client, Server, Relay Agent, Process, Designing of DHCP: Setting up DHCP In a Small Office, DHCP</p>	<p>Logical, Port and Application Specific Address. IP Addressing: (IPv4 and IPv6): Class full, Classless, CIDR, Special and Network Address Translation (NAT) The Address Resolution Protocol ARP: Packet Formats, Encapsulation, Operation, Proxy ARP, ARP in LAN and WANATM ARP: ARP Package: Catch Table, Queues, Input Output Module, Multi-Protocol Over ATM (MPOA)</p> <p>System Configuration & Details</p> <p>DHCP Theory of Operation: Introduction, Operation, Allocation of DHCP: Remote, Automatic and Manual. DHCP Architecture: DHCP Client, Server, Relay Agent, Process, Designing of DHCP: Setting up DHCP In a Small Office, DHCP</p>	<p>Extensible Authentication Protocol (EAP) standards and Mechanisms (IEEE 802.11, IEEE 802.1x)</p>		
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		<p>Auto-Configuration: DHCP Client, Server, Relay Agent, Process, Network Address Translation: Methods of Translation, NAT, NAT Traversal, Dynamic Network Address translation, NAT in IPv6, NAT in PIX, Google Cloud NAT Architectural View TCP: DNS, Connection Mgt, Time-out, Data Flow, Congestion Cont., TLS, DNSSEC, DKIM TCP: Principal, operational, Segment Structure of simplified TCP, TCP Connection Management: Connection Establishment, Transfer, Termination and Reset, Time out and Data flow (Error and Flow Control), Congestion control, (Congestion Control and avoidance algorithm (NEW Rano – RFC 6582)) DNS: Distribution of Name Space and Defined</p>	<p>Auto-Configuration: DHCP Client, Server, Relay Agent, Process, Network Address Translation: Methods of Translation, NAT, NAT Traversal, Dynamic Network Address translation, NAT in IPv6, NAT in PIX, Google Cloud NAT Architectural View TCP: DNS, Connection Mgt, Time-out, Data Flow, Congestion Cont., TLS, DNSSEC, DKIM TCP: Principal, operational, Segment Structure of simplified TCP, TCP Connection Management: Connection Establishment, Transfer, Termination and Reset, Time out and Data flow (Error and Flow Control), Congestion control, (Congestion Control and avoidance algorithm (NEW Rano – RFC 6582)) DNS: Distribution of Name Space and Defined</p>			
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		<p>Zones, DNS in Internet (Generic, Country and Reverse), Dynamic Domain Name System, DNS Security, TLS algorithm (Transport Layer)</p> <p>Advancement In Other Protocol Suites: ICMPv4/v6, IGMP, MLD, UDP, IP Fragmentation, IP Sec, EAP]</p> <p>ICMPv4/v6 : Datagram Structure of Internet Message Control Protocol V.4 (ICMPv4 & ICMP v6), Encapsulation in ICMPv4/v6, Common error messages in ICMPv4 Type 3 and ICMPv6 Type 1 Compare and contrast between ICMPv6 with ICMPv4.</p>	<p>Zones, DNS in Internet (Generic, Country and Reverse), Dynamic Domain Name System, DNS Security, TLS algorithm (Transport Layer)</p> <p>Advancement In Other Protocol Suites: ICMPv4/v6, IGMP, MLD, UDP, IP Fragmentation, IP Sec, EAP]</p> <p>ICMPv4/v6 : Datagram Structure of Internet Message Control Protocol V.4 (ICMPv4 & ICMP v6), Encapsulation in ICMPv4/v6, Common error messages in ICMPv4 Type 3 and ICMPv6 Type 1 Compare and contrast between ICMPv6 with ICMPv4. EAP: Multicast Listener Discovery (MLD) and IGMP Windows Sockets. Position of UDP in the TCP/IP protocol suite, User Datagram format, Basics of IP Fragmentation, Reassemble Header</p>				
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Tally
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			Format of IP Fragmentation, TCP Segmentation, Difference Between IP Fragmentation and TCP Segmentation, Extensible Authentication Protocol (EAP) standards and Mechanisms (IEEE 802.11, IEEE 802.1x)				
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