



## Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

Accredited by NAAC as 'A++' Approved by AICTE ISO 9001-2015 Certified

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

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### XXVII ACADEMIC COUNCIL-ANNEXURE 3.5

Date: 07/05/2019

#### DEPARTMENT OF BIOTECHNOLOGY MINUTES OF XXV BOARD OF STUDIES MEETING

The Department Board of Studies meeting was conducted on 07/05/2019 at C501 from 1:30 PM to 5:00 PM Chaired by Dr.K Giridhar, HoD-BT.

The following members were present for XXV BoS meeting

1. Dr.K Giridhar, Assoc. Professor, HoD-BT, Chairman
2. Dr.G Satyanaraya, Professor, IIT-Madras-External Member
3. Mr.Akshay Dedaniya, Sr.Scientist, Indushealthplus-Pune-External Member
4. Dr.Y Srinivasa Reddy, Director, Sajjala Biotech-External Member
5. Dr.V.Praveen Kumar, Assoc.Professor, Deputy HoD-Member
6. Dr.K.Shrinivaslu, Professor-Member
7. Dr.JayaKumar Singh, Professor-Member
8. Dr.BVLS Prasad, Professor-Member
9. Dr.M.Sudhamani, Assoc.Professor-Member
10. Dr.M.Maheswara Reddy, Asst.Professor-Member
11. Dr.G.Siva Reddy, Asst.Professor-Member
12. Dr.M S R Krishna, Asst.Professor-Member
13. Dr.Nadeem Siddiqui, Asst.Professor-Member
14. Dr.Sarada Prasanna Mallick, Asst.Professor-Member

#### Members Absent-NIL

Dr.K Giridhar, Chairman of BoS, initiated the meeting by welcoming and introducing the external members to the internal and special invite members and thanking them for accepting to become members of the Board of Studies. The chairman put forward the Agenda items before the Board of Studies meeting.

The following items of the agenda were placed for consideration before the Board of Studies in Biotechnology at its present meeting.

Head

Department of Biotechnology  
Koneru Lakshmaiah Education Foundation  
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VADESWAREM, Guntur Dt.



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### AGENDA and RESOLUTIONS

#### AGENDA ITEM-I

To consider and approve the curriculum for the 2019-20 admitted batch of B.Tech & M.Tech and the minor changes proposed in the curriculum of 2018-19 admitted batch of B.Tech as per the suggestions and feedback received from stakeholders discussed in DAC.	Approved and recommended to Academic Council
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**RESOLUTION:** The curriculum for 2019-20 B.Tech & M.Tech and the minor changes proposed in the curriculum of 2018-19 admitted batches have been approved by BoS members and recommended to the Academic council. Course structure of 2019-20 and 2018-19, batches have been furnished in **Annexure-I**.

#### AGENDA ITEM-II

To consider and approve the revisions proposed by the course coordinators in syllabus / Course Outcomes /experiments/teaching pedagogies for the courses to be offered in the 2019-2020 odd semesters.	Approved and recommended to Academic Council
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**RESOLUTION:** The revisions proposed by the course coordinators in syllabus/Course Outcomes /experiments / teaching pedagogies for the courses to be offered in 2018-19, 2019-20 admitted batches have been approved by BoS members and recommended to the Academic Council. Syllabi of 2019-20 and 2018-19 batches have been furnished in **Annexure: II**

#### AGENDA ITEM-III

To consider and approve the resolutions made by XXV DAC conducted on 29 <sup>th</sup> April 2019.	Approved and recommended to Academic Council
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**RESOLUTION:** The points discussed in the DAC meeting were approved by BoS members and recommended to the Academic Council. DAC minutes and proofs mentioned in **Annexure: III**.

  
Head 08/05/2019

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### AGENDA ITEM-IV

To approve the feedback from stakeholders regarding 2019-20 batch admitted students

Approved and recommended to Academic Council

### The following is the feedback given by stakeholders on curriculum

- ❖ Dr. Alok Kumar, Sanofi Biotech, Medchal, and Telangana, Suggested including Bernoulli's equation and applications of Laplace transforms in solving ordinary differential equations in the subject Mathematical methods. Upon discussion, the resolution was passed and recommended to academic council.
- ❖ Dr. Easwaran, Biocon Research Academy, Bangalore, Recommended to add design thinking and Innovation 1&2 courses for 2019-2020 curriculum. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Bhisham Narayan Singh, MAHE, Karnataka, Suggested incorporating Mathematics for computing in 2019-20 curriculum. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Mahesh Kumar Sah, NIT Jalandhar, Advised changing the title for the course Basic Mathematics to Mathematical methods. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Vijay Rajesh, NRI Medical College suggested including concepts such as the Latin square design chi-square test -goodness of fit and independence in the Biostatistics course. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Lakshmi Prasuna, NIT Bhopal, Advised to incorporate topics like molecules and material applications in engineering chemistry. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Siva Reddy, suggested including Mechanical properties of Engineering materials in Engineering physics. Upon discussion the resolution was passed and recommended for academic council.

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- ❖ Dr. Mahesh Reddy, M, Advised to add OOPS in the course curriculum for 2019-20. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Chandrasekhar Naidu, Advised to include thermodynamics of microbial growth in Biochemical thermodynamics. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Subhash Reddy, Suggested adding concepts such as material balances with recycle, bypass, and purge streams in PEP. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Naveen Reddy Recommended to add DNA Fingerprinting in TPT-2 (Bioprocessing). Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Himaja Choudhary, Suggested enriching the syllabus by industrial needs. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Bhagya Lakshmi, Recommended to alter the LTP structures for the courses like Indian Heritage & culture and Indian constitution and these courses are to be offered as audited courses. Upon discussion the resolution was passed and recommended for academic council. Action Taken Report has been attached as **Annexure IV.**

### AGENDA ITEM-V

To consider and approve the pre PhD courses for the July 2019 admitted batch of PhD

Approved and recommended to Academic Council

**RESOLUTION:** Pre-PhD courses and syllabi for July-2019 admitted batch of PhD have been approved by BoS members and recommended to Academic council and the corresponding proofs have been attached in **Annexure -V.**

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### AGENDA ITEM-VI

To consider and approve the list of Basic Science and Engineering science courses introduced for the 2019-2020 admitted batch.

Approved and  
recommended to  
Academic Council

### DISCUSSION:

- ❖ Dr. Eswaran, Biocon Research Academy, Bangalore, Recommended to add design thinking and Innovation 1&2 courses for 2019-2020 curriculum. Upon discussion the resolution was passed and recommended for academic council. Design thinking and Innovation 1&2 was introduced in place of Introduction to Engineering.
- ❖ Dr. Bhisham Narayan Singh, affiliated with MAHE in Karnataka, proposed the inclusion of Mathematics for Computing in the 2019-20 curriculum. After thorough discussion, the resolution was successfully passed and subsequently endorsed for consideration by the academic council. Consequently, Mathematics for Computing was incorporated into the curriculum, replacing Single Variable Calculus and Matrix Algebra.
- ❖ Dr. Y Rajesh Reddy from NIT Warangal proposed the inclusion of Object-Oriented Programming in the 2019-20 curriculum. Following extensive discussion, the resolution was successfully passed and subsequently recommended to the academic council. As a result, Object-Oriented Programming was introduced, replacing Technical Skills-I & II (Coding) in the curriculum.

**RESOLUTION:** Upon discussion, all the BOS members approved the incorporation of following Basic and Engineering science courses into the curriculum from the Academic Year 2019-2020 which improves the skill set of students in Design Thinking & Innovation-I and Design Thinking & Innovation-II. In addition, Mathematics for Computing is rooted in its pivotal role in enhancing problem-solving abilities, algorithmic thinking, data analysis skills, and innovation in the field of computing and computational Biology. By providing students with a strong mathematical foundation, the course enhances their employability and equips them to excel in diverse computing roles that require analytical and computational expertise.

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1. Design Thinking & Innovation-I
2. Design Thinking & Innovation-II
3. Mathematics for Computing
4. Object-Oriented Programming

The syllabus of the new courses has been depicted in **Annexure-VI**

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The following members have attended the XXV Board of studies (BOS) meeting held on 07/05/2019 at C501 from 01:30 pm to 05:00 pm.

S.No	FULL NAME	DESIGNATION	ORGANIZATION	POSITION IN THE MEETING	SIGNATURE
1	Dr.G Satyanaraya	Professor	IIT-Madras	External	Satyanarayana
2	Dr.Y Srinivasa Reddy	Scientist	Sajjala Biotech-Hyderabad	External	Y.S.R.
3	Mr.Akshay Dedaniya	Senior Bioinformatics Manager	Indushealthplus-Pune	External	Akshay
4	Dr.K.Giridhar	Associate Professor & HOD	Biotechnology	Chairman	G.K.
5	Dr.V.Praveen Kumar	Alternate Head & Assoc. Professor	Biotechnology	Secretary	V.P.K.
6	Dr.JayaKumar Singh	Professor & Assoc. Dean	Biotechnology	Internal member	JK Singh
7	Dr.K.Shrinivasulu	Professor	Biotechnology	Internal member	Shrinivasulu
8	Dr.BVLS Prasad	Professor	Biotechnology	Internal member	BVLS
9	Dr.M.Sudhamani	Assoc. Professor & Research Group Head	Biotechnology	Internal member	Sudhamani
10	Dr.M.Maheswara Reddy	Asst. Professor	Biotechnology	Special Invitee	M.M.R.
11	Dr.G.Siva Reddy	Asst. Professor & Professor incharge Academics	Biotechnology	Internal member	G.Si
12	Dr.M S R Krishna	Asst. Professor-R Pac chairman	Biotechnology	Internal member	M.S.R.

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07/05/2019



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13	Dr.Nadeem Siddiqui	Assoc. Professor	Biotechnology	Special Invitee	N.S.
14	Dr.Sarada Prasanna Mallick	Asst. Professor	Biotechnology	Special Invitee	Sarada
15	170010097-Md.Anjum	III <sup>rd</sup> Year	Biotechnology	Special Invitee	Anjum
16	170010098-Ms.N Kusuma	III <sup>rd</sup> Year	Biotechnology	Special Invitee	Kusuma
17	180010049-Ms.Polladi Bhavana	II <sup>nd</sup> Year	Biotechnology	Special Invitee	Bhavana
18	180010059-Ms.Vemuri Sarvani	II <sup>nd</sup> Year	Biotechnology	Special Invitee	Sarvani
19	160010067-V Renuka	IV <sup>th</sup> Year	Biotechnology	Special Invitee	Renuka
20	160010037-Sreerama Chandra Karthik	IV <sup>th</sup> Year	Biotechnology	Special Invitee	Karthik

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### Annexure-I: Program structure (with all Courses) containing following categorization

Si. No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-requisite	New Course/ Revised Course/ Retained Course	Changes Proposed by	Employability / Entrepreneurship / Skill Development
1	19UC1101	BASIC ENGLISH	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
2	19UC1202	ENGLISH PROFICIENCY	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
3	19UC2103	PROFESSIONAL COMMUNICATION SKILLS	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
4	19UC2204	APTITUDE BUILDER-1	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
5	19UC3105	APTITUDE BUILDER-2	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
6		FOREIGN LANGUAGE ELECTIVE	HSS	2	0	0	0	2	2	Nil	Retained Course		EMPLOYABILITY
7	19UC3206	CAMPUS TO CORPORATE	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
8	19UC0009	ECOLOGY & ENVIRONMENT	HSS	2	0	0	0	2	2	Nil	Retained Course		EMPLOYABILITY
9	19UC0008	INDIAN CONSTITUTION	HSS	2	0	0	0	0	2	Nil	Retained Course		EMPLOYABILITY
10	19UC0007	INDIAN HERITAGE AND CULTURE	HSS	2	0	0	0	0	2	Nil	Retained Course		EMPLOYABILITY
11	19UC0010	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS	HSS	2	0	0	0	0	2	Nil	Retained Course		EMPLOYABILITY
12	19UC0011	ENTREPRENEURSHIP	HSS	2	0	0	0	0	2	Nil	Retained Course		ENTREPRENEURSHIP

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08/05/2019



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13	19MT1101	MATHEMATICS FOR COMPUTING	BS	3	1	0	0	4	4	4	Nil	New course	Industry Peers	EMPLOYABILITY
14	19MT2001	MATHEMATICAL METHODS	BS	3	0	0	0	3	3	3	Nil	Revised course	Industry Peers	EMPLOYABILITY
15	20UC1102	Design Thinking and Innovation-I	SKE	1	0	0	4	2	5	5	Nil	New course	Industry Peers	SKILL DEVELOPMENT
16	20UC1203	Design thinking and Innovation - II	SKE	1	0	0	4	2	5	5	Nil	New course	Industry Peers	SKILL DEVELOPMENT
17	19SC1106	Technical Skills-1 (Coding)	SKE	0	0	0	6	1.5	6	6	Nil	Retained Course		SKILL DEVELOPMENT
18	19MT2011	BIO STATISTICS	BS	2	1	0	0	3	3	3	Nil	Revised course	Academic Peers	EMPLOYABILITY
19	19CY1101	ENGINEERING CHEMISTRY	BS	3	0	2	0	4	5	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
20	19PH1001	ENGINEERING PHYSICS	BS	3	0	2	0	4	5	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
21	19SC1101	PROBLEM SOLVING AND COMPUTER PROGRAMMING	ES	3	0	2	0	4	5	5	Nil	Retained Course		SKILL DEVELOPMENT
22	19ME1103	DESIGN TOOLS WORKSHOP - I	ES	0	0	4	0	2	4	4	Nil	Retained Course		EMPLOYABILITY
23	19SC1209	DESIGN TOOLS WORKSHOP - II	ES	0	0	4	0	2	4	4	Nil	Retained Course		EMPLOYABILITY
24	19SC1202	DATA STRUCTURES	ES	3	0	2	3	4.75	8	8	Nil	Retained Course		EMPLOYABILITY
25	19CS1203	OBJECT ORIENTED PROGRAMMING	ES	3	0	2	3	4.75	8	8	Nil	New Course	Industry Peers	EMPLOYABILITY & Skill development
26	19ES2103	BIOCHEMICAL THERMODYNAMICS	ES	3	1	0	0	4	4	4	Nil	Revised course	Academic Peers	EMPLOYABILITY
27	19ES2101	PROCESS ENGINEERING PRINCIPLES	ES	2	1	0	0	3	3	3	Nil	Revised course	Academic Peers	EMPLOYABILITY

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05/05/2019



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28	19ES2102	TRANSPORT PROCESSES IN BIOLOGICAL SYSTEMS	ES	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
29	19BT1201	CELL BIOLOGY	PC	3	0	0	0	3	3	Nil	Retained Course	EMPLOYABILITY
30	19BT2105	BIOCHEMISTRY	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
31	19BT2108	MOLECULAR BIOLOGY	PC	3	0	0	0	3	3	Nil	Retained Course	EMPLOYABILITY
32	19BT2109	IMMUNOLOGY	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
33	19BT3110	BIOINFORMATICS	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
34	19BT3111	GENETIC ENGINEERING	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
35	19BT3112	FERMENTATION TECHNOLOGY	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
36	19BT3113	BIOCHEMICAL REACTION ENGINEERING	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
37	19ET3201	PLANT BIOTECHNOLOGY	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
38	19ET3202	DOWNSTREAM PROCESSING	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
39	19ET2106	MICROBIOLOGY	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
40	19BT2107	BIOANALYTICAL TECHNIQUES	PC	3	0	2	0	4	5	Nil	Retained Course	EMPLOYABILITY
41	19TS1001	Skilling for Engineers-1 (Medical Lab Technology)	SKE	0	0	0	8	2	8	Nil	Retained Course	SKILL DEVELOPMENT
42	19TS1002	Skilling for Engineers-2 (Process Engineering Tools)	SKE	0	0	0	8	2	8	Nil	Retained Course	SKILL DEVELOPMENT

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09/05/2019



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43	19TS1003	Skilling for Engineers-3 (Animal Cell Culture)	SKE	0	0	0	0	0	0	8	2	8	Nil	Retained Course	SKILL DEVELOPMENT
44	19BT3150	Technical Proficiency & Training -1 (Genomics)	SKE	1	0	0	0	0	0	1	1	1	Nil	Retained Course	SKILL DEVELOPMENT
45	19BT3250	Technical Proficiency & Training-2 (Bioprocessing)	SKE	1	0	0	0	0	0	1	1	1	Nil	Revised course	SKILL DEVELOPMENT
46	19TS1004	Skilling for Engineers-4 (Advanced Instrumentation)	SKE	0	0	0	0	0	0	8	2	8	Nil	Retained course	SKILL DEVELOPMENT
47	19IE4048	Project (Part I)	PR	0	0	0	0	0	0	24	6	24	Nil	Retained Course	SKILL DEVELOPMENT
48	19IE4049	Project (Part II)	PR	0	0	0	0	0	0	24		24	Nil	Retained Course	SKILL DEVELOPMENT
49	19IE4050	Practice School	PR	0	0	0	0	0	0	24	6	24	Nil	Retained Course	SKILL DEVELOPMENT
50	19IE4051	Internship	PR	0	0	0	0	0	0	24		24	Nil	Retained Course	SKILL DEVELOPMENT
51	19IE3247	Term Paper	PR	0	0	0	4	0	0	2	2	4	Nil	Retained Course	SKILL DEVELOPMENT
52	19IE2246	Industrial Training	PR	0	0	0	4	0	0	2	2	4	Nil	Retained Course	SKILL DEVELOPMENT
53	OE-1	Open Elective-1	OE	3	0	0	0	0	0	3	3	3	Nil	Retained Course	EMPLOYABILITY
54	OE-2	Open Elective-2	OE	3	0	0	0	0	0	3	3	3	Nil	Retained Course	EMPLOYABILITY
55	OE-3	Management Elective-1	OE	2	0	0	0	0	0	2	2	2	Nil	Retained Course	ENTREPRENEURSHIP
56	OE-4	Management Elective-2	OE	2	0	0	0	0	0	2	2	2	Nil	Retained Course	ENTREPRENEURSHIP
57	PE-1	PROFESSIONAL ELECTIVE-1	PE	3	0	0	0	0	0	3	3	3	Nil	Retained Course	EMPLOYABILITY

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08/05/2019



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58	PE-2	PROFESSIONAL ELECTIVE-2	PE	3	0	0	0	0	0	0	3	3	Retained Course	EMPLOYABILITY
59	PE-3	PROFESSIONAL ELECTIVE-3	PE	3	0	0	0	0	0	0	3	3	Retained Course	EMPLOYABILITY
60	PE-4	PROFESSIONAL ELECTIVE-4	PE	3	0	0	0	0	0	0	3	3	Retained Course	EMPLOYABILITY
61	PE-5	PROFESSIONAL ELECTIVE-5	PE	3	0	0	0	0	0	0	3	3	Retained Course	EMPLOYABILITY
62	19BT3051	Molecular Genetics	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
63	19BT3052	Transgenic Technology	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
64	19BT3053	Molecular Expression Technology	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
65	19BT3054	Genomics and Proteomics	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
66	19BT3055	Molecular markers and Diagnostics	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
67	19BT3056	Gene and the Environment	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
68	19BT3057	Microbial Genetics	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
69	19BT3058	DNA Forensics	PE	3	0	0	0	0	0	0	3	3	19BT3111	EMPLOYABILITY
70	19BT3255	Microbial Technology	PE	3	0	0	0	0	0	0	3	3	19BT2106	EMPLOYABILITY
71	19BT3256	Pharmaceutical Biotechnology	PE	3	0	0	0	0	0	0	3	3	19BT2106	EMPLOYABILITY
72	19BT3257	Metabolic Engineering	PE	3	0	0	0	0	0	0	3	3	19BT2106	EMPLOYABILITY

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73	19BT3258	Bio resource Technology	PE	3	0	0	0	0	0	0	3	19BT2106	Retained Course	EMPLOYABILITY
74	19BT4154	Bioprocess Economics and Plant Design	PE	3	0	0	0	0	0	0	3	19BT2106	Retained Course	EMPLOYABILITY
75	19BT4155	Enzyme Engineering	PE	3	0	0	0	0	0	0	3	19BT2106	Retained Course	EMPLOYABILITY
76	19BT4156	Bioprocess Validation and cGMP	PE	3	0	0	0	0	0	0	3	19BT2106	Retained Course	EMPLOYABILITY
77	19BT4157	Food Technology	PE	3	0	0	0	0	0	0	3	19BT2106	Retained Course	EMPLOYABILITY
78	19BT4158	Pharmacovigilance and Safety	PE	3	0	0	0	0	0	0	3	19BT2106	Retained Course	EMPLOYABILITY
79	19BT3259	PERL and Bioperl programming	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
80	19BT3260	Biomedical Informatics	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
81	19BT3261	Molecular Modelling and Drug Design	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
82	19BT3262	Structural Biology	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
83	19BT4159	Systems Biology	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
84	19BT4160	Applied Bioinformatics	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
85	19BT4161	Data Base Management System	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
86	19BT4162	Python and R Programming	PE	3	0	0	0	0	0	0	3	19BT3110	Retained Course	EMPLOYABILITY
87	19BT3263	Stem cell technology	PE	3	0	0	0	0	0	0	3	19BT1201	Retained Course	EMPLOYABILITY

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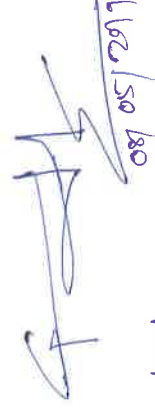
			3	0	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
88	19BT3264	Healthcare Biotechnology	PE	3	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
89	19BT3265	Cancer Biology	PE	3	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
90	19BT3266	Neurobiology	PE	3	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
91	19BT4163	Bioelectronics & Biosensors	PE	3	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
92	19BT4164	Tissue Engineering	PE	3	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
93	19BT4165	Virology	PE	3	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
94	19BT4166	Nanobiotechnology	PE	3	0	0	0	0	3	3	19BT1201	Retained Course	EMPLOYABILITY
95	19BT40A1	IPR & PATENT LAWS	OE	3	0	0	0	0	3	3	Nil	Retained Course	EMPLOYABILITY

Percentage of Syllabus Revision =  $(11/61) * 100 = 18.03\%$

Percentage of Courses focusing on Employability =  $(41/61) * 100 = 67.21\%$

Percentage of Courses focusing on Entrepreneurship =  $(3/61) * 100 = 4.9\%$

Percentage of Courses focusing on Skill Development =  $(17/61) * 100 = 27.86\%$

  
08/05/2017

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### Annexure -II: Course wise Syllabus revision of approved structure as mentioned in the above Annexure -I.

Course code	Course Title	Course Category	Existing Syllabus	New Syllabus	Topics added/ Removed/ Replaced	Changes in Course Outcome (s)	Justification for the modifications	Revision (%)
19MT1101	Mathematics for Computing	BS	NA	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EXVpakhX7cBli_oF22qdGtDEB0G5UF2-uFXNo5AOnk6Y4bg?e=onZYBW">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EXVpakhX7cBli_oF22qdGtDEB0G5UF2-uFXNo5AOnk6Y4bg?e=onZYBW</a>	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new course (Mathematics for computing) introduced in 2019-20 batch.	100%
19MT2001	Mathematical Methods	BS	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EbCcB0Vg_iFdKioIMbQYVdtkBpaw_YzzcL.SUP80sty1oFPzw?e=vLE9aZ">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EbCcB0Vg_iFdKioIMbQYVdtkBpaw_YzzcL.SUP80sty1oFPzw?e=vLE9aZ</a>	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EUPLdmuAAIZCpYLCxC2Z1joBDRrEBymQAo4b4fttEW9sWA?e=herQNe">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EUPLdmuAAIZCpYLCxC2Z1joBDRrEBymQAo4b4fttEW9sWA?e=herQNe</a>	Bernoulli's equations, Applications of Laplace transforms in solving ordinary differential equations	CO1	As per the feedback received from the stakeholders we have revised the syllabus for 2019-20 batch.	10%

  
09/09/2019

Head  
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20UC1102	Design Thinking and Innovation - I	SKE	NA	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EUaWKQ4BUDhCgux7Fa8WBloB3z-mjKObthVakPZXRolbuw?e=DRY3Ee">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EUaWKQ4BUDhCgux7Fa8WBloB3z-mjKObthVakPZXRolbuw?e=DRY3Ee</a>	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stake holders we have new course (DTI-I) introduced in 2019-20 batch.	100%
20UC1203	Design thinking and Innovation - II	SKE	NA	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EXLB9inSMzfgsZgv6bklV0BAPm2FafQ1bfgHlhPzGk9qQ?e=em3Dlh">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EXLB9inSMzfgsZgv6bklV0BAPm2FafQ1bfgHlhPzGk9qQ?e=em3Dlh</a>	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stake holders we have new course (DTI-II) introduced in 2019-20 batch.	100%
19MT2011	Biostatistics	BS	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EQpWQFRqc7VlgCnb0IXjPMABiNgmr3q4aRCEMLEnBdsUw?e=rHz2be">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EQpWQFRqc7VlgCnb0IXjPMABiNgmr3q4aRCEMLEnBdsUw?e=rHz2be</a>	Latin square design, Chi-square test-goodness of fit and independence of attributes.	CO2	As per the feedback received from the stake holders we have revised the syllabus for 2019-20 batch.	10%	

*[Handwritten Signature]*  
05/05/2019

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19CY1101	Engineering Chemistry	BS	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EeZfUf_S0FRKuP2m4jSE_EBS9sflGomBFbVui8hHrTFPw?e=jvdSR9">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EeZfUf_S0FRKuP2m4jSE_EBS9sflGomBFbVui8hHrTFPw?e=jvdSR9</a>	Molecules and Materials: polymers, Teflon, Bakelite, Urea Formaldehyde	CO4	As per the feedback received from the stakeholders we have revised the syllabus for 2019-20 batch.	10%
19PH1001	Engineering Physics	BS	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/Ec5E5F7TthRAiceLDd2w6YUBQjQGji9Z03okxP1C3Qd3wg?e=8jtbkU">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/Ec5E5F7TthRAiceLDd2w6YUBQjQGji9Z03okxP1C3Qd3wg?e=8jtbkU</a>	Mechanical properties of Engineering materials (Tensile strength, Hardness, Fatigue, Impact strength, Creep) - Fracture	CO4	As per the feedback received from the stakeholders we have revised the syllabus for 2019-20 batch.	10%
19CS1203	Object oriented Programming	ES	NA	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new course (OOPS) introduced in 2019-20 batch.	100%

*[Signature]*  
08/07/2019

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19ES2103	Biochemical Thermodynamics	ES	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EVnzPEUaD5x0na2I022dfggBmaYQ7zyQvAUdQCEwsUKYag?e=F7MFHU">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EVnzPEUaD5x0na2I022dfggBmaYQ7zyQvAUdQCEwsUKYag?e=F7MFHU</a>	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EXOn9d6bK9VPtib8gSIz4YYBHVqEfrR_3VS-BF0d1Xjbf0?e=q7vd9a">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EXOn9d6bK9VPtib8gSIz4YYBHVqEfrR_3VS-BF0d1Xjbf0?e=q7vd9a</a>	Thermodynamics of microbial growth, oxygen consumption and heat evolution in aerobic cultures, energy balance equation for cell culture, reaction thermodynamics	C04	As per the feedback received from the stakeholders we have revised the syllabus for 2019-20 batch.	10%
19ES2101	Process Engineering Principles	ES	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EYIUAbfnmXN0oAnISzyuvhoBZCMG0jGUnegHNtsSgvGHw?e=nMRaRb">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EYIUAbfnmXN0oAnISzyuvhoBZCMG0jGUnegHNtsSgvGHw?e=nMRaRb</a>	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EWI_Qs78ahJKn04UdjXTZ3YBqwAH0VK_u33B8qR5n2ox9g?e=vNBK0Z">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EWI_Qs78ahJKn04UdjXTZ3YBqwAH0VK_u33B8qR5n2ox9g?e=vNBK0Z</a>	Material balances with recycle, by pass and purge streams	C03	As per the feedback received from the stakeholders we have revised the syllabus for 2019-20 batch.	10%

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08/05/2019

Head

Department of Biotechnology  
Koneru Lakshmaiah Education Foundation  
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19BT3250	Technical Proficiency & Training-2 (Bioprocessing)	SKE	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/ETMK-AcjwJIFgrK15RNNf-EBqjPmGt2vvlwndLV0V07urg?e=LXa4ie">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/ETMK-AcjwJIFgrK15RNNf-EBqjPmGt2vvlwndLV0V07urg?e=LXa4ie</a>	<a href="https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EZPVPiPKddZFt48fgTrYKsQBrkAwID_YDF0yUmfkqZJk3A?e=3Y5m7x">https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EZPVPiPKddZFt48fgTrYKsQBrkAwID_YDF0yUmfkqZJk3A?e=3Y5m7x</a>	DNA fingerprinting; Southern and northern blotting; In-situ hybridization; RAPD, RFLP; Site-directed mutagenesis; Gene transfer technologies; Gene therapy.	CO1	As per the feedback received from the stakeholders we have revised the syllabus for 2019-20 batch.	5%
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Head

Department of Biotechnology  
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### Annexure III

### Minutes of the XXV DAC meeting-Department of Biotechnology held on 29-04-2019 in C-501 from 10:00 AM to 11:30 AM

#### Agenda Item-I

PDD of new program Structure highlighting, Local/Regional/National/Global needs and Mapping to courses.	Approved and Recommended to BOS
---	---------------------------------

**Resolution:** PDD of new program Structure highlighting Local/Regional/National/Global needs and Mapping to courses has been approved and recommended to BoS by DAC.

To consider the approval of proposal for launching certificate courses for 2018-19 admitted batch.	Approved and Recommended to BOS
--	---------------------------------

The following value added courses for Y19 batch have been introduced, approved and recommended by DAC to BoS.

1. Base SAS
2. Clinical data management
3. Regulatory affairs
4. Sports

Proposal for B.Tech and M.Tech Y19 batch course structure along with Employability, Entrepreneurship, and skill development categorizations.	Approved and Recommended to BOS
--	---------------------------------

**Resolution:** For the A.Y. 2019-20 curriculum, the Basic Mathematics course should be mandatory for students with PCB background. Similarly, Basic biology should be mandatory for students with PCM background joining in B.Tech Biotechnology.

The same resolution of Basic mathematics and Basic biology courses for PCB and PCM students has been accepted by the Department Academic Council (DAC).

As per the feedback from stakeholders, Basic mathematics course has been renamed has mathematical methods.

Further, change in the course titles and syllabi of Immunology, Biochemical Thermodynamics and Tissue Engineering have been recommended by DAC committee to BoS.

The same resolution of modifying the syllabi of Immunology, Biochemical Thermodynamics and Tissue Engineering has been accepted by the Department Academic Council (DAC).

Head  
Department of Biotechnology  
Koneru Lakshmaiah Education Foundation  
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09/05/2019



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By implementing the proposed modifications, course structure of 2019-20 admitted batches is under the categories of Employability, Entrepreneurship and skill development and the same will be recommended to BoS.

Restructuring of existing curriculum and syllabi for the year Y18 and Y17 batches.

Approved and  
Recommended  
to BOS

**Resolution:** As per the suggestions of DAC members, the existing course structures of Y18 and Y17 has been modified and recommended to BoS.

DAC has approved the revised course structures of Y18, Y17 and Y16 and the amended structures attached in **Annexure-I**.

The following courses of Y19 and 18 batches have undergone the changes in their syllabi

1. Engineering Chemistry
2. Engineering Physics
3. Biostatistics
4. Biochemical Thermodynamics
5. Process Engineering Principles
6. Biostatistics
7. Mathematical Methods

The following courses of Y17 batch have undergone the changes in their syllabi

1. Tissue Engineering
2. Bioprocess Economics and Plant design
3. Biochemical reaction Engineering

The following courses of Y16 batch have undergone the changes in their syllabi

1. Molecular modelling and drug design

DAC has approved the revised syllabi of above mentioned course recommended to BoS and shown in **Annexure-II**.

### Vote of thanks:

The chair has thanked all the DAC members for their efforts and active participation

  
Professor in charge Academics

  
Head of the Department

Head  
Department of Biotechnology  
Koneru Lakshmaiah Education Foundation  
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### Annexure-IV: Feedback from Various stake holders

Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS	Name of the Programme	Academic Year	Department	Date of BOS
Industry Personnel	Dr. Alok Kumar, Sanofi Biotech, Medchal, Telangana, Suggested to include Bernoulli's equation and applications of Laplace transforms in solving ordinary differential equations in the subject Mathematical methods	Suggested topics have been incorporated in Mathematical Methods approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Industry Personnel	Dr. Easwaran, Biocon Research Academy, Bangalore, Recommended to add design thinking and Innovation 1&2 courses for 2019-2020 curriculum	Courses are floated Under skilling for engineers categorization approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Academic Peer	Dr. Bhisham Narayann Singh, MAHE, Karnataka, Suggested to incorporate Mathematics for computing in 2019-20 curriculum	Mathematics for computing have been incorporated to 2019-20 admitted batch approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019

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Academic Peer	Dr. Mahesh Kumar Sah, NIT Jalandhar, Advised to change the title for the course Basic mathematics to Mathematical methods	Resolved to modify as Mathematical Methods approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Academic Peer	Dr. Vijay Rajesh, NRI Medical college Suggested to include concepts like Latin square design chi-square test -goodness of fit and independence in Biostatistics course	Suggested topics have been incorporated in Biostatistics approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Academic Peer	Dr. Lakshmi Prasuna, NIT Bhopal, Advised to incorporate topics like molecules and material applications in Engineering chemistry	Suggested topics have been incorporated in Engineering Chemistry approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Alumni	Dr. Siva Reddy, Suggested to include Mechanical properties of Engineering materials in Engineering physics	Suggested topics have been incorporated in Engineering Physics approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019

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Alumni	Dr. Mahesh Reddy, M, Advised to add OOPS in course curriculum for 2019-20	Course is floated Under Engineering Science categorization approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Parents	Mr. Chandrasekhar Naidu, Advised to include thermodynamics of microbial growth in Biochemical thermodynamics	Suggested topics have been incorporated in Biochemical Thermodynamics approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Parents	Mr. Subhash Reddy, Suggested to add concepts such as material balances with recycle, bypass and purge streams in PEP	Suggested topics have been incorporated in Process Engineering Principles approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Students	Mr. Naveen Reddy, Recommended to add DNA Fingerprinting in TPT-2 (Bioprocessing)	Suggested topics have been incorporated in TPT-2 (Bioprocessing) approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019

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Students	Ms. Himaja choudary, Suggested to enrich the syllabus in accordance with industrial needs	Suggested modifications have been incorporated in 2019-20 curriculum approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019
Students	Ms. Bhagya lakshmi, Recommended to alter the LTP structures for the courses like Indian Heritage & culture and Indian constitution and these courses to be offered as audited courses.	0-0-2 has been modified as 2-0-0, and resolved to offer as audited courses from Y19 regulation approved by BoS and eventually recommended to Academic council.	B.Tech	2019-2020	Biotechnology	7/5/2019

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### Annexure-V: Pre PhD Courses

S.NO.	COURSE CODE	NAME OF THE COURSE	PAPER NUMBER
1	19BT201	Bioanalytical Techniques	PAPER-2
2	19BT202	Plant Biotechnology	PAPER-3
3	19BT203	Genetic Engineering	PAPER-3
4	19BT204	Microbial Technology	PAPER-3
5	19BT205	Biochemistry	PAPER-3
6	19BT206	Molecular Modelling and Drug Design	PAPER-3
7	19BT207	Bioprocess Engineering	PAPER-3
8	19BT208	Immunotechnology	PAPER-3

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### Annexure-VI: New Courses Syllabus

**Course Code: 19MT1101**

**Course Title: MATHEMATICS FOR COMPUTING**

**L-T-P-S: 3-1-0-4**

**Credits: 5**

**Course Rationale:** The course rationale of Mathematics for Computing is rooted in its pivotal role in enhancing problem-solving abilities, algorithmic thinking, data analysis skills, and innovation in the field of computing. By providing students with a strong mathematical foundation, the course enhances their employability and equips them to excel in diverse computing roles that require analytical and computational expertise.

**Course Objective:** The course objectives of "Mathematics for Computing" aim to provide students with a strong mathematical foundation that enables them to tackle complex computing challenges, make informed decisions, and contribute effectively to the development and innovation of computing technologies and applications.

### **COURSE OUTCOMES (CO'S)**

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Demonstrate a strong understanding of foundational mathematical concepts relevant to computing, including algebra, calculus, discrete mathematics, and linear algebra.	PO1	3
CO2	Apply mathematical concepts and techniques to solve computing problems, analyse algorithms, and optimize computational processes.	PO3	3
CO3	Develop skills in algorithmic problem-solving, using mathematical reasoning to design efficient algorithms and solve computational challenges.	PO1	3
CO4	Understand and apply mathematical modelling techniques to represent and analyze computing systems, including data structures, networks, and algorithms.	PO3	3
CO5	Demonstrate the ability to communicate mathematical concepts effectively, both in written and verbal forms, to explain solutions, algorithms, and mathematical reasoning.	PO3,PO5	3

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### Syllabus

Foundations of Computational Mathematics-I Basic Structures: Sets, Functions, Sequences and Summations, Cardinality of Sets, Relations and their Properties, Equivalence Relations. Permutations and combinations probability: Linear Permutations, Circular Permutations and combinations, addition theorem, conditional probability, multiplication theorem.

Foundations of Computational Mathematics-II Matrix Algebra: Introduction, Types of Matrices, Rank of matrix, Solutions of linear Equations -Gauss elimination, Jacobi and Gauss-Seidel, Eigen values, Eigen vectors. Game Theory: Pay off Matrix, Mini-Max criteria, Saddle points and dominance property Optimal Strategy, Mixed Strategy, Value of a game, Decision under uncertainty discrete

Mathematics-III Logic and Proofs: Propositional Logic, Applications of Propositional, Propositional Equivalences, Predicates and Quantifiers, Rules of Inference Predicate logic, Consequences, Introduction to Proofs, Proof methods and strategy. Applications of Number theory: Fermat's theorem, Euclidean Algorithm, Counting Techniques: Recursive definitions, Solving Linear Recurrence Relations, Fibonacci series, Divide-and-Conquer Algorithms, Generating Functions, Inclusion-Exclusion Lattices: Introduction, Properties of Lattices, Sub lattices, Partial order relation, Homomorphism and Isomorphism, Hasse diagrams. Discrete Mathematics-II& Statistics: Graphs & Trees: Terminology, Types of Graphs, Bipartite graphs, Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path, Planar Graphs, Trees, Tree traversal and application of trees, spanning trees and Minimal spanning trees Statistics: Curve fitting, Correlation, Linear Regression. LOGIC AND REASONING: Deductions, Logical Connectives, Linear and circular arrangements, Ordering and sequencing, Clocks, Calendars, Blood Relations, Cubes, Direction sense, Number and letter series, Number and letter Analogy, Odd man out, Coding and Decoding, Symbolic representations of given data, Binary Logic, Non Verbal reasoning. Foundations in Arithmetic: Numbers, Ratio, Proportion, Variation, Averages, Percentages, Profit & loss, Time and distance, Time and work. Geometry: Lines, Triangles, Quadrilaterals, Polygons, Practical applications of common solids, irregular solids, and their application in various engineering problems.

Books: 1. Kenneth H Rosen, Discrete Mathematics and its Applications, Seventh edition, McGraw Hill, 2007, USA. Reference

Reference Books: 1. R.E. Walpole, R.H. Myers, S.L. Myes, Keying Ye, Probability and Statistics for engineers and scientist, Ninth edition, Pearson publications, 2012, USA.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, Wiley,

3. Tremblay J P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", First edition, TataMcGraw Hill, 1975, India.

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**Course Code: 20UC1102**

**Course Title: DESIGN THINKING AND INNOVATION-I**

**L-T-P-S: 1-0-0-4**

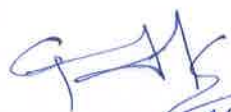
**Credits: 2**

**Course Rationale:** The course rationale of "Design Thinking and Innovation" is driven by the need for individuals and organizations to embrace a human-centered, creative, and innovative approach to problem-solving. By equipping participants with design thinking methodologies and fostering a culture of innovation, the course aims to empower individuals to drive positive change, enhance user experiences, and create meaningful impact in diverse domains.

**Course Objective:** The course objectives of "Design Thinking and Innovation" aim to equip participants with a robust toolkit for approaching problems creatively, developing user-centric solutions, and fostering a culture of innovation. By cultivating design thinking skills, participants are prepared to drive positive change, create meaningful impact, and contribute to innovative initiatives in diverse professional settings.

### COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
C01	Demonstrate a thorough understanding of the principles and methodologies of design thinking, including empathy, ideation, prototyping, and iteration.	P03	3
C02	Develop creative problem-solving skills by applying ideation techniques to generate innovative solutions for complex challenges.	P01	3
C03	Gain proficiency in prototyping and iterative design processes, including the ability to create and refine prototypes based on user feedback and testing.	P01	3
C04	Develop collaborative skills and effective communication strategies within multidisciplinary teams, fostering an environment conducive to innovation.	P03	3

  
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### Syllabus

Overview of Design Thinking: Define Design Thinking, Differentiate Design Thinking from Design, and Get an Overview of the Design Thinking Process, Empathize and Understand: Explain how empathy influences the outcomes of Design Thinking, List Different Empathy Research Techniques, Define the Guidelines for an Empathetic Research, Defining Needs: Explain how PoV can be used in defining the design problem, Use a structured approach to arrive at a PoV, Ideation for Solutions: List the best practices for conducting a successful ideating session, Describe the techniques for evaluating and prioritizing ideas, Prototyping: Define prototyping, Explain how prototyping aids in communicating ideas effectively, List various tools for prototyping, Testing the Solution: Define the steps of a successful testing approach, Demonstrate the process of gathering and responding to user feedback.

**Text Books:** The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems



Signature

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**Course Code: 20UC1203**

**Course Title: DESIGN THINKING AND INNOVATION-II**

**L-T-P-S: 1-0-0-4**

**Credits: 2**

**Course Rationale:** The course rationale of "Design Thinking and Innovation" is driven by the need for individuals and organizations to embrace a human-centered, creative, and innovative approach to problem-solving. By equipping participants with design thinking methodologies and fostering a culture of innovation, the course aims to empower individuals to drive positive change, enhance user experiences, and create meaningful impact in diverse domains.

**Course Objective:** The course objectives of "Design Thinking and Innovation" aim to equip participants with a robust toolkit for approaching problems creatively, developing user-centric solutions, and fostering a culture of innovation. By cultivating design thinking skills, participants are prepared to drive positive change, create meaningful impact, and contribute to innovative initiatives in diverse professional settings.

### COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
C01	Demonstrate proficiency in applying advanced design thinking techniques and methodologies to address complex challenges and develop innovative solutions.	P01	3
C02	Develop strong user-centered design skills, including the ability to empathize with users, understand their needs, and integrate user feedback into the design process.	P03	3
C03	Gain the ability to integrate technology seamlessly into the design process, leveraging digital tools and emerging technologies to enhance the innovation and user experience.	P03	3
C04	Cultivate an entrepreneurial mind-set and leadership skills to drive innovation, lead design teams, and navigate the challenges of bringing innovative ideas to market.	P05	3

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**Syllabus**

Design Thinking for Contextualized Problem-Solving, Empathetic Research, Analysis of Research, Defining Needs, Brainstorming and Evaluation, Prototyping and Testing, From Testing to Launch, Entrepreneurial Innovation

**Text Books:** Wiley PlayBook

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**Course Code: 19CS1203**

**Course Title: OBJECT ORIENTED PROGRAMMING**

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

**Credits: 4.75**

**Course Rationale:** The "Object-Oriented Programming" course is designed to provide students with a solid foundation in the principles and practices of object-oriented programming (OOP), which is a fundamental paradigm in modern software development. OOP is widely used in industry to create robust, scalable, and maintainable software systems. As the complexity of software applications continues to increase, the ability to design, implement, and understand object-oriented code is crucial for aspiring software developers.

**Course Objective:** This course aims to equip students with the essential skills to thrive in the programming job market and excel in various software development roles.

### COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
C01	Demonstrate a thorough understanding of fundamental Object-Oriented Programming concepts, including classes, objects, inheritance, polymorphism, encapsulation, and abstraction.	PO1,PO3	3
C02	Apply OOP principles to design and model software solutions, emphasizing the creation of modular, reusable, and maintainable code.	PO1,PO3	3
C03	Develop proficiency in implementing OOP concepts through hands-on programming, using a programming language such as Java, C++, or Python.	PO1,PO3	3
C04	Apply OOP principles to solve complex problems and develop algorithms, demonstrating the ability to break down problems into modular components and use OOP features effectively.	PO1,PO3	3
C05	Demonstrate proficiency in testing and debugging object-oriented code, identifying and resolving errors, and ensuring the reliability of software applications.	PO3,PO5	3

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C06	Develop collaboration skills by working on group projects and effectively documenting code, including the use of comments, documentation standards, and version control.	PO3,PO5	3
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### Syllabus

Module 1: Introduction to Object-Oriented Programming: Introduction to programming paradigms: procedural vs. object-oriented programming, Understanding objects, classes, and instances, Encapsulation and data hiding, Methods, attributes, and behaviours, Creating and using objects in a programming language (Java/Python)

Module 2: Inheritance and Polymorphism, Inheritance and its role in code reusability, Creating subclasses and super classes, Method overriding and the super keyword, Polymorphism and dynamic method dispatch, Abstract classes and interfaces

Module 3: Encapsulation and Advanced OOP Concepts, Access modifiers: public, private, protected, Getters and setters: Encapsulation for controlled access, Composition, and aggregation: Building complex objects, Singleton and Factory design patterns, Exception handling in an object-oriented context

Module 4: Design Principles and Patterns: Introduction to design principles: SOLID (Single Responsibility, Open/Closed, Liskov Substitution, Interface Segregation, Dependency Inversion), Applying design principles to code, Creational patterns: Factory Method, Abstract Factory, Builder, Structural patterns: Adapter, Decorator, Facade, Behavioural patterns: Observer, Strategy, Template Method.

#### Textbooks:

1. "Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides
2. "Starting Out with C++: From Control Structures through Objects" by Tony Gaddis
3. "Python Programming: An Introduction to Computer Science" by John Zelle

05/2019