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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Minutes of 23rd Board of Studies Meeting

25th June 2020

Minutes of the 23rd BoS meeting, Computer Science and Engineering Department was held on 25th June 2020, from 9:30 AM to 1:00 PM in online mode.

The Following members were present:

1. Dr. K. Thirupathi Rao, Professor, BoS Chairman
2. Dr. N. Venkatram, Dean Academics, Invitee
3. Mr. V. Hari Kiran, Assoc. Professor, Member
4. Dr. L.S.S. Reddy, Vice Chancellor, Invitee
5. Dr. Madhu Muthyam, Professor, IIT, Madras, External Member
6. Mr. Ramesh Kumar Dacha, Associate Director, Accenture Solutions India Pvt. Ltd., Hyderabad, External Member
7. Dr. Amaralingeswara Rao Kaka, Program Director, IBM, Hyderabad, External Member
8. Mr. Jagan Mohan Chevvakula, Sr. Qa Manager, Nga Hr Pvt Limited, Hyderabad, External Member
9. Dr. V. Srikanth, Professor, Member
10. Dr. E. Anupriya, Professor, Member
11. Dr. B. V. Appa Rao, Professor, Department of Maths, Member
12. Dr. Shanmukh Kumar, Professor, Department of Chemistry, Member
13. Dr. M. Kameswara Rao, Assoc. Professor, Department of ECM, Member
14. Dr. B. T. P. Madhav, Professor, Department of ECE, Member
15. Dr. M. V. V. K. Srinivas Prasad, Professor, Department of Physics, Member
16. Dr. V. Chandra Prakash, Professor, Member
17. Dr. K. Subrahmanyam, Professor, Member
18. Dr. M. R. Narsinga Rao, Professor, Member
19. Dr. V. Krishna Redddy, Professor, Member

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20. Dr. G. Pradeepini, Professor, Member
21. Dr. N. Srinivasu, Professor, Member
22. Dr. P. Rajarajeswari, Professor, Member
23. Dr. K. Amarendra, Professor, Member
24. Dr. K. V. V.Satyanarayana, Professor, Member
25. Dr. Gandharba Swain, Professor, Member
26. Dr. Y Prashanth, Professor, Member
27. Dr. K. Bhanu Prakash, Professor, Member
28. Mr. M. Vishnuvardhan, Assoc.Professor, Member
29. Mrs. V. Divya, Asst.Professor, Member
30. Mr. A.V Praveen Krishna, Asst.Professor, Member
31. Ms. Naga Lakshmi, Student, Student Member
32. Ms. Indu, Student, Student Member
33. Ms. Raveena, Student, Student Member

The following members were Absent:

1. Dr. S.Venkateswarulu, Professor, Member
2. Mr. B. Tirupathi Reddy, Assoc.Professor, Member
3. Mrs. A. Roshini, Asst.Professor, Member
4. Mr. A. Roshan, Student, Student Member
5. Mr. Satya Naryan, Student, Student Member
6. Mr. Bhargav, Student, Student Member

BoS Chairman welcomed all the members to the BoS meeting and started the meeting by highlighting the Vision & Mission statements of Department and University. He also presented PEOs, POs and PSOs of the program.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

AGENDA and RESOLUTIONS

AGENDA ITEM-1

Consider and approve DAC minutes held on 24th June,2020 in online mode	Resolution: Approved DAC minutes and recommended to Academic Council for approval.

- Chairman of the BOS informed all the members about the Department Academic Committee (DAC) meeting held on 24th June,2020 and highlighted the major resolutions of discussion.
  It is resolved to approve the recommendations made by DAC. **Annexure-1 DAC minutes (Dt: 24-06-2020)**

AGENDA ITEM-2

Proposed to introduce additional mandatory, project, SDC, TBL courses for 2020-21 B.Tech admitted Batch based on the feedback received from stakeholders for approval.	Resolution: Approved for introduced courses for B.Tech 2020-21 admitted Batch and the same is recommended to Academic Council.

To consider and introduce courses for 2020-21 admitted batch students based on the stake holder's feedback.

i. Dr. P. Radhika, Professor & Principal, Academic Peer recommended to introduce integrated Professional English in the curriculum so that it helps in preparing students for effective communication, collaboration, and presentation skills in a globalized professional environment, enhancing their employability and career prospects.

   It is resolved to introduce a course "Integrated Professional English" for 2020-21 admitted batch students.

ii. Arunkumar Gopu, Senior Assistant Professor, Academic Peer proposed Computational Thinking for Design course as it helps students to know how to approach complex problems systematically and creatively using computational principles.

   It is resolved to introduce a course "Computational Thinking for Design" for 2020-21 admitted batch students.

iii. Dr. Damodar Reddy Edla, Academic Peer recommended integrating the course Design Thinking & Innovation - 1 into the curriculum as it equips students with

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essential problem-solving and creative skills crucial for navigating today's rapidly evolving business landscape. This course fosters a mindset that encourages innovative thinking and solutions.

It is resolved to introduce a course "Design Thinking & Innovation -1" for 2020-21 admitted batch students.

iv. Dr. D. William Albert, Academic Peer strongly recommended integrating the course "Design Thinking & Innovation - 2" into the curriculum as it equips students with advanced problem-solving skills and fosters a culture of innovation, essential for success in today's dynamic world.

It is resolved to introduce a course "Design Thinking & Innovation -2" for 2020-21 admitted batch students.

v. Ramesh Kumar Dacha, Associate Director, Industry Person suggested the new course "MEA(R)N Stack Web Development" is highly recommended as it equips students with the latest web development technologies, enhancing their career prospects and keeping our curriculum up-to-date.

It is resolved to introduce a course "MEA(R)N Stack Web Development" for 2020-21 admitted batch students.

vi. Mr. P S Nagendra Babu, Industry Person strongly recommended the introduction of a "Java Full Stack Development + Microservices" course to the curriculum. This course would provide students with comprehensive skills in full-stack web development, encompassing both frontend and backend technologies, while also incorporating the critical aspect of microservices architecture.

It is resolved to introduce a course "Java Full Stack Development + Microservices" for 2020-21 admitted batch students.

vii. T.Cithraleka, Professor, Academic Peer highly recommended leveraging AI for Data Science as a powerful tool for enhancing data analysis capabilities within the curriculum.

It is resolved to introduce a course "AI for Data Science" for 2020-21 admitted batch students.

viii. Dr.P.Harini, Professor & Principal, Academic Peer proposed "Social Internship" as it allows individuals to work with nonprofit organizations, community groups, or government agencies to address social and community-related issues.

It is resolved to introduce a course "Social Internship" for 2020-21 admitted batch students.

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ix. N PRIYA, Alumni recommended to incorporate Tool-Based Learning (Cloud Foundations-AWS) and Tool-Based Learning (Google Cloud) in curriculum. These courses would provide students with practical experience in utilizing contemporary cloud tools, enhancing their hands-on skills and industry readiness.

It is resolved to introduce a course "Tool-Based Learning (Cloud Foundations-AWS) and Tool-Based Learning (Google Cloud) " for 2020-21 admitted batch students.

x. Dr. Prashant Shukla, Professor, Faculty strongly recommended to introduce Tool-Based Learning (UI PATH) in the curriculum as this course involves modern educational approach facilitates hands-on experience with industry-standard tools which enhancing students' practical programming skills and preparing them for real-world challenges. Integrating this into the syllabus ensures that students acquire valuable proficiency in tool usage, vital for success in today's tech-driven world.

It is resolved to introduce a course "Tool-Based Learning (UI PATH)" for 2020-21 admitted batch students.

xi. Ahmeed, Alumni recommended to introduce "Tool-Based Learning (Robotic Process Automation) and Tool-Based Learning (Blue Prism)" to incorporate the latest industry-relevant tools and techniques, ensuring that students are equipped with cutting-edge skills.

It is resolved to introduce a course "Tool-Based Learning (Robotic Process Automation) and Tool-Based Learning (Blue Prism)" for 2020-21 admitted batch students.

xii. Mr.Saroj Kumar Dhakal, Industry Person recommended that the internship program allows individuals work in technical or STEM-related fields to gain hands-on experience and apply their knowledge and skills.

It is resolved to introduce a course "Technical Internship" for 2020-21 admitted batch students.

S. No	Course Code	Course Title	Course Type	Credits	Remarks
1	20UC1101	INTEGRATED PROFESSIONAL ENGLISH	Mandatory	2	Introduced as a Humanities & Social Sciences course
2	20SC1101	COMPUTATIONAL THINKING FOR DESIGN	Mandatory	5.5	Introduced in place of Problem Solving and Computer Programming

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S. No	Course Code	Course Title	Course Type	Credits	Remarks
					course as an Engineering Science course
3	20UC1102	DESIGN THINKING & INNOVATION -1	Mandatory	2	Introduced as a Basic Science course
4	20UC1203	DESIGN THINKING & INNOVATION -2	Mandatory	2	Introduced as a Basic Science course
5	20TS2101S	MEA(R)N STACK WEB DEVELOPMENT	Skill Development Course	2	Introduced as a skill development course
6	20TS3101RA	JAVA FULL STACK DEVELOPMENT+MICRO SERVICES	Skill Development Course	2	Introduced as a skill development course
7	20CS2221RA	AI FOR DATA SCIENCE	Professional Core Course	5	Introduced in place of artificial Intelligence course
8	20IE2050	SOCIAL INTERNSHIP	Project	2	Introduced as a Project course
9	20IE2246	Technical Internship	Project	2	Introduced as a Project course
10	20TS1005	CLOUD FOUNDATIONS-AWS(CF)	Tool Based Learning	1	Introduced as a skill development course
11	20TS2007	UI PATH(UP)	Tool Based Learning	1	Introduced as a skill development course
12	20TS2008	ROBOTIC PROCESS AUTOMATION(RPA)	Tool Based Learning	1	Introduced as a skill development course
13	20TS2006	BLUEPRISM(BP)	Tool Based Learning	1	Introduced as a skill development course
14	20TS1006	GOOGLE CLOUD(GC)	Tool Based Learning	1	Introduced as a skill development course

The detailed syllabus for the list of proposed courses is given in Annexure-2

AGENDA ITEM-3

Proposed to revise the syllabus for 2020-21 B.Tech admitted Batch based on the feedback received from stakeholders.	Resolution: Approved the revision of syllabus for B.Tech 2020-21 admitted Batch and the same is recommended to Academic Council.

To consider and approve the revision of syllabus for 2020-21 admitted batch students based on the stake holders feedback.

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i. Mr. Nimmagadda Ravi Shankar, Industry Person highly recommended incorporating the "Elements of Software Construction" revision into the curriculum as it will provide students with updated knowledge and skills crucial for modern software development.

It is resolved to approve the revision of syllabus in "Elements of Software Construction" course to 2020-21 admitted batch.

ii. Dr.V.B.V.N.Prasad and Dr. T. Rajeswari (Course Coordinator), Faculty suggested to revise Aptitude builder as it is a valuable tool for honing skills and enhancing cognitive abilities, providing individuals with the means to excel in academic, professional, and personal endeavours by fostering continuous learning and improvement.

It is resolved to approve the revision of syllabus in "Aptitude builder" course to 2020-21 admitted batch.

iii. B Vijay, Faculty strongly recommended conducting internships separately for the odd and even semesters, rather than as a single combined internship, to provide our students with more focused and meaningful learning experiences.

It is resolved to approve to offer INTERNSHIP courses in two semesters as "INTERNSHIP-1"in odd semester and "INTERNSHIP-2" in even semester for 2020-21 admitted batch.

iv. Dr. C.Karthikeyan, Faculty suggested that the Students are encouraged to do multi-disciplinary projects so recommended to revise the project part1 and project part-II titles as Capstone Project-1 and Capstone Project –2.

It is resolved to approve to offer Project-I and Project-II as Capstone Project-1 and Capstone Project-2 to 2020-21 admitted batch.

v. Siva Kowsika, Industry Person suggested to revise syllabus for Python Full Stack Development to empower students with the most relevant skills and tools needed to excel in full-stack development, covering front-end and back-end development, databases, frameworks, and deployment strategies.

It is resolved to revise syllabus of "Python Full Stack Development" Course for 2020-21 admitted batch students.

The members of the BOS have noticed the justification of the DAC members with reference to the negative feedback and concluded that the justification is considered.

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S. No	Course Code	Course Title	Course Type	Percentage of Revision	Remarks
1	20UC3005	APTITUDE BUILDER	Mandatory	60%	Based on Faculty Feedback
2	20CS2205R	ELEMENTS OF SOFTWARE CONSTRUCTION	Professional Core	30%	Based on Industry Person Feedback
3	20TS2290RA	PYTHON FULL STACK DEVELOPMENT	Skill Development Course	10%	Based on Industry Person Feedback

The detailed syllabus for the list of revised courses is given in Annexure-3(a)

The detailed feedback and action taken report is presented in Annexure-3(b)

AGENDA ITEM-4

To consider and introducing courses proposed for M. Tech - MLC and M.Tech - DFCS for 2020-21 admitted batch students.	Resolution: Approved new courses proposed for M. Tech - MLC and M.Tech - DFCS for 2020-21 admitted batch students and the same is recommended to Academic Council for approval.

The following list of new Courses is proposed to offer for M.Tech-Machine Learning and Computing and M.Tech - DFCS 2020-21 admitted batch students.

Program	Course Code	Course Name	Category	L	T	P	S	Cr	CH
M. Tech - MLC	18CS5121	DATA WAREHOUSING & MINING	PCC	3	0	0	0	3	3
M. Tech - MLC	18CS51A5	MACHINE LEARNING	Elective-2	3	0	0	0	3	3
M. Tech - MLC, M. Tech -DFCS	18CS52M3	CLOUD SYSTEM INFRASTRUCTURE	Elective-3	3	0	4	4	6	11
M. Tech - MLC	18CS52M4	DEEP LEARNING	Elective-4	3	0	4	4	6	11
M. Tech -MLC M. Tech - DFCS	18CS51E4	CLOUD COMPUTING	Elective-1	3	0	0	0	3	3
M. Tech - DFCS	18CS52L4	PROGRAMMING FOR BLOCK CHAIN	Elective-4	3	0	4	4	6	11

i. P Vamsi Krishna Raja, Professor, Swarnandhra Engineering College, Academic Peer Suggested to include Data Warehousing and Data Mining practices to

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implement a robust data governance framework and incorporate advanced analytics for improved decision-making and competitiveness.

It is resolved to approve introducing a new course "Data Warehousing and Data Mining" for M.Tech 2020-21 admitted batch students.

ii. A V S Siva Rama rao, Associate Professor, Sasi Institute Of Technology & Engineering, Academic Peer suggested to include machine learning concepts is essential to ensure a strong foundation in this rapidly evolving field for M.Tech Students

It is resolved to approve introducing a new course "Machine Learning" for M.Tech 2020-21 admitted batch students.

iii. D Shiva Kmar, Scrum Manager Vitusa Pvt Ltd, Industry Person recommended to include "Cloud System Infrastructure" course to equip students with essential skills in managing and leveraging cloud technology

It is resolved to approve introducing a new course "Cloud System Infrastructure" for M.Tech 2020-21 admitted batch students.

iv. Dr. PRAGNYABAN MISHRA, Associate Professor, Faculty highly recommended the Deep Learning course for its cutting-edge insights and practical applications, essential for anyone aspiring to excel in the field of artificial intelligence.

It is resolved to approve introducing a new course "Deep Learning" for M.Tech 2021-22 admitted batch students.

v. A Vamsi Krishna Test Engineer Tech Mahendra, Industry Person recommended incorporating a Cloud Computing course into the curriculum to equip students with essential skills in managing and leveraging cloud technology, a critical component of modern IT infrastructure.

It is resolved to approve introducing a new course "Cloud Computing" for M.Tech 2020-21 admitted batch students.

vi. S Sridhar Infosys, Software Engineer, Industry Person recommended to include Programming for Blockchain in curriculum for M.Tech Students as it is crucial to educate students about this transformative technology, fostering a deep understanding of its applications, security considerations

It is resolved to approve introducing a new course "Programming in Blockchain" for M.Tech 2020-21 admitted batch students.

The detailed syllabus for the list of new courses in M.Tech-MLC and M.Tech-DFCS programs is given in Annexure-4

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AGENDA ITEM-5

Consider and approve the curriculum of B.Tech, M.Tech-CSE, M.Tech-DFCS and M.Tech-MLC programs offered for 2020-21 admitted batch students.	Resolution: Approved 2020-21 structure and recommended to Academic Council for approval

i. It is suggested to change difference among regular, advanced and Peer Mentor mode of learning in the core subjects as follows

a) Regular mode courses are to be reassigned as 20CSXXXXRA.

b) Advanced mode courses are to be reassigned as 20CSXXXXAA.

c) Peer Mentor courses are to reassigned as 20CSXXXXPA.

ii. A student graduating with B.Tech CSE degree MUST - complete 59 courses and acquire a minimum of total 160.5 credits and meet minimum credit requirement in each category of courses and complete 4 Value Added Courses & 1 sports certification and spend a recorded 40 hours in social service activities during the four years of under-graduate studies and get a minimum CGPA of 5.25.

iii. A specialization degree is awarded if a student meets all requirements of B.Tech. CSE and acquires a minimum total of 162.5 credits with two additional credits being obtained from Basic Sciences, Professional Core or Professional Elective Course categories and take all professional electives from the same specialization.

iv. A honors degree is awarded if a student meets all requirements of a B.Tech. CSE degree and acquires a total of minimum 180.5 credits by taking courses highlighted above with A/AA or P/PA suffix in the course codes and takes up advanced project in a multi-disciplinary domain and secures a minimum CGPA of 8.5" and "has no history of F grade or DT grade in any course.

The detailed Course Structure of B.Tech 2020-21 admitted batch is given in Annexure-5(a)

The detailed Course Structure of M.Tech-CSE, M.Tech-DFCS and M.Tech-MLC 2020-21 admitted batch students are given in Annexure-5(b)

The proposed List of Courses to offered in advance and Peer mentor mode for 2020-21 admitted batch B.Tech Students is given in Annexure-5(c).

AGENDA ITEM-6

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To consider and approve the Program Development Document for syllabus of B.Tech & M.Tech programs offered for 2020-21 admitted batch students.	Resolution: Approved the PDD for syllabus of B.Tech & M.Tech programs offered for 2020-21 admitted batch students.

The detailed Program Development Document for B.Tech Computer Science and Engineering Program is given in Annexure-6(a).

The detailed Program Development Document for M.Tech Computer Science and Engineering Program is given in Annexure-6(b).

The detailed Program Development Document for M.Tech Digital Forensics and Cyber Security Program is given in Annexure-6(c).

The detailed Program Development Document for M.Tech Machine Learning and Computing Program is given in Annexure-6(d).

AGENDA ITEM-7

To consider and approve the list of MOOC's courses offering to 2020-21 admitted batch students.	Resolution: Approved the list of MOOCS courses offering to 2019-20 admitted batch students.

All the Bos members are proposed to offer Open Electives, Management Electives, Foreign Languages though MOOC's Courses to provide academic flexibilities and to develop more effective learning experiences for the students.

It is resolved to offer a proposed list of MOOC's Courses for the students of 2020-21 B.Tech admitted batch students. The resolution is recommended to the Academic Council for approval.

The detailed list of MOOC's Courses is given in Annexure-7

AGENDA ITEM-8

To consider and approve the list of Value-Added courses offering to 2020-21 admitted batch students.	Resolution: Approved the list of Value Added courses offering to 2019-20 admitted batch students.

To enrich the curriculum and to provide students with the skills they need to succeed in the workforce, all the Bos members are recommended to offer a list of value-added courses to 2020-21 admitted batch students.

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It is resolved to offer the proposed list of value-added courses to 2020-21 B. Tech admitted batch students. The resolution is recommended to the Academic Council for approval.

The detailed list of Value-Added Courses is given in Annexure-8

BoS Meeting (Online) Screenshot:

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-1

DEPARTMENT ACADEMIC COMMITTEE MEETING MINUTES

The Department Academic Council Meeting of Computer Science and Engineering was conducted online mode, on 24th June 2020 from 2.00 PM to 5.00 PM.

The head of the department welcomed DAC members and started the meeting by highlighting the vision & mission statements of university and department also PEOs, POs and PSOs of the program.

The following Agenda Items are discussed, and the resolutions passed are marked against them:

Agenda:

1. To discuss on proposal of syllabus and course structure of B. Tech - CSE 2020-21 admitting batch
2. To discuss on proposed syllabus and course structure for all M. Tech programs for 2020-21 admitting batch
3. To discuss feedbacks obtained from various stake holders (students, Academic Peers, Parents, Course Coordinators, Alumni, industry)
4. To discussion on 2019-2020 ODD Semester Course Closure Minutes
5. To discuss on result analysis of 2019-2020 ODD Semester courses.
6. To discuss on CO-PO Attainment of courses in 2019-2020 Even Semester
7. To discuss on Gap Analysis report on CO-PO Attainment and Teaching Pedagogy

The following members were present:

1. Mr. HARI KIRAN VEGE
2. Dr. K. AMARENDRA
3. Dr. N. SRINIVASU
4. Dr. P. RAJARAJESWARAI
5. Dr. M. R. NARASINGA RAO
6. Dr. K. V. V. SATYANARAYANA
7. Dr. G. PRADEEPINI
8. Dr. K. SUBRAHMANYAM

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9. Dr. V. VIJAYABABU
10. Dr. C.M. SHEELA RANI
11. Dr. G. KRISHNA MOHAN
12. Dr. Y. PRASANTH
13. Dr. T. PAVAN KUMAR
14. Dr. K. V. D. KIRAN
15. Dr. G. SIVANAGESWARA RAO
16. Dr. P. VIDYA SAGAR
17. Dr. M. SREEDEVI
18. Dr. P. SAI KIRAN
19. Dr. Md. MOULANA
20. Dr. ENIREDDY VAMSIDHAR
21. Dr. T. SANTHISRI
22. Dr. NIKHAT PRAVEEN
23. Dr. G. RAMAKOTESWARA RAO
24. Dr. VITHYA GANESAN
25. Dr. P. VIDYULLATHA
26. Dr. K. V. PRASAD
27. Dr. S. SAGAR IMAMBI
28. Dr. SRINIVAS MALLADI
29. Dr. K. VIJAYA SRI
30. Dr. K. ASHESH
31. Dr. P. YELLAMMA
32. Mrs. Ch. RADHIKA RANI
33. Mrs. K. RUTH RAMYA
34. Mr. T. L. S. RAMA KRISHNA
35. Mrs. V. DIVYA
36. Mr. J. SURYA KIRAN
37. Mrs. A. ROSHINI

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38. Mr. P.S.R.KRISHNA
39. Mr. SHAIK ASLAM
40. Mrs. M. PRAVEENA
41. Mr. N. RAJESH
42. Ms. B. SADANA
43. Mrs. P.RAMYA
44. Mr. CH. MOHAN KUMAR

The following points were discussed and resolved:

i. CO-PO Attainment of 2019-20 odd Semester courses and gap analysis report on CO-PO attainment and teaching pedagogy are discussed.

ii. Result analysis on 2019-20 odd semester courses is discussed.

iii. It is suggested to change difference among regular, advanced and Peer Mentor mode of learning in the core subjects as follows
Regular mode courses are to be reassigned as 20CSXXXXRA.
Advanced mode courses are to be reassigned as 20CSXXXXAA.
Peer Mentor courses are to reassigned as 20CSXXXXPA.

iv. Stake holder feedback collected on 2020-21 Admitted batches proposed curriculum is discussed.

Based on feedback from the academic peer the following points are discussed and resolved

a) Dr.P.Radhika, Professor & Principal, Academic Peer recommended to introduce integrated Professional English in the curriculum It helps in preparing students for effective communication, collaboration, and presentation skills in a globalized professional environment, enhancing their employability and career prospects.

b) Arunkumar Gopu, Senior Assistant Professor, Academic Peer proposed Computational Thinking for Design is a valuable curriculum topic as it teaches students how to approach complex problems systematically and creatively using computational principles.

c) Dr. Damodar Reddy Edla, Academic Peer recommend integrating the course DESIGN THINKING & INNOVATION -1 into the curriculum as it equips students with essential problem-solving and creative skills crucial for navigating today's rapidly evolving business landscape. This course fosters a mindset that encourages innovative thinking and solutions.

d) Dr. D. William Albert, Academic Peer strongly recommend integrating the course "Design Thinking & Innovation - 2" into the curriculum as it equips students with

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advanced problem-solving skills and fosters a culture of innovation, essential for success in today's dynamic world.

e) .Cithraleka,Professor, Academic Peer highly recommend leveraging AI for Data Science as a powerful tool for enhancing data analysis capabilities within the curriculum.

f) Dr.P.Harini, Professor & Principal, Academic Peer, proposed "Social Internship" as it allows individuals to work with nonprofit organizations, community groups, or government agencies to address social and community-related issues.

g) P Vamsi Krishna Raja, Professor, Swarnandhra Engineering College, Academic Peer Suggested to include Data Warehousing and Data Mining practices to implement a robust data governance framework and incorporate advanced analytics for improved decision-making and competitiveness for M.Tech Students.

h) A V S Siva Rama rao, Associate Professor, Sasi Institute Of Technology & Engineering, Academic Peer suggested to include machine learning concepts is essential to ensure a strong foundation in this rapidly evolving field for M.Tech Students.

i. Feedback from Alumni

a) AHMEED, Alumni, recommend a comprehensive revision of the syllabus for "Tool-Based Learning (RPA/BLUE PRISM)" to incorporate the latest industry-relevant tools and techniques, ensuring that students are equipped with cutting-edge skills.

b) N PRIYA, Alumni recommend revising the syllabus to incorporate "Tool-Based Learning (Cloud Foundations)" This addition would provide students with practical experience in utilizing contemporary cloud tools, enhancing their hands-on skills and industry readiness.

ii. Feedback from Faculty and course coordinators from Course closure minutes

a) Dr. Prashant Shukla,Professor, Faculty strongly recommend revising the curriculum to incorporate Tool-Based Learning (Programming). This modern educational approach facilitates hands-on experience with industry-standard tools, enhancing students' practical programming skills and preparing them for real-world challenges. Integrating this into the syllabus ensures that students acquire valuable proficiency in tool usage, vital for success in today's tech-driven world.

b) Dr.V.B.V.N.PRASAD and Dr. T. Rajeswari (Course Coordinator), Faculty suggested to revise Aptitude builder as it is a valuable tool for honing skills and enhancing cognitive abilities, providing individuals with the means to excel in academic, professional, and personal endeavours by fostering continuous learning and improvement.

c) B Vijay, Faculty strongly recommend conducting internships separately for the odd and even semesters, rather than as a single combined internship, to provide our students with more focused and meaningful learning experiences.

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d) Dr. C.KARTHIKEYAN, Faculty suggested that the Students are encouraged to do multi-disciplinary projects Recommended to revise the project part1 title as Capstone Project 1.

e) Dr. PRAGNYABAN MISHRA, Associate Professor, Faculty highly recommended the Deep Learning course for its cutting-edge insights and practical applications, essential for anyone aspiring to excel in the field of artificial intelligence.

iii.Feedback from Industry Persons

a) Mr.SAROJ KUMAR DHAKAL, Industry Person recommended that the internship program allows individuals work in technical or STEM-related fields to gain hands-on experience and apply their knowledge and skills.

b) RAMESH KUMAR DACHA, Associate Director, Industry Person suggested the new course "MEA(R)N Stack Web Development" is highly recommended as it equips students with the latest web development technologies, enhancing their career prospects and keeping our curriculum up-to-date.

c) Mr. P S Nagendra Babu, Industry Person strongly recommends the introduction of a "Java Full Stack Development + Microservices" course to the syllabus. This course would provide students with comprehensive skills in full-stack web development, encompassing both front-end and backend technologies, while also incorporating the critical aspect of microservices architecture.

d) Mr. Nimmagadda Ravi Shankar, Industry Personnel, highly recommend incorporating the "Elements of Software Construction" revision into the curriculum as it will provide students with updated knowledge and skills crucial for modern software development.

e) D Shiva Kmar, Scrum Manager Vitusa Pvt Ltd, Industry Person recommended to include "Cloud System Infrastructure" course to equip students with essential skills in managing and leveraging cloud technology for M.Tech Students.

f) A Vamsi Krishna Test Engineer Tech Mahendra, Industry Person recommended incorporating a Cloud Computing course into the curriculum to equip students with essential skills in managing and leveraging cloud technology, a critical component of modern IT infrastructure for M.Tech students.

g) S Sridhar Infosys, Software Engineer, Industry Person recommended to include Programming for Blockchain in curriculum for M.Tech Students as it is crucial to educate students about this transformative technology, fostering a deep understanding of its applications, security considerations for M.Tech students.

iv. As per the negative feedback analysis from stakeholders, the following questions are discussed.

Alumni:

How do you rate the experiments in terms of their relevance to the real life application?

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DAC members are discussed and concluded that, "organizing practical, skill-based programs such as Software Development Projects (SDP) that expose students to real-time global challenges provides them with invaluable hands-on experience".

Industry:

How do you rate the offering of the electives in relation to the Technological advancements?

DAC members are discussed and concluded that, "offering multiple elective courses that align with industrial needs provides students with the flexibility to adapt their technical advancements".

Parent:

How do you rate the sequence of the units in the course?

DAC members are discussed and concluded that, "A well planned course outcomes order, designed by subject experts and course coordinators, ensures a logical and effective flow of topics, enhancing the overall learning experience for students".

Student:

How do you rate the allocation of the credits to the courses?

DAC members are discussed and concluded that, "the allocation of credits to our courses is carefully considered to ensure a balanced and comprehensive curriculum".

Academic Peer:

How do you rate the sequence of the Courses provided in the curriculum?

DAC members are discussed and concluded that, "As per the University policy department conduct meetings regularly to ensure the sequence of the courses, revisions and inclusions of new courses in the curriculum.

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Annexure-2

Course Code: 20UC1101 **Course Name: INTEGRATED PROFESSIONAL ENGLISH**

L-T-P-S: 0-0-4-0 **Credits: 2** **Prerequisite:**
NIL

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Understand the concepts of grammar to improve communication, reading, and writing skills	PO5	2
CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context . Demonstrate ability to face formal situations / interactions.	PO10	2
CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices	PO9	2
CO4	Apply the concepts of writing to draft corporate letters, emails and memos	PO10	3

Syllabus:

Language Mechanics Basic Grammar - Countable and uncountable nouns, present simple and continuous, past simple and continuous – classroom practice – Understand and interpret Texts and work place situations B)Structural Pattern - Present continuous for future arrangements State verbs, Regular and irregular verbs, Voice, Modal verbs – Reporting on going tasks in the corporate world C)Descriptive and Qualitative Patterns: Adjectives and Adverbs classroom practice) Time Expressions, Comparatives and superlatives , Pronouns, Conditionals, Phrases and clauses (Including Relative)

Interactive Listening & Speaking A)Formal contexts: Being a PA, Describing changes in a company Taking orders over the phone B)Listening & Speaking: Participate in conversation with proper contextual language markers and turn taking. Classroom practice- Presenting context, reason, problem – Case analysis (short).C)Body Language: Dos and Don'ts of one to one interaction, Telephone interaction Video/ web conferencing. Culture specific practices. D)Work Etiquette- situation, ambiance, team skills, time management and leadership ability.

Integrated Reading A)Understand and assimilate main ideas and specific details. (250-300 words text of moderate difficulty)B)Read for general understanding, interpreting, factual or specific information, for grammatical accuracy and information transfer.C)Understand the corporate context D)Understand office correspondence

Techniques of Business Correspondence A)Internal Correspondence. Making notes on routine matters, such as, taking/ placing orders B)Emails: Types of emails, salutations, vocabulary used in formal and informal (Including beginnings and endings)C)Writing straight-forward, routine letters of factual nature

Textbooks: Nil

Reference Books:

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1. Business Benchmark Book- Preliminary- 2nd edition Cambridge Press 2019.

2. Business Benchmark Book- Pre Intermediate to Intermediate- 2nd edition Cambridge Press 2019

MOOCS/Web Links:

1. https://www.cambridgeenglish.org/ https://www.cambridgeassessment.org.uk/

2. https://learnenglish.britishcouncil.org

3. https://apps.apple.com/in/app/bec-from-cambridge/id1351207688

4. https://play.google.com/store/apps/details?id=com.liqvid.bec

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Course Code: 20UC1102 **Course Name:** DESIGN THINKING & INNOVATION -1

L-T-P-S:1-0-0-4 **Credits:** 2 **Prerequisite:** NIL

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Understand the basics of design thinking and its implications in product or service development	PO3	2
CO2	Understand and Analyse the requirements of a typical problem	PO6	4
CO3	Plan the necessary activities towards solving the problem through ideation and prototyping	PO8	4
CO4	evaluate the solution and refine them based on the customer feedback	PO5,PSO1	5

Syllabus:

Overview of Design Thinking: Define Design Thinking, Differentiate Design Thinking from Design, 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.

Textbooks:

1.The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20UC1203 **Course Name: DESIGN THINKING & INNOVATION -2**

L-T-P-S:1-0-0-4 **Credits: 2** **Prerequisite: DTI-1**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	compare and select problems suitable for DT projects and use techniques for empathetic research	PO2	2
CO2	identify and document insights, user habits and identify user needs	PO3	3
CO3	Visualise solutions, evaluate solution concepts and able to create rough prototypes, gather feedback	PO5,PO11,PO4	4
CO4	Able to create high-fidelity prototypes. Able to test user experience,Able to identify a business model for a solution concept. Able to estimate financial results	PO4,PO7,PO11	4

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

Textbooks:

1.Wiley Play Book

Reference books:

1.Michael Lewrick, Patrick Link & Larry Leifer: The Design Thinking Play Book. Wiley Press: 2018

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Course Code: 20SC1101 **Course Name: COMPUTATIONAL THINKING FOR DESIGN**

L-T-P-S: 3-0-2-6 **Credits: 5.5** **Prerequisite: NIL**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Design Basic and Complex Building Blocks for real world problems using structured programming paradigm	PO1,PO2	3
CO2	Translate computational thinking into Logic Design for Solving real world problems	PO2,PO1	3
CO3	Apply and Analyse CRUD operations on Basic Data Structures using Asymptotic Notations.	PO1,PO2	4
CO4	Apply and Analyse CRUD operations on Linear Data Structures using Asymptotic Notations.	PO4	4
CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems	PO1,PO2,PO4	3

Syllabus:

Structured Programming Paradigm: Problem Solving Approach, Algorithms and Algorithm Analysis, Program Development Steps, Structure of C Program, Pre-Processor Directives, Design of Building Blocks for solving real world problems : Modularization: Functions, Scope of Variables and Storage classes , Data Types: Primitive, Extended and Derived Including Pointers, Operators: Types of operators, Precedence, Associativity , User I/O: Formatted I/O, Command line arguments, Redirecting I/O :Files and File Operations. Logic Design for Computational Thinking: Control Flow Statements: Decision Making using conditional statements, Definite and indefinite Iterative statements. Recursion, logic building using complex building blocks. CRUD operations on Basic Data Structures: Basic Data Structure: Arrays, 2-D Arrays, Dynamic Memory Allocation Searching: Linear Search and Binary Search Sorting: Bubble Sort CRUD operations on Linear Data Structures : Stacks, Queues and Single Linked List. Introduction to Trees.

Textbooks:

1. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language: ANSI C Version", 2/e, Prentice-Hall/Pearson Education-2005.
2. 2. E. Balagurusamy, "Programming in ANSI C" 4th ed.,Tata McGraw-Hill Education, 2008.
3. 3. R. F. Gilberg, B. A. Forouzan, "Data Structures", 2nd Edition, Thomson India Edition-2005.

Reference Books:

1. Mark Allen weiss, Data Structures and Algorithm Analysis in C, 2008, Third Edition, Pearson Education.
2. Horowitz, Sahni, Anderson Freed, "Fundamentals of Data structures in C", 2nd Edition-2007.
3. Robert Kruse, C. L. Tondo, Bruce Leung, Shashi Mogalla, "Data structures and Program Design in C", 4th Edition-2007. 4
4. C for Engineers and Scientists – An Interpretive Approach by Harry H. Cheng, Mc Graw Hill International Edition-2010.
5. Jeri R. Hanly, Elliot B. Koffman, "Problem Solving and Program Design in C", 7/e, Pearson Education-2004.
6. Jean Paul Trembly Paul G.Sorenson, "An Introduction to Data Structures with applications", 2nd Edition.

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MOOCS/Web Links:

1. www.hackerrank.com
2. www.codechef.com
3. www.spoj.com
4. https://www.coursera.org/programs/coursera-response-program-for-kl-university-dkj6o/browse?productId=hPTXdasoEeiY5QqSMz6eiA&productType=s12n&query=Computational+Thinking+&showMiniModal=true

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20CS2221RA **Course Name: AI FOR DATA SCIENCE**

L-T-P-S: 3-0-2-4 **Credits: 5** **Prerequisite: MATHEMATICS FOR COMPUTING**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Understand Artificial Intelligence as Representation and Search. Apply Logic Programming	PSO2,PO1	3
CO2	Understand Data preprocessing, analysis and manipulation. Apply Importing, Summarizing, and Visualizing Data, and Feature selection	PO3,PSO2	3
CO3	Predict outcomes using regression and learn how to classify data. Discover hidden patterns and capture the possible natural groupings in the data	PSO2,PO2	3
CO4	Understand Data Science Algorithms for Association analysis, Anomaly detection, Deep learning, Recommenders, Time series forecasting	PSO2,PO2	2
CO5	Implement real world applications related to AI and Data Science	PSO2,PO5	4

Syllabus:

Intuition of artificial intelligence, Applications of AI, Search fundamentals, the intuition of planning and searching, Intelligent search, Uninformed search strategies-BFS, DFS, Iterative deepening, bidirectional search. Heuristic Search Techniques: Greedy BFS, A*, AO*, Memory bounded heuristic functions. Local & Adversarial search: Optimization problems, hill climbing search, simulated annealing, local beam search, genetic algorithms. Optimal decisions in games, alpha beta pruning, cutting of search, forward pruning, Constraint satisfaction problems: Inference in CSPs, back tracking search for CSPs, Cannibals and missionaries problem using CSP, Solving puzzles using AI: Tic-tac-toe, Sudoku. Knowledge and reasoning: knowledge-based agents, Logic, propositional logics, and horn clauses, first order logic, Inference in first order logic, Propositional versus first order inference, unification and lifting, forward & backward chaining, resolution, Conceptual dependency, Semantic nets. Handing uncertainty: Quantifying uncertainty, basic probability notation, Bayes' theorem, Probabilistic reasoning, representation of conditional distributions, probabilistic reasoning overtime, Hidden Markov model, Introduction to Neural Networks: Perceptrons, Back propagation networks. Data Science Process: Introduction to Data Science, Understanding the types of data, Big data overview, Overview of Data Analytics Lifecycle, Discovery, Data Preparation, Model Planning, Model Building, Communicating Results and Findings, Operationalizing. Data Analytics Process, Exploratory Data Analysis (EDA), EDA-Quantitative Technique, EDA - Graphical Technique, Data Analytics Conclusion or Predictions. Big Data Exploration, Importing, Summarizing, and Visualizing Data: Data Analytics Communication, Data Types for Plotting Data Types and Plotting, Simple Line Plots, Simple Scatter Plots, Visualizing Errors, Density and Contour Plots, Histograms, Binnings, and Density, Customizing Plot Legends, Customizing Colour bars, Multiple Subplots. Data analysis and manipulation using Pandas. Probability and Independence-Using independence to find probabilities, Pairwise and mutual independence, Bernoulli Scheme,Law of total probability. Random variables, probability distribution functions, Variance, covariance, and correlation-Linear transformations of random variables, Functions of random variables, Geometric and Poisson distributions Aggregation and Grouping, Pivot Tables, Vectorized String Operations. Data Pre-processing: Feature Selection: Introduction to Feature selection techniques (Filter methods, Wrapper methods, Embedded methods, Hybrid methods). Outlier

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Detection: What Are Outliers? Types of Outliers, Challenges of Outlier Detection. Introduction to different types of Learning methods, Classification: Introduction to Classification and applications, k-Nearest Neighbours, Decision Trees, Support Vector Machine, Naive Bayes, Random Forest, Gradient Boosting, performance metrics (Precision, Recall, F-Measure). Regression Methods: Linear Regression, Polynomial Regression, Logistic Regression. Association Analysis: Association analysis with the Apriori algorithm. Clustering: Unsupervised Learning and their Techniques. What Is Cluster Analysis. Requirements for Cluster Analysis. Overview of Basic Clustering Methods. Partitioning Methods: k-Means: A Centroid-Based Technique. Text Mining: overview of natural language processing techniques and text representation, mixture models and how they work, Expectation-Maximization (EM) algorithm and how it can be used to estimate parameters of a mixture model. Time Series Forecasting: The fundamentals of Statistical Time Series analysis, the study of correlated random variables over time. Descriptive methods to describe trends, seasonal patterns, and autocorrelation in time series data. Working with Time Series, High-Performance Pandas: eval() and query(). Time Domain Methods of analysis such as Autoregression and ARIMA modelling will be presented. Frequency Domain Methods will also be covered. Anomaly Detection, Recommendation Engines, Introduction to deep Learning- Model Evaluation: goal-based, process-based, and outcomes-based, Efficient Model Execution

Textbooks:

1. Russel and Norvig, 'Artificial Intelligence', third edition, Pearson Education, PHI, (2015)

2. Deshpande, BalachandreKotu, Vijay - Data science_ concepts and practice (2019, Elsevier)

3. Data science Hand book – Field cady- wiley

Reference Books:

1. Statistical inference for data science-Brian Caffo

2. Introducing Data science by Davy cielen, Arno D.B.Meysmen, Mohamed Ali RishalHurbans - Grokking Artificial Intelligence Algorithms (2020, Manning Publications)

3. Forecasting: principles and practice by Rob J Hyndman and George Athanasopoulos, 3rd Edition, OTexts.

4. Zacharias Voulgaris, Yunus Emrah Bulut - AI for Data Science_ Artificial Intelligence Frameworks and Functionality for Deep Learning, Optimization, and Beyond (2018, Technics Publications)

5. Usman Qamar, Muhammad Summair Raza - Data Science Concepts and Techniques with Applications (2020, Springer)

6. Elaine Rich & Kevin Knight, 'Artificial Intelligence', 3nd Edition, Tata McGrawHill Edition, Reprint(2008)

MOOCS/Web Links:

1. https://www.linkedin.com/learning/artificial-intelligencefoundations-machine-learning

2. https://www.coursera.org/learn/python-for-datavisualization#

3. https://www.linkedin.com/learning/artificial-intelligencefoundations-machine-learning

4. https://www.coursera.org/learn/python-for-datavisualization#

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20IE2050 **Course Name: SOCIAL INTERNSHIP**

L-T-P-S: 0-0-0-8 **Credits: 2** **Prerequisite: NIL**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Remember the fundamentals of the science of water cycle along with powerful tools that students can use to diagnose the health of the local water cycle as well as develop targeted action plans to restore the local natural water cycle and bring water prosperity	PO9,PSO1,PO1,PO3	1
CO2	Remember the water sustainability and water resilience of village, city, residential facilities and households using multi-level water scorecards	PSO2,PO4,PO5	1
CO3	Apply the design thinking positive action plan for a village, campus, residential facility and community neighborhood.	PO5,PO7,PO9	3
CO4	Applying the water positive solutions within an urban watershed, a rural watershed, residential institutional and corporate community	PO1,PO8,PSO1	3

Syllabus:

The module will cover the following 1) Science of Natural Water Cycle 2) Watershed death spiral that is the cause of climate change 3) Water Literacy - Know how water flows in your city, in your residential community and inside your own home. 4) Design Thinking Process 5) Water Accounting - Water Scorecard Tools to rapidly assess and account for water sustainability security & resilience of your own household, your residential community & your city 6) Basic Hydrology 7) Groundwater Fundamentals 8) Water Cycle and Biodiversity 9) Nature Based Solutions to Restore & Repair the Local Natural Water Cycle 10) Model prototype

Text Books: Nil

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code:20TS2101S **Course Name: MEA(R)N STACK WEB DEVELOPMENT**

L-T-P-S: 0-0-0-8 **Credits: 2** **Prerequisite: OOP**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Build full stack web applications using the MongoDB, Express JS, React & Node JS Full Stack framework	PSO1,PO2,PO3	3
CO2	Build React Native Apps and use Redux for state management	PSO1,PO3	3
CO3	Apply the object-oriented programming concepts for building design patterns, data structures and collections framework	PO1,PO2	3
CO4	Apply JUNIT framework for Test Driven Development and apply the JDBC concepts for CRUD operations	PO1,PO2	3

Syllabus:

MEA(R)N Stack Web Development: Fundamentals of Web Apps, Single Page App, Full Stack Web Development, Introduction to React, JavaScript, Component State, Event Handlers, Debugging React Apps, Rendering a collection module, Forms. Node.js & Express, REST, HTTP request types, Middleware, Deploying App, Mongo DB, Validation & ES Lint. Testing Express servers, user administration, Testing React apps, State management with Redux, React router, Custom hooks, Styling app with CSS and Webpack, GraphQL. Advanced Java: Modularisation, Array based logic building, Console based iterative applications, Object oriented concepts, Constructor chaining, Data hiding, String manipulation algorithms, Inheritance, Class abstraction, Dynamic method dispatch, Singleton class – lazy and early instantiation, Factory method pattern, Abstract factory pattern, Aggregator classes and Dependency injection, Inversion of control. Interfaces, Comparable, Comparator, Cloneable interfaces, Generic classes, Building abstract data structures – stack, queue, linked list and BST, Collections framework - TreeSet, Hash Set, Tree Map, Hash Map and other collections. Design patterns - decorator, adapter, strategy and observer patterns, chain of responsibility, command pattern and iterator pattern, Null Object pattern and template methods. Test driven development, XUnit framework, JUnit, Assertions, Clean coding techniques to handle bloaters, Object-oriented abusers, Couplers and dispensables. SOLID Design principles with emphasis on loose coupling and strong Cohesion. Java Database Connectivity, establishing connection to the MySQL database, Handling DML, DDL and DCL SQL statements using JDBC.

Textbooks:

1. The Full Stack Developer, Author: Chris Northwood.

2. Herbert Schildt, "Java, The Complete Reference", Ninth Edition, Oracle Press, 2018.

3. H.M.Deitel, P.J.Deitel, S.E.Santry, " Advanced Java 2 Platform How to Program", 3rd Edition, Prentice Hall Publications.

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Reference Books:

1. Mongo DB – The Definitive Guide by Krishna Chodorow, Publisher: Oreily, Second Edition. 2. Mastering Mongo DB 4.x by Alex Giamas, Publisher: Packt, Second Edition.

3. Introduction to Java Programming and Data Structures, Comprehensive Version – by Daniel Liang. 11th Edition, Pearson Publications

4. Paul J.Dietel and Dr.HarveyM.Deitel, "Java How to Program", 9th Edition, Prentice-Hall, Pearson Education, 2016.

5. David Geary, Cay S.Horstmann "Core JavaServer Faces" Third edition, 2016, Prentice Hall.

6. Jim Keogh, "The Complete reference to J2EE", reprint 2017, Tata McGrawHill

MOOCS/Web Links:

1. Intro to TypeScript - https://www.udemy.com/course/understanding-typescript/

2. AngularUsing TypeScript - https://www.coursera.org/learn/angular/

3. Intro to MongoDB - https://www.coursera.org/learn/introduction-mongodb/

4. Node and Express Using TypeScript - https://www.udemy.com/course/typescript-asyncawait-in-node-js-with-testing/

5. React Using TypeScript - https://www.udemy.com/course/react-with-typescript/

6. Java Begginers - https://beginnersbook.com/java-tutorial- for-beginners-with-examples/

7. Complete JDBC Programming Part-1 - https://www.udemy.com/complete-jdbc-programming-part-1/

8. Complete JDBC Programming Part-2 - https://www.udemy.com/complete-jdbc-programming-part-2/

9. An Intro to Git and GitHub for Beginners - https://product.hubspot.com/blog/git-and-github-tutorial-for-beginners/

10. GIT Handbook - https://guides.github.com/introduction/git-handbook/

11. Modern Web Development with MEAN and React - https://fullstackopen.com/en/

12. Coursera Full-Stack Web Development with React Specialization - https://www.coursera.org/specializations/fullstack-react/

13. Become a React Developer - https://www.linkedin.com/learning/paths/becomea-react- developer/

14. Become a React Native Developer - https://www.linkedin.com/learning/paths/becomea-react-native-developer/

15. Object Oriented Programming in Java Specialization - https://www.coursera.org/specializations/object-oriented-programming/

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code:20TS3101RA **Course Name: JAVA FULL STACK DEVELOPMENT+MICRO SERVICES**

L-T-P-S: 0-0-0-8 **Credits: 2** **Prerequisite: OOP**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Build full stack web applications using the MongoDB, Express JS, React & Node JS Full Stack framework	PSO1,PO2,PO3	3
CO2	Build React Native Apps and use Redux for state management	PSO1,PO3	3
CO3	Apply the object-oriented programming concepts for building design patterns, data structures and collections framework	PO1,PO2	3
CO4	Apply JUNIT framework for Test Driven Development and apply the JDBC concepts for CRUD operations	PO1,PO2	3

Syllabus:

JDBC API - Introduction to JDBC API, Type of Drivers in JDBC, Statement, Prepared Statement, Callable Statement, Result Set Meta Data, Database Meta Data, Scrollable & Updatable Result Set, Transaction Management in JDBC. JUnit - Introduction to JUnit framework, JUnit Environment Setup, Features of Junit Framework, Junit Framework and its Implementation. Servlets - Introduction to Servlets, Lifecycle, Init and context parameters, Servlet Collaboration, Session Tracking Techniques, Servlet CRUD Operations. JSP – Servlets vs JSP, JSP Architecture and Lifecycle, JSP Scripting Elements, Session Tracking Techniques, JSP Implicit Objects, JSP Directive Elements, JSP Action Tags, JSP MVC Architecture, JSP CRUD Operations. Hibernate – JDBC Vs Hibernate, Introduction to Hibernate Framework, Advantages, XML & Annotation based Hibernate CRUD Operations, Generator Classes in Hibernate, HQL, HCQL.Maven – Introduction to Maven Repository, Maven Directory Structure. Maven Project and Dependencies. Maven Build Lifecycles, Phases and Goals. Maven Repository with different archetypes Spring and Spring Boot – Introduction to Spring, Spring Architecture, Spring Vs Spring Boot, Maven Repository, Introduction to Spring Boot, Advantages of Spring Boot over Spring, Dependency Injection (DI), Inversion of Control (IoC), Creating Spring starter project, Hello World Application using Spring Boot, Spring Boot Autowire, Web Application MVC using Spring Boot, Spring Boot CRUD Operations with Spring MVC, Spring Boot with RESTful Web Service, Spring Boot and RESTful API Vs REST API with JSON, Spring Boot and Hibernate CRUD Operations, Microservices with Spring – monolithic vs micro-service Architecture, SOA vs Microservices, Spring Boot Microservices with Spring Cloud.

Textbooks:

1. Web Technologies: Concepts, Methodologies, Tools, and Applications, Information Science Reference,4th edition, Arthur Tatnall

2. Spring and Hibernate, Tata McGraw-Hill Education,2009, Santosh Kumar k

3. Beginning Spring Boot 2 Applications and Microservices with the Spring Framework, Apress,1st edition, K. Siva Prasad Reddy

4. Learning GraphQL: Declarative Data Fetching for Modern Web Apps, 1st Edition, Eve Porcello (Author), Alex Banks

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5. Java Persistence with Hibernate, Manning Publications,2nd edition, Christian Bauer, Gavin King,Gary Gregory

6. Java: A Beginner's Guide, Herbert Schildt, 8th edition, McGraw Hill Education.

7. Java-The complete reference, Herbert Schildt, 11th edition, McGraw Hill Education.

8. Learn Python 3 The Hard Way, by Zed A. Shaw

9. Headfirst Python: A Brain Friendly Guide, by Paul Barry

Reference Books:

1. Java The Complete Reference - Eleventh Edition, Herbert Schildt

2. J2EE: The complete reference by James Keogh, publisher: McGraw-Hill Osborne Media, 1st Edition, 2002.

3. Spring in Practice by Willie Wheeler with Joshua White, publisher: Manning, shelter Island

4. Java Persistence with Hibernate, Manning Publications,2nd edition, Christian Bauer, Gavin King, Gary Gregory

5. Introduction to Java Spring Boot: Learning by Coding, Dave Wolf, Afua Ankomah, Jennifer Le

6. Full Stack Java Development with Spring MVC, Hibernate, jQuery, and Bootstrap - Mayur Ramgir

MOOCS/Web Links:

1. Spring Framework Specialization: https://www.coursera.org/specializations/spring-framework

2. Spring MVC, Spring Boot and Rest Controllers: https://www.coursera.org/learn/spring-mvc-rest-controller

3.Java Servlet Pages (JSPs): https://www.coursera.org/learn/java-servlet-pages?=

4. Building Cloud Services with the Java Spring Framework: https://www.coursera.org/learn/cloud-services-java-spring-framework

5.Building Scalable Java Microservices with Spring Boot and Spring Cloud: https://www.coursera.org/learn/google-cloud-java-spring

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20TS1005 **Course Name: TOOL BASED LEARNING (CLOUD FOUNDATIONS)**

L-T-P-S: 0-0-0-4 **Credits: 1** **Prerequisite: NIL**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Skill based -Build a real world and scalable full stack application using Serverless technologies	PO3,PO4,PSO1	4

Syllabus:

Cloud Concepts, Define the AWS Cloud and its value proposition, identify aspects of AWS Cloud economics,Explain the different cloud architecture design principles.Security and Compliance, Define the AWS shared responsibility model,AWS Cloud security and compliance concepts, Identify AWS access management capabilities,Identify resources for security support,Technology. Define methods of deploying and operating in the AWS Cloud,Define the AWS global infrastructure,Identify the core AWS services,Billing and Pricing,Compare and contrast the various pricing models for AWS. Recognize the various account structures in relation to AWS billing and pricing,Identify resources available for billing support.

Textbooks:

1. AWS Certified Cloud Practitioner Study Guide:by Ben Piper (Author), David Clinton (Author), First, Sybex

2. Cloud Computing Bible, Barrie Sosinsky, 2011, John Wiley & Sons

3. Mastering Cloud Computing Foundations and Applications Programming, Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, 2013, Morgan Kauffman, Elsevier

4. Full Stack Serverless_ Modern Application Development with React, AWS, and GraphQL, Nader Dabit, 2013, O'Reilly Media, Inc.

MOOCS/Web Links:

1. AWS CLOUD PRACTITIONER: https://aws.amazon.com/certification/certified-cloud-practitioner/?trk=662aeb66-1ee5-4842-b706-60c6a1b4f187&sc_channel=ps&ef_id=EAIaIQobChMIu9S2ksbW_wIVQZJmAh2p1gHfEAAYASAAEgJpmfD_BwE:G:s&s_kwcid=AL!4422!3!508672715014!e!!g!!aws%20cloud%20practitioner%20certification!1113824348 3!106933367222

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20TS2006 **Course Name: TOOL BASED LEARNING (BLUEPRISM)**

L-T-P-S: 0-0-0-4 **Credits: 1** **Prerequisite: NIL**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Skill based -The Robotic Process Automation (RPA) specialization offers comprehensive knowledge and professional-level skills focused on developing and deploying software robots.	PO3,PO4,PSO1	4

Syllabus:

Blue Prism Infrastructure and Installation, Blue Prism Infrastructure, Installation and Administration, Background of Blue Prism, Essentials and setup for the Blue Prism, How Blue Prism works & areas of RPA, Infrastructure and Installation, Java Access Bridge and Login Agent. Blue Prism Administration, Users, Roles and Permission, Object Studio, Process Studio, Development, Basic actions in Blue Prism, Object in the context of business and Blue Prism, Process – business and Blue Prism context. Actions in the Object and Process Studio, Object Studio – Object flow. Process Studio – Process Flow, Correct use of data types, session and environment variables, System Manager, Exception Handling and case management, Publishing process in control room, Control Room resource and session mgmt, Basic VBO's – in built VBO's, Basic work queues – all the templates, Blue Prism internal calculation functions, How to debug process solutions. Introduction to Work Queues, Working Items, Queue Items, Work Queue Configuration. Deferring Items, Exception Item Retries.

Textbooks:

1 . Learning Robotic Process Automation, Alok Mani Tripathi Packt, Publishing , 2016.

2 . Robotic Process Automation with Blue Prism Quick Start Guide Lim Mei ,Ying Packt Publishing, 2020.

3 . Blue Prism for RPA Projects: Learn Blue Prism End to End Vullam Kindle edition 2020.

4. Robotic Process Automation with Blue Prism Quick Start Guide: Create Software Robots and Automate Business Processes By Ying , Kindle edition, 2016.

MOOCS/Web Links:

1. https://university.blueprism.com/certification/associate-developer

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20TS1006 **Course Name: TOOL BASED LEARNING (GOOGLE CLOUD)**

L-T-P-S: 0- 0- 0-4 **Credits: 1** **Prerequisite: NIL**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Skill Based- Deploys and secures applications and infrastructure, monitors operations of multiple projects, and maintains enterprise solutions to ensure that they meet target performance metrics.	PO3,PO4,PSO1	5

Syllabus:

Setting up a cloud solution environment: Setting up cloud projects and accounts, Managing billing configuration, Installing and configuring the command line interface (CLI), specifically the Cloud SDK (e.g., setting the default project). Planning and configuring a cloud solution: Planning and estimating GCP product use using the Pricing Calculator ,Planning and configuring compute resources, Planning and configuring data storage options, Planning and configuring network resources. Deploying and implementing a cloud solution: Deploying and implementing Compute Engine resources, Deploying and implementing Google Kubernetes Engine resources, Deploying and implementing App Engine, Cloud Run, and Cloud Functions resources, Deploying and implementing data solutions, Deploying and implementing networking resources, Deploying a solution using Cloud Marketplace, Deploying application infrastructure using Cloud Deployment Manager. Ensuring successful operation of a cloud solution: Managing Compute Engine resources, Managing Google Kubernetes Engine resources, Managing App Engine and Cloud Run resources, Managing storage and database solutions, Managing networking resources, Monitoring and logging. Configuring access and security: Managing identity and access management (IAM), Managing service accounts, Viewing audit logs for project and managed services.

Reference Books:

1. Google Cloud Certified Associate Cloud Engineer Study Guide, Dan Sullivan, WILEY 2019.
2. Google Cloud Certified Associate Cloud Engineer All-in-One Exam Guide, Jack Hyman, McGraw-Hil Education, 2020.
3. Google Cloud Certified Associate Cloud Engineer Study Guide, 2nd Edition, Dan Sullivan, WILEY 2023.
4. https://cloud.google.com/learn/certification/guides/cloud-engineer

MOOCS/Web Links:

1. https://cloud.google.com/learn/certification/cloud-engineer

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20TS2007 (UI PATH(UP)) **Course Name: TOOL BASED LEARNING**

L-T-P-S: 0- 0- 0-4 **Credits: 1** **Prerequisite: NIL**

CO#	Course Outcome (CO)	PO / PSO	BTL
CO1	Apply the methods involved in the concept of a UI Path.	PO2,PO4, PSO1	3
CO2	Apply the Classification models of a UI path and Robotic Process Automation	PO2,PO4, PSO2	3
CO3	Apply the concept of a UiPath Studio and Automation Fundamental in a Strategically Plan	PO2,PO4, PSO2	3

Syllabus:

Tool Based UI Path Building Blocks: Installation and activation: UI Path Introduction, Interfaces, Different types of workflows, Creating-a-basic-workflow, Debugging, Managing packages, Reusing Library, Installing-the-extension-for-Ui Path-studio, Source control, Workflow, Control Flow, Sequences, Flowcharts, State Machines

Scraping: UI Elements, Examples-of-using-output-or-screen-scraping-methods, - Image and Text Automation, About-image-and-text-automation, Mouse-and-keyboard-activities, Guides/text-activities, Guides/ocr-activities, Image-activities, Mouse-and-keyboard-automation, Text-automation, OCR-and-image-automation

UiPath Orchestrator, Front + Back Office Robots: Orchestrator Overview, Orchestrator Hosting, Robots Hosting, Processing Hosting, Process Monitoring

Reference Books:

1. UI Path Process Automation: A Primer, Jonathan Smith, Create space Independent Publishing Platform, 2017

2. Practical UI Path Process Automation: Enterprise Blue Prism, Syed Ali, Apress, 2018.

3. UI Path Process Automation and Risk Mitigation: The Definitive Guide, Edward Brooks, Renee Mestad, CFPIM, CIRM, CSCP, SCOR-P, 2021.

4. UI Path Process Automation and Artificial Intelligence: Quickly master the next wave of the digital economy, Markus Kirchberg, Independently published, 2017.

MOOCS/Web Links:

1. https://www.uipath.com/rpa/academy/certifications

2. https://www.uipath.com/rpa/academy/certifications

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 20TS2008 **Course Name: TOOL BASED LEARNING (ROBOTIC PROCESS AUTOMATION(RPA))**

L-T-P-S: 0- 0- 0-4 **Credits: 1** **Prerequisite: NIL**

Syllabus:

Introduction: Introduction to RPA, Scope and Techniques of Automation, Components of RPA, RPA Platforms and Comparison, Introduction to Automation Anywhere, Automation Anywhere Architecture, Task Recorder: Smart Recorder, Screen Recorder and Web Recorder, Introduction to Workbench, Inserting Mouse Click, Mouse Moves and KeyStrokes, Variables and Variable Manager, Variable Operations, Reading User Input-Prompt Command, If/Else Commands: Files/Folders, Windows, Applications, Task and Variable.

File Operations & Reading Data: Basic Files and Folder Commands, Read from Text/CSV, Usage of Filedata Column Variables, Introduction to Excel Automation, Usage of Excel Column Variables, Loops, String Operations, Introduction to Object Cloning, Usage of Excel Column/Filedata Column Variables with Object Cloning, PDF Integration, OCR.

Error Handling & Email Automation: Introduction to Error Handling, Error Handling options: Snapshot, Run Task, Log Data into File, Send e-mail and Variable Assignment, Send Mail Command, Read Mails, Delete Mails, Certificate Generation and Mailing.

Control Room & AA Client: Introduction to Control Room, Control Room Components: Dashboard, Repository Manager, Operations Room, User Management, Task Schedules, Security and Application Manager, AA Client: Properties, Schedule and Trigger.

MOOCS/Web Links:

1. https://university.automationanywhere.com/rpa-learningtrails/automation-anywhere-university-essential-level-prep-courses-engineering-students/
2. https://university.automationanywhere.com/rpa-learning-trails/advanced-rpa-professional/

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-2(0)

B.Tech - Computer Science and Engineering 2020-21 Syllabus Revision

Course Code	Course Name	Course Category	Existing Syllabus	New Syllabus	Topics Added /Removed/Replaced	Change in Outcome	Justification for the Modification	*Overall Revision Percentage
20UC3005	APTITUDE BUILDER	HSS	CO1-Sentence completion, Idioms and phrases, One word Substitutes, Sentence improvement, , Sentence Equivalence, Analogies CO2- Attitude, Empathy Vs Sympathy, curriculum Vitae, Workplace Etiquette, Group Discussion, Persuasion and Negotiation, Conflict Resolution CO3- Progressions, Mensuration, Quadratic Equations & Inequalities, Logarithms, Data Interpretation and Data Sufficiency CO4- Ranking and Time Sequence , Symbols and Notations , Nonverbal Reasoning, Connectives, Blood relations and Data Sufficiency	CO1-Sentence completion, Idioms and phrases, One word Substitutes, Sentence improvement, , Sentence Equivalence, Analogies CO2- Attitude, Empathy Vs Sympathy, curriculum Vitae, Workplace Etiquette, Group Discussion, Persuasion and Negotiation, Conflict Resolution CO3- Progressions, Mensuration, Quadratic Equations & Inequalities, Logarithms, Data Interpretation and Data Sufficiency CO4- Ranking and Time Sequence , Symbols and Notations , Nonverbal Reasoning, Connectives, Blood relations and Data Sufficiency	All four CO's Replaced	CO1, CO2, CO3, CO4	1. Develop effective communication and listening skills. 2. Develop problem-solving and negotiation skills. 3. Build and maintain positive relationships.	60%
20CS2205R	ELEMENTS OF	PC	Software and Software Engineering: Nature of	Software and Software Engineering: Nature of	Added: CO2:Agile Modeling,	CO2, CO3	1. Improve Software	30%

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Course Code	Course Name	Course Category	Existing Syllabus	New Syllabus	Topics Added /Removed/Replaced	Change in Outcome	Justification for the Modification	*Overall Revision Percentage
	SOFTWARE CONSTRUCTION		software, software application domains, unique nature of web applications, software engineering, software process, software engineering practice, software myths. Process Models: Generic process model, prescriptive process models, specialized process models, unified process, personal and team process models, product and process, Reverse Engineering: Reverse Engineering to Understand Data, Reverse Engineering to Understand Processing, Reverse Engineering User Interfaces. Understanding Requirements: Identify stakeholders, recognizing multiple viewpoints, eliciting requirements, Building requirement model, negotiating requirements, validating requirements, SRS Vs User	software, software application domains, unique nature of web applications, software engineering, software process, software engineering practice, software myths. Process Models: Generic process model, prescriptive process models, specialized process models, unified process, personal and team process models, product and process, Reverse Engineering: Reverse Engineering to Understand Data, Reverse Engineering to Understand Processing, Reverse Engineering User Interfaces. Understanding Requirements: Identify stakeholders, recognizing multiple viewpoints, eliciting requirements, Building requirement model, negotiating requirements, validating requirements, SRS Vs User	Extreme Programming, Scrum, Kanban, SAFe Methodology. CO3:Scrum: Scrum Introduction, Scrum Principles, Lifecycle of scrum, Adoption Strategies, common mistakes and misunderstandings of scrum, Process Mixtures of scrum. Kanban: Kanban Introduction, Kanban Foundational Principles, 6 Core Practices of the Kanban, WIP Limits in Kanban, SAFe Methodology: SAFe Methodology Introduction, Foundations of Scaled Agile Framework, SAFe Lean-Agile Principles, principles of Agile Manifesto.		Development Skills. 2. Understand the basics of Scrum, including its roles, artifacts, and ceremonies. 3. Master the Scrum lifecycle, from sprint planning to sprint review and retrospective.	

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Course Code	Course Name	Course Category	Existing Syllabus	New Syllabus	Topics Added /Removed/Replaced	Change in Outcome	Justification for the Modification	*Overall Revision Percentage
			Stories. Test Driven Development: Basics, A strategic approach to software testing, strategic issues, test strategies for conventional software, Black-Box and White-Box testing, validation testing, system testing. Performing TDD Test, TDD Vs Traditional Testing, Acceptance TDD and Developer TDD, Scaling TDD via Agile Model Driven Development (AMDD), Test Driven Development (TDD) Vs. Agile Model Driven Development (AMDD), Examples of TDD, and Benefits of TDD. JUnit. The CMMI process improvement framework: CMMI, Levels, Staged CMMI model, Continuous CMMI model, Six Sigma Model	Stories. Agile Modeling, Extreme Programming. Scrum: Scrum Introduction, Scrum Principles, Lifecycle of scrum, Adoption Strategies, common mistakes and misunderstandings of scrum, Process Mixtures of scrum. Kanban: Kanban Introduction, Kanban Foundational Principles, 6 Core Practices of the Kanban, WIP Limits in Kanban, SAFe Methodology: SAFe Methodology Introduction, Foundations of Scaled Agile Framework, SAFe Lean-Agile Principles, principles of Agile Manifesto. Test Driven Development: Basics. A strategic approach to software testing: strategic issues, test strategies for conventional software, Black-Box and White-Box testing, validation testing,				

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				system testing. Performing TDD Test, TDD Vs Traditional Testing, Acceptance TDD and Developer TDD, Scaling TDD via Agile Model Driven Development (AMDD), Test Driven Development (TDD) Vs. Agile Model Driven Development (AMDD), Examples of TDD, and Benefits of TDD. JUnit. The CMMI process improvement framework: CMMI, Levels, Staged CMMI model, Continuous CMMI model, Six Sigma Model				
20TS2290RA	PYTHON FULL STACK DEVELOPMENT	SDC	PYTHON Attributes, Properties, Methods and Types. NameSpaces, Constructors, OOps Concepts- Inher Time, OS, Random, RE. File Handling. GIT- Git Integration with PYcharm IDE, GIT Commands PyTestsIntroduction, Installation, integrating pytest to Pycharm IDE,	PYTHON Attributes, Properties, Methods and Types. NameSpaces, Constructors, OOps Concepts- Inher Time, OS, Random, RE. File Handling. GIT- Git Integration with PYcharm IDE, GIT Commands PyTestsIntroduction, Installation, integrating pytest to Pycharm IDE,	Added: CO4:Identifying and fixing security threats in Django framework based web applications. Penetration Testing Tools: Nmap, dirb, gobuster, john the ripper,curl,nikto, Searchsploit,burpsuite,sqlmap	CO4	1. Essential for developers who want to create secure and reliable applications. 2. Developers can help to protect users' data, meet compliance requirements,	10%

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			Assertions, Running subset of tests from test suite, Run tests in parallel, fixtures, parameterized tests, Python connectivity with Databases MYSQL, MongoDB CRUD operations. Flask Introduction, Introduction to Web Key features and key terms in Web, Client-Server Architecture, About Flask framework, Characteristics of Flask framework, Installation in Virtual Environment, Flask application structure, Phases in Flask Application Creation, Routing, App Settings, URL Building, HTTP methods, Templates, Working with Static, Media Files, Request Objects, Sending Form Data to Template, Advanced Features of Flask, Pagination, Database connectivity MongoDB, Sqlite3, MySQL, Page	Assertions, Running subset of tests from test suite, Run tests in parallel, fixtures, parameterized tests, Python connectivity with Databases MYSQL, MongoDB CRUD operations. Flask Introduction, Introduction to Web Key features and key terms in Web, Client-Server Architecture, About Flask framework, Characteristics of Flask framework, Installation in Virtual Environment, Flask application structure, Phases in Flask Application Creation, Routing, App Settings, URL Building, HTTP methods, Templates, Working with Static, Media Files, Request Objects, Sending Form Data to Template, Advanced Features of Flask, Pagination, Database connectivity MongoDB, Sqlite3, MySQL, Page			and reduce the risk of downtime.	

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Course Code	Course Name	Course Category	Existing Syllabus	New Syllabus	Topics Added /Removed/Replaced	Change in Outcome	Justification for the Modification	*Overall Revision Percentage
			Restrictions using decorators, Cookies, Sessions Handling Exceptions and Errors, Flash Message, Working with Mails, App Deployment, Introduction: Introduction to Web, Key features and key terms in Web, Client-Server Architecture, Features of Django framework, Characteristics of Django framework, Installation in Virtual Environment Django commands, Phases in Django Project Creation, Create a Project, Creation of Apps and their Structure, Working with ADMIN, Console, Creating Views, URL Mapping, Template System, Working with Models, Page Re-directions, Set-up E-Mails, Types of Views, Form Processing, static, media files handling, Advanced Features of Django, Pagination,	Restrictions using decorators, Cookies, Sessions Handling Exceptions and Errors, Flash Message, Working with Mails, App Deployment, Introduction: Introduction to Web, Key features and key terms in Web, Client-Server Architecture, Features of Django framework, Characteristics of Django framework, Installation in Virtual Environment Django commands, Phases in Django Project Creation, Create a Project, Creation of Apps and their Structure, Working with ADMIN, Console, Creating Views, URL Mapping, Template System, Working with Models, Page Re-directions, Set-up E-Mails, Types of Views, Form Processing, static, media files handling, Advanced Features of Django, Pagination,				

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			Database connectivity Sqlite3, MySQL, Page Restrictions using decorators, Cookies, Sessions, Caching, Migrations, Deployment free web Hosting Domains	Database connectivity Sqlite3, MySQL, Page Restrictions using decorators, Cookies, Sessions, Caching, Migrations, Deployment free web Hosting Domains, Identifying and fixing security threats in Django framework based web applications. Penetration Testing Tools: Nmap, dirb, gobuster, john the ripper,curl,nikto, Searchsploit,burpsuite,sql map				

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Annexure- 3(b)

Report- Analysis of Feedback on curriculum – received from the stake holders prior to the commencement of the Academic Year 2020-21

Feedback from different stake holders has been collected in respect of the curriculum offered for the academic year 2020-21

S. No.	Type of Stake holder	Number of feedback
1	Students	686
2	Parents	43
3	Alumni	15
4	Faculty	140
5	Academic peers	15
6	Industry persons	16
Total		**915**

Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Academic Peer	Dr.P.Radhika, Professor & Principal, Academic Peer recommended to introduce integrated Professional English in the curriculum It helps in preparing students for effective communication, collaboration, and presentation skills in a globalized professional environment, enhancing their employability and career prospects.	It is resolved to approve introducing a new course "INTEGRATED PROFESSIONAL ENGLISH" for 2020-21 admitted batch students.
Academic Peer	Arunkumar Gopu, Senior Assistant Professor, Academic Peer proposed Computational Thinking for Design is a valuable curriculum topic as it teaches students how to approach complex problems systematically and creatively using computational principles.	It is resolved to approve introducing new course "COMPUTATIONAL THINKING FOR DESIGN" for 2020-21 admitted batch students.
Academic Peer	Dr. Damodar Reddy Edla, Academic Peer recommended integrating the course DESIGN THINKING & INNOVATION -1 into	It is resolved to approve introducing a new course "DESIGN THINKING &

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
	the curriculum as it equips students with essential problem-solving and creative skills crucial for navigating today's rapidly evolving business landscape. This course fosters a mindset that encourages innovative thinking and solutions.	INNOVATION -1" for 2020-21 admitted batch students.
Academic Peer	Dr. D. William Albert, Academic Peer strongly recommended integrating the course "Design Thinking & Innovation - 2" into the curriculum as it equips students with advanced problem-solving skills and fosters a culture of innovation, essential for success in today's dynamic world.	It is resolved to approve introducing a new course "DESIGN THINKING & INNOVATION -2" for 2020-21 admitted batch students.
Academic Peer	T.Cithraleka, Professor, Academic Peer highly recommended leveraging AI for Data Science as a powerful tool for enhancing data analysis capabilities within the curriculum.	It is resolved to approve introducing a new course "AI for Data Science" for 2020-21 admitted batch students.
Academic Peer	Dr.P.Harini, Professor & Principal, Academic Peer proposed "Social Internship" as it allows individuals to work with nonprofit organizations, community groups, or government agencies to address social and community-related issues.	It is resolved to approve to introducing a new course "Social Internship" for 2020-21 admitted batch students.
Alumni	N PRIYA, Alumni recommended to incorporate "Tool-Based Learning (Cloud Foundations) and Tool-Based Learning (Google Cloud)" in curriculum. These courses would provide students with practical experience in utilizing contemporary cloud tools, enhancing their hands-on skills and industry readiness.	It is resolved to approve introducing new courses "Tool-Based Learning (Cloud Foundations-AWS) and Tool-Based Learning (Google Cloud)" for 2020-21 admitted batch students.
Alumni	AHMEED, Alumni, recommended to introduce". Tool-Based Learning (RPA) and Tool Based Learning (BLUE PRISM)" to incorporate the latest industry-relevant tools and techniques, ensuring that students are equipped with cutting-edge skills.	It is resolved to approve to introducing new courses "Tool-Based Learning (Robotic Process Automation) and Tool-Based Learning (Blue Prism)" for 2020-21 admitted batch students.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Faculty	Dr. Prashant Shukla, Professor, Faculty strongly recommended to introduce Tool-Based Learning (UI Path) in the curriculum as this course involves modern educational approach facilitates hands-on experience with industry-standard tools which enhancing students' practical programming skills and preparing them for real-world challenges. Integrating this into the syllabus ensures that students acquire valuable proficiency in tool usage, vital for success in today's tech-driven world.	It is resolved to approve introducing new course "Tool-Based Learning (UI Path)" for 2020-21 admitted batch students.
Faculty	Dr.V.B.V.N.PRASAD and Dr. T. Rajeswari (Course Coordinator), Faculty suggested to revise Aptitude builder as it is a valuable tool for honing skills and enhancing cognitive abilities, providing individuals with the means to excel in academic, professional, and personal endeavours by fostering continuous learning and improvement.	It is resolved to approve the revision of syllabus in Aptitude builder course to 2020-21 admitted batch.
Faculty	B Vijay, Faculty strongly recommended conducting internships separately for the odd and even semesters, rather than as a single combined internship, to provide our students with more focused and meaningful learning experiences.	It is resolved to approve to offer INTERNSHIP course in two semesters as INTERNSHIP-1in odd semester and INTERNSHIP-2 in even semester for 2020-21 admitted batch.
Faculty	Dr. C.KARTHIKEYAN, Faculty suggested that the Students are encouraged to do multi-disciplinary projects so recommended to revise the project part1 and project part-II titles as Capstone Project-1 and Capstone Project -2 .	It is resolved to approve to offer Project-I and Project-II as Capstone Project-1 and Capstone Project-2 to 2020-21 admitted batch.
Industry Person	Mr.SAROJ KUMAR DHAKAL, Industry Person recommended that the internship program allows individuals work in technical or STEM-related fields to gain hands-on experience and apply their knowledge and skills.	It is resolved to approve to introducing a new course "Technical Internship" for 2020-21 admitted batch students.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Industry Person	RAMESH KUMAR DACHA, Associate Director, Industry Person suggested the new course "MEA(R)N Stack Web Development" is highly recommended as it equips students with the latest web development technologies, enhancing their career prospects and keeping our curriculum up to date.	It is resolved to approve introducing a new course "MEA(R)N Stack Web Development" for 2020-21 admitted batch students.
Industry Person	Mr. P S Nagendra Babu, Industry Person strongly recommend the introduction of a "Java Full Stack Development + Microservices" course to the syllabus. This course would provide students with comprehensive skills in full-stack web development, encompassing both frontend and backend technologies, while also incorporating the critical aspect of microservices architecture.	It is resolved to approve introducing a new course "Java Full Stack Development + Microservices" for 2020-21 admitted batch students.
Industry Person	Mr. Nimmagadda Ravi Shankar, Industry Person, highly recommend incorporating the "Elements of Software Construction" revision into the curriculum as it will provide students with updated knowledge and skills crucial for modern software development.	It is resolved to approve the revision of syllabus in "Elements of Software Construction" course to 2020-21 admitted batch.
Industry Person	Siva Kowsika, Industry Person suggested to revise syllabus for Python Full Stack Development to empower students with the most relevant skills and tools needed to excel in full-stack development, covering front-end and back-end development, databases, frameworks, and deployment strategies.	It is resolved to revise syllabus of "Python Full Stack Development" Course for 2020-21 admitted batch students.
Academic Peer	P Vamsi Krishna Raja, Professor, Swarnandhra Engineering College, suggested to include Data Warehousing and Data Mining practices to implement a robust data governance framework and	It is resolved to approve introducing a new course "Data Warehousing and Data Mining" for 2020-21 admitted batch students.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
	incorporate advanced analytics for improved decision-making and competitiveness.	
Academic Peer	A V S Siva Rama Rao, Associate Professor, Sasi Institute of Technology & Engineering, including machine learning concepts is essential to ensure a strong foundation in this rapidly evolving field for M. Tech Students	It is resolved to approve introducing a new course "Machine Learning" for 2020-21 admitted batch students.
Industry Person	D Shiva Kmar, Scrum Manager Virtusa Pvt Ltd, recommend to include "Cloud System Infrastructure" course to equip students with essential skills in managing and leveraging cloud technology.	It is resolved to approve introducing a new course "Cloud System Infrastructure" for 2020-21 admitted batch students.
Industry Person	A Vamsi Krishna Test Engineer Tech Mahendra, I recommend incorporating a Cloud Computing course into the curriculum to equip students with essential skills in managing and leveraging cloud technology, a critical component of modern IT infrastructure.	It is resolved to approve introducing a new course "Cloud Computing" for 2020-21 admitted batch students.
Industry Person	S Sridhar Infosys, Software Engineer, recommend to include Programming for Blockchain in curriculum for M. Tech Students as it is crucial to educate students about this transformative technology, fostering a deep understanding of its applications, security considerations	It is resolved to approve introducing a new course "Programming for Block Chain" for 2020-21 admitted batch students.
Faculty	Dr. PRAGNYABAN MISHRA, Associate Professor, Faculty highly recommend the Deep Learning course for its cutting-edge insights and practical applications, essential for anyone aspiring to excel in the field of artificial intelligence.	It is resolved to approve introducing a new course "Deep Learning" for M. Tech 2020-21 admitted batch students.

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Annexure-4

18CS5121: DATA WAREHOUSING & MINING

L-T-P-S: 3-0-0-0 **Credits: 3** **Pre-requisite: Nil**

Mapping of Course Outcomes (CO) with Program Outcomes (PO):

CO	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand stages in building a Data Warehouse	PO1,PO5	2
CO2	Analyze Pre processing techniques for data cleansing and multi-dimensional modelling techniques	PO5,PO2	4
CO3	Analyze performance of algorithms for Association Rule	PO2,PO5	4
CO4	Analyze Classification and Clustering algorithms	PO2,PO5	4
CO5	Evaluate the results obtained from all the algorithms	PO5	5

Syllabus:

KDD Process, Introduction to Data Warehouse, Data Pre processing- Data Cleaning methods, Descriptive Data Summarization, Data Reduction, Data Discretization and Concept hierarchy generation, Overview of ETL and OLAP OLTP integration – comparison of OLAP with OLTP systems, ROLAP, MOLAP and DOLAP, Data Cube Computation methods, Advanced SQL support for OLAP, multi-dimensional modelling, Attribute-oriented Induction, Data Warehouse architecture and implementation - Parallel execution, Materialized views. Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity Data Mining Techniques: Basic concepts of Association Rule Mining, Frequent Item set mining, Mining various kinds of association rules, Classification by decision tree induction, Bayesian Classification, Classification based on Back-propagation, Support Vector Machine classifier, Softmax Classifier, lazy learners. Model Evaluation and Selection, Techniques to improve classification accuracy, Multiclass classification, semi-supervised classification, Transfer Learning.Outliers and Outlier analysis, Outlier Detection methods, Statistical approaches to outlier detection, classification based approaches for outlier detection. Clustering methods, , Data Objects and Attribute Types, Partitioning-Based Clustering Methods; Hierarchical Clustering Methods; Density Based and Grid-Based Clustering Methods, Advanced clustering techniques such as probabilistic model based clustering.

Text Books:

1. Han J & Kamber M, "Data Mining: Concepts and Techniques", Third Edition, Elsevier, 2011.
2. Pang-Ning Tan, Michael Steinback, Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2008

Reference Books:

1. M.Humphires, M.Hawkins, M.Dy,"Data Warehousing: Architecture and Implementation", Pearson Education, 2009.
2. Anahory, Murray, "Data Warehousing in the Real World", Pearson Education, 2008.
3. Kargupta, Joshi,etc., "Data Mining: Next Generation Challenges and Future Directions", Prentice Hall of India Pvt Ltd, 2007

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18CS51A5: MACHINE LEARNING

L-T-P-S: 3-0-0-0 **Credits: 3** **Pre-requisite: Nil**

Mapping of Course Outcomes (CO) with Program Outcomes (PO):

CO	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand Supervised Learning, Bayesian Decision Theory, and Parametric Methods.	PO2	3
CO2	Apply multivariate methods, Dimensionality reduction, and Clustering techniques.	PO2,PO4	4
CO3	Apply non parametric methods, Decision trees and linear discrimination methods.	PO2,PO4	3
CO4	Analyze different machine learning techniques like MLP's, local methods, kernel machines, Hidden Markov Models and Bayesian Estimation	PO2,PO4,PO5	3
CO1	Understand Supervised Learning, Bayesian Decision Theory, and Parametric Methods.	PO2	3

Syllabus:

Supervised Learning, Bayesian Decision Theory, Parametric Methods, Multivariate Methods, Dimensionality Reduction. Clustering, Nonparametric Methods, Decision Trees, Linear Discrimination, Local Models, Kernel Machines. Bayesian Estimation, Hidden Markov Models. Multilayer perceptrons, . Neural network models, Reinforcement learning models

Text Books:

1. Ethem Alpaydin, —Introduction to Machine Learning|| , The MIT Press, 2010
2. Stephen Marsland, —Machine Learning an Algorithmic Perspective|| , CRC Press, 2009.

Reference Books:

1. Richard O. Duda, Peter E. Hart, David G. Stork, —Pattern Classification|| , Wiley, 2012
2. Horst Bunke, Abraham Kandel, Mark Last, —Applied Pattern Recognition—, Springer, 2008.
3. Russel and Norvig, 'Artificial Intelligence', Pearson Education, PHI, 2003
4. M. Narasimha Murty and V. Susheela Devi, Pattern Recognition.

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Green Fields, VADDESWARAM-522 302.
Guntur District, Andhra Pradesh

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 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

18CS52M3: CLOUD SYSTEM INFRASTRUCTURE

L-T-P-S: 3-0-4-4 **Credits: 6** **Pre-requisite: Nil**

Mapping of Course Outcomes (CO) with Program Outcomes (PO):

CO	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand the Cloud Computing Techniques and Virtualization on cloud platforms	PO1,PO2	2
CO2	Analyse and Apply AWS Services	PO2,PO1	4
CO3	Understand Programming, management console and storage on AWS, AWS Security and Compliances and analyse AWS computing and Marketplace	PO1,PO2	2
CO4	Analyse AWS networking and databases and AWS billing and dealing disaster	PO1,PO2	4
CO5	Develop Cloud services using Amazon Web Services	PO1,PO2	5

Syllabus:

Introduction to Cloud Technologies: Introduction to the Cloud Computing, History of cloud computing, Cloud service options, Cloud Deployment models, Business concerns in the cloud. Virtualization and Cloud Platforms: Exploring virtualization, Load balancing, Hypervisors, Machine imaging, Cloud marketplace overview, Comparison of Cloud providers, The Evolution of Compute: Understanding enterprise data centers, Exploring the units of compute, Understanding software architectures. Introduction to AWS: AWS history, AWS Infrastructure, AWS services, AWS ecosystem. Programming, management console and storage on AWS: Basic Understanding APIs-AWS Programming Interface, web services, AWS URL naming, Matching interfaces and services, Elastic block store - Simple storage service, Glacier - Content delivery platforms. AWS identity services, security and compliance: Users, groups, and roles - Understanding credentials, Security policies, IAM abilities and limitations, AWS physical security - AWS compliance initiatives, Understanding public/private keys. Event-Driven Applications: Understanding modern applications, Evolution of integration patterns. AWS computing and marketplace: Elastic cloud computer-Introduction to servers, Imaging Computers, Auto scaling, Elastic load balancing, Cataloging the marketplace, AMIs, Selling on the marketplace's networking and databases: Virtual private clouds, Cloud models, Private DNS servers (Route 53), Relational database service – DynamoDB, ElastiCache, Redshift. Adding Amazon API Gateway, Introducing Amazon API Gateway, Securing an API. Other AWS services and management services: Analytics services, Application services, Cloud security, CloudWatch, CloudFormation, CloudTrail, OpsWorks. AWS billing and Dealing with disaster: Managing costs, Utilization and tracking, Bottom line impact, Geographic and other concerns, Failure plans, Examining logs. Serverless Framework Technical requirements: Understanding the need for a framework, Exploring the core concepts of the Serverless Framework, Deploying your first service.

Text Books:

1. Cloud Computing Bible: Barrie Sosinsky. John Wiley & Sons. ISBN-13: 978-0470903568.
2. Amazon Web Services For Dummies. Bernard Golden. For Dummies. ISBN-13: 978-1118571835
3. Learn AWS Serverless Computing: A beginner's guide to using AWS Lambda, Amazon API Gateway, and services from Amazon Web Services by Scott Patterson, ISBN:1789958350, 2019.

Reference Books:

1. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition.
2. Building Applications in the Cloud: Concepts, Patterns and Projects by Christopher M. Moyer, Pearson Addison-Wesley Professional, ISBN-10: 0321720202.

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3. Cloud Computing : A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by The McGraw-Hill.
4. Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more. by Dr. Kris Jamsa.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

18CS52M4: DEEP LEARNING

L-T-P-S: 3-0-4-4 **Credits: 6** **Pre-requisite: Nil**

Mapping of Course Outcomes (CO) with Program Outcomes (PO):

CO	Course Outcome (CO)	PO/PSO	BTL
CO1	To be able to understand and remember the concepts of Perceptron, Back Propagation, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp	PO1,PO2	2
CO2	To be able understand auto encoders- and apply Regularization, Denoising, Sparse, Contractive, Vectorial Representation of Words Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet	PO2	3
CO3	Build RCNN, Fast RCNN, Faster RCNN, LSTMs Encoder Decoder ,Backpropagation Through Time (BPTT)	PO3	3
CO4	Able to Apply Markov Networks , Markov Chains , Backpropagation Through Time (BPTT), RBM models and Generative Adversarial Networks (GANs)	PO2	3
CO5	Able to implement neural networks CNN, RNN RBMs, GAN models for real time applications	PO6	5

Syllabus:

History of Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Perceptron's, Perceptron Learning Algorithm and Convergence, Multilayer Perceptron's (MLPs), Representation Power of MLPs, Sigmoid Neurons, Feedforward Neural Networks, Backpropagation, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalues and eigenvectors, Eigenvalue Decomposition, Basis, Principal Component Analysis and its interpretations, Singular Value Decomposition , Basis, Principal Component Analysis and its interpretations, Singular Value Decomposition. Auto encoders and relation to PCA, Regularization in autoencoders, Denoising autoencoders, Sparse autoencoders, Contractive autoencoders, Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout, Greedy Layer wise Pre-training, Better activation functions, Better weight initialization methods, Batch Normalization, Learning Vectorial Representations Of Words Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet Object Detection, RCNN, Fast RCNN, Faster RCNN, YOLO. Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks , Recurrent Neural Networks, Backpropagation Through Time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, Gated Recurrent Units (GRUs), Long Short Term Memory (LSTM) Cells, Solving the vanishing gradient problem with LSTMs Encoder Decoder Models Attention Mechanism, Attention over images, Hierarchical Attention Directed Graphical Models, Markov Networks. Using joint distributions for classification and sampling, Latent Variables, Restricted Boltzmann Machines, Unsupervised Learning, Motivation for Sampling, Markov Chains, Gibbs Sampling for training RBMs, Contrastive Divergence for training RBMs, Variational autoencoders, Autoregressive Models: NADE, MADE, PixelRNN , Generative Adversarial Networks (GANs)

Text Books:

1. ian Goodfellow and Yoshua Bengio and Aaron Courville (2016) Deep Learning Book

Reference Books:

1. Deep Learning with PyTorch: A practical approach to building neural network models using PyTorch by Vishnu bramanian
2. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996 Pattern Recognition and Machine Learning, Christopher Bishop, 2007

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

18CS51E4: CLOUD COMPUTING

L-T-P-S: 3-0-0-0 **Credits: 3** **Pre-requisite: Nil**

Mapping of Course Outcomes (CO) with Program Outcomes (PO):

CO	Course Outcome (CO)	PO/PSO	BTL
CO1	To apply the basic concepts of secret sharing and blockchain	PO1,PO3	3
CO2	To understand the components and types of Blockchain, and recognize the significance of consensus algorithms	PO3,PO2	2
CO3	To apply the basic and advanced coding skilling using smart contract programming for the blockchain business logic	PO2,PO7	3
CO4	To analyse the need for business logic using heperledger and able to apply chaincode for hyper ledger	PO2,PO7	3
CO5	To evaluate and implement small business logic for ethereum environment and a chaincode for hyerledger	PO5	4

Syllabus:

Overview of Cloud Computing: Introduction, Cloud computing elements, Essential characteristics, cloud services, cloud deployment models, NIST cloud computing reference architecture, ITU-T cloud computing reference architecture. Software as a Service (SaaS)- Understanding the Multitenant Nature of SaaS Solutions, Understanding SOA. Platform as a Service (PaaS)-IT Evolution Leading to the Cloud, Benefits of PaaS Solutions, Disadvantages of PaaS Solutions. Infrastructure as a Service(IaaS)-Understanding IaaS, Improving Performance through Load Balancing, System, and Storage Redundancy. Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization, and cloud computing, Pros and cons of virtualization, Technology examples: Xen- paravirtualization, VMware: full virtualization, Microsoft Hyper-V.Cloud Computing Security Architecture: Architectural Considerations, General Issues, Trusted Cloud Computing, Secure Execution Environments and Communications, Identity Management and Access Control, Autonomic Security.

Text Books:

1. Cloud Computing Security: Foundations and Challenges,BY JOHN R. VACCA, CRC Press Taylor & Francis Group,2017.
2. Cloud computing principles and paradigms editors Rajkumar buyya,2011 by Wiley Publications.
3. Mastering Cloud computing :Foundations and Application programming editors Rajkumar buyya, Christian Vecchiola , S. Thamarai Selvi 2011 by Elsevier Publications
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, by Ronald L. Krutz and Russell Dean Vines ByWiley Publishing, 2010

Reference Books:

1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing", Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
2. Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by The McGraw-Hill

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18CS52L4: PROGRAMMING FOR BLOCK CHAIN

L-T-P-S: 3-0-4-4 **Credits: 6** **Pre-requisite: Nil**

Mapping of Course Outcomes (CO) with Program Outcomes (PO):

CO	Course Outcome (CO)	PO/PSO	BTL
CO1	To apply the basic concepts of secret sharing and blockchain	PO1,PO3	3
CO2	To understand the components and types of Blockchain, and recognize the significance of consensus algorithms	PO3,PO2	2
CO3	To apply the basic and advanced coding skilling using smart contract programming for the blockchain business logic	PO2,PO7	3
CO4	To analyse the need for business logic using heperledger and able to apply chaincode for hyperledger	PO2,PO7	3
CO5	To evaluate and implement small business logic for ethereum environment and a chaincode for hyerledger	PO5	4

Syllabus:

Unit - I Introduction to Cryptography: Structure of cryptosystem – symmetric key cryptography – asymmetric key cryptography – types of attacks – authentication models – SHA-256 Hash algorithm – RSA algorithm – Elliptic Curve cryptography – Digital signature standards. Basics of Blockchain concepts: Architecture – Properties of Blockchain – Distributed ledger – Merkle tree – structure of a block – Smart contract – Crowd funding – Transaction – Double spending – Block propagation. Unit - II Types of Blockchain: Blockchain Compenents – Permissioned Blockchain – Permissionless Blockchain – Consortium Blockchain – Consensus – Proof of Work, Proof of Stack, Proof of Burn, Proof of Elapsed Time – Mining – Consensus Algorithms: PAXOS consensus Algorithm – RAFT consensus Algorithm – Byzantine general problem – Practical Byzantine fault tolerance Algorithm – Three phase commit Protocol. Unit - III Smart Contract Programming (Solidity): Global variable and functions – expressions and control structures – arrays, enums, structs, mappings, special variables – Functions: function modifiers, view function, pure functions, fallback function, function overloading, mathematical and cryptographic functions – common pattern: withdrawal pattern, restricted access – contracts, inheritance, constructors, abstract contracts, interfaces, libraries, assembly, exceptions, events, and logging – truffle basics and unit testing. Unit - IV Introduction to Hyperledger: Framework – Tools – Design Philosophy – Hyperledger Fabric: Architectural overview – network consensus – channels and ordering service – components – network setup – endorsement policies – membership services, use cases. Hyperledger Programming Tool (Golang): Golang Programme Structure, data types, variables, constants – expressions and control structures – functions, scope rules - array, pointers, structures, slice, range, map, recursion, type casting, interfaces, error handling.

Text Books:

1. Behrouz A. Forozan and Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, McGraw Hill Education (India) Private Limited, 2015.
2. William Stallings, "Cryptography and Network Security: Principles and Practice", 7th Edition, Pearson Education, 2017.
3. Chandramouli Subramanian, Asha A George, Abhilash K A, Meena Karthikeyan, "Blockchain Technology", University Press (India) Private Limited, 2021
4. Ritesh Modi, "Solidity Programming Essentials", Packt Publishing, 2018. 5. "An Introduction to Programming in GO" Caleb Doxsey, 2012.

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Annexure-5(a)

B.Tech 2020-21 Admitted Batch Category Wise Course Structure

Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-Req Course Code	New/Revised /Retained	EES	Stake holders	Justification for Considering the feedback
20UC1101	INTEGRATED PROFESSIONAL ENGLISH	HSS	0	0	4	0	2	4	NIL	New	SKILL DEVELOPMENT	Academic Peer	To enhance employability and career prospects.
20UC1202	ENGLISH PROFICIENCY	HSS	0	0	4	0	2	4	NIL	Retained	SKILL DEVELOPMENT		
20UC2103	PROFESSIONAL COMMUNICATION SKILLS	HSS	0	0	4	0	2	4	NIL	Retained	SKILL DEVELOPMENT		
20UC2204	CORPORATE COMMUNICATION SKILLS	HSS	0	0	4	0	2	4	NIL	Retained	EMPLOYABILITY		
20UC3005	APTITUDE BUILDER	HSS	0	0	4	0	2	4	NIL	60% - Revised considered as new course	EMPLOYABILITY	Faculty	Enhance cognitive abilities, providing individuals with the means to excel in academic, professional, and personal endeavours by fostering continuous learning and improvement.

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Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-Req Course Code	New/Revised /Retained	EES	Stake holders	Justification for Considering the feedback
20UC0010	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS (UHPE)	HSS	2	0	0	0	2	2	NIL	Retained	EMPLOYABILITY		
							Total Credits	**12**					
20MT1101	MATHEMATICS FOR COMPUTING	BS	2	2	0	2	4.5	4	NIL	Retained	SKILL DEVELOPMENT		
19MT2102	MATHEMATICS FOR ENGINEERS	BS	2	1	0	0	3	3	NIL	Retained	SKILL DEVELOPMENT		
20CS2105R	MATHEMATICAL PROGRAMMING - 1	BS	2	2	0	0	4	4	20MT1101	Retained	SKILL DEVELOPMENT		
20CS2210RA	MATHEMATICAL PROGRAMMING - 2	BS	2	2	0	0	4	4	20CS2105	Retained	SKILL DEVELOPMENT		
SE1	SCIENCE ELECTIVE - 1	BS	3	0	0	0	3	3	NIL				
SE2	SCIENCE ELECTIVE - 2	BS	3	0	0	0	3	3	NIL				
20UC1102	DESIGN THINKING & INNOVATION -1	BS	1	0	0	4	2	5	NIL	New	ENTREPRENEURSHIP	Academic Peer	It equips with essential problem-solving and creative skills crucial for
20UC1203	DESIGN THINKING & INNOVATION -2	BS	1	0	0	4	2	5	20UC1102	New	ENTREPRENEURSHIP	Academic Peer	It equips students with advanced problem-solving skills
							Total Credits	**25.5**					

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Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-Req Course Code	New/Revised /Retained	EES	Stake holders	Justification for Considering the feedback
20SC1101	COMPUTATIONAL THINKING FOR DESIGN	ES	3	0	2	6	5.5	11	NIL	New	EMPLOYABILITY	Academic Peer	To solve complex problems systematically and creatively using computational principles.
20ME1103	DESIGN TOOLS WORKSHOP - 1	ES	0	0	4	0	2	4	NIL	Retained	SKILL DEVELOPMENT		
20EC1101	DIGITAL LOGIC & PROCESSORS	ES	3	0	2	0	4	5	NIL	Retained	EMPLOYABILITY		
19CS1203	OBJECT ORIENTED PROGRAMMING	ES	3	0	2	3	4.75	8	20SC1101	Retained	EMPLOYABILITY		
19SC1202	DATA STRUCTURES	ES	3	0	2	3	4.75	8	20SC1101	Retained	EMPLOYABILITY		
19SC1209	DESIGN TOOLS WORKSHOP - II	ES	0	0	4	0	2	4	NIL	Retained	SKILL DEVELOPMENT		
19EC1202	COMPUTER ORGANIZATION & ARCHITECTURE	ES	2	0	0	0	2	2	20EC1101	Retained	EMPLOYABILITY		
						Total Credits	**25**						
20CS2104S	DATABASE MANAGEMENT SYSTEMS	PC	3	0	2	2	4.5	7	20SC1101	Retained	EMPLOYABILITY		
20CS2205R	ELEMENTS OF SOFTWARE CONSTRUCTION	PC	2	2	0	0	4	4	NIL	30%-Revised Considered as New Course	EMPLOYABILITY	Industry Person	Will provide students with updated knowledge and skills crucial for

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Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-Req Course Code	New/Revised /Retained	EES	Stake holders	Justification for Considering the feedback
													modern software develcpment.
20CS2103S	OPERATING SYSTEMS DESIGN	PC	3	0	2	2	4.5	7	19EC1202	Retained	EMPLOYABILITY		
20CS2222RA	COMPUTER NETWORKS & SECURITY	PC	3	1	0	0	4	4	NIL	Retained	EMPLOYABILITY		
20CS2221RA	AI FOR DATA SCIENCE	PC	3	0	2	4	5	9	20MT1101	New	EMPLOYABILITY	Academic Peer	For enhancing data analysis capabilities within the curriculum
20CS2220RA	DESIGN & ANALYSIS OF ALGORITHMS (DAA)	PC	3	0	2	4	5	9	19SC1202	Retained	EMPLOYABILITY		
20CS2107RA	ENTERPRISE PROGRAMMING	PC	2	0	2	4	4	8	19CS1203	Retained	EMPLOYABILITY		
20CS4115	PARALLEL & DISTRIBUTED COMPUTING	PC	2	1	0	0	3	3	20CS2103	Retained	EMPLOYABILITY		
						Total Credits	**34**						
PE1	PROFESSIONAL ELECTIVE 1	PE	2	0	2	4	4	8	MAPPED CORE				
PE2	PROFESSIONAL ELECTIVE 2	PE	2	0	2	0	3	4	MAPPED CORE				
PE3	PROFESSIONAL ELECTIVE 3	PE	2	0	2	4	4	8	MAPPED CORE				

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Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-Req Course Code	New/Revised /Retained	EES	Stake holders	Justification for Considering the feedback
PE4	PROFESSIONAL ELECTIVE 4	PE	2	0	2	0	3	4	MAPPED CORE				
PE5	PROFESSIONAL ELECTIVE 5	PE	2	0	2	0	3	4	MAPPED CORE				
PE5 - MOOCS	PROFESSIONAL ELECTIVE 5	PE	3	0	0	0	3	4	MAPPED CORE				
						Total Credits	**17**						
20IE3043	TERM PAPER	PJ	0	0	4	0	2	4	NIL	Retained	SKILL DEVELOPMENT		
20IE4051	INTERNSHIP-1	PJ	0	0	0	24	6	24	NIL	Revised	EMPLOYABILITY	Faculty	To provide students with more focused and meaningful learning experiences.
20IE4050	PRACTICE SCHOOL	PJ	0	0	0	24	6	24	NIL	Retained	EMPLOYABILITY		
20IE4150	CAPSTONE PROJECT-1	PJ	0	0	4	16	6	20	20IE3043	Revised	EMPLOYABILITY	Faculty	To do multi-disciplinary projects
20IE4052	INTERNSHIP-2	PJ	0	0	0	24	6	24	NIL	Revised	EMPLOYABILITY	Faculty	To provide students with more focused and meaningful learning experiences.

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20IE4250	CAPSTONE PROJECT-2	PJ	0	0	4	16	6	20	20IE4150	Revised	EMPLOYABILITY	Faculty	To do multi-disciplinary projects
20IE2050	SOCIAL INTERNSHIP	PJ	0	0	0	8	2	8	NIL	New	EMPLOYABILITY	Academic Peer	Allows individuals to work with nonprofit organizations, community groups, or government agencies to address social and community-related issues.
20IE2246	Technical Internship	PJ	0	0	0	8	2	8	NIL	New	EMPLOYABILITY	Industry Person	Allows individuals work in technical or STEM-related fields to gain hands-on experience and apply their knowledge and skills.
						Total Credits	**18**						
OE-1	OPEN ELECTIVE - 1	OE	3	0	0	0	3	3	NIL				
OE-2	OPEN ELECTIVE - 2	OE	3	0	0	0	3	3	NIL				

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OE-3	OPEN ELECTIVE - 3	OE	3	0	0	0	3	3	NIL				
ME	MANAGEMENT ELECTIVE	OE	3	0	0	0	3	3	NIL				
FL	FOREIGN LANGUAGE	OE	2	0	0	0	2	2	NIL				
						Total Credits	**14**						
FC1	FLEXI-CORE 1	FC	2	1	0	0	3	3	COURSE SPECIFIC				
FC2	FLEXI-CORE 2	FC	2	0	2	0	3	4	COURSE SPECIFIC				
						Total Credits	**6**						
TS-1	TECHNICAL SKILLING-1	SDC	0	0	0	8	2	8	19CS1203		SKILL DEVELOPMENT		
TS-2	TECHNICAL SKILLING-2	SDC	0	0	0	8	2	8	19CS1203		SKILL DEVELOPMENT		
TS-3	TECHNICAL SKILLING-3	SDC	0	0	0	8	2	8	19CS1203		SKILL DEVELOPMENT		
TS-4	TECHNICAL SKILLING-4	SDC	0	0	0	8	2	8	20TS2101		SKILL DEVELOPMENT		
	TOOL BASED LEARNING-1	SDC	0	0	0	4	1	4	NIL		EMPLOYABILITY		
	TOOL BASED LEARNING-2	SDC	0	0	0	4	0	4	NIL		EMPLOYABILITY		
	TOOL BASED LEARNING-3	SDC	0	0	0	4	0	4	NIL		EMPLOYABILITY		

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						Total Credits	**9**						
SP	SPORTS	Sports	0	0	2	0	0	2	NIL	Retained			
						Total Credits	**0**						
20UC0012M	GENDER SENSATIZATION	AUC	2	0	0	0	0	2	NIL	Retained	-		
20UC0008	INDIAN CONSTITUTION	HSS	2	0	0	0	0	2	NIL	Retained	SKILL DEVELOPMENT		
20UC0007	INDIAN HERITAGE & CULTURE	HSS	2	0	0	0	0	2	NIL	Retained	ENTREPRENEURSHIP		
18UC0009	ECOLOGY & ENVIRONMENT	AUC	2	0	0	0	0	2		Retained	SKILL DEVELOPMENT		
						Total Credits	**0**						
Certification	VAC FOR CAREER ADVANCEMENT - 1 (VCA1)	VAC	0	0	8	0	0	0	NIL				
Certification	VAC FOR CAREER ENHANCEMENT - 1 (VCE1)	VAC	0	0	8	0	0	0	NIL				
Certification	VAC FOR CAREER ADVANCEMENT - 2 (VCA2)	VAC	0	0	8	0	0	0	NIL				
Certification	VAC FOR CAREER ENHANCEMENT - 2 (VCE2)	VAC	0	0	8	0	0	0	NIL				

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						Total Credits	**0**						
						Total Credits	**160.5**						
PROFESSIONAL ELECTIVES													
ARTIFICIAL INTELLIGENCE & INTELLIGENT PROCESS AUTOMATION (AI & IPA)													
20CS3020RA	MACHINE LEARNING	PE-1	2	0	2	4	4	8	20CS2221	Retained	SKILL DEVELOPMENT		
20CS3022RA	SOFT COMPUTING	PE-2	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
20CS3026RA	ARTIFICIAL NEURAL NETWORKS	PE-2	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
20CS3269RA	DEEP LEARNING	PE-3	2	0	2	4	4	8	20CS2221	Retained	Skill Development		
20CS3270RA	COGNITIVE COMPUTING	PE-4	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
20CS3271RA	PERCEPTION AND COMPUTER VISION	PE-4	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	2	0	2	0	3	4	19SC1202	Retained	EMPLOYABILITY		
20CS3282RA	MACHINE LEARNING ON CLOUD	PE-4	2	0	2	0	3	4	20CS3020	Retained	SKILL DEVELOPMENT		
20CS3272RA	COMPUTATIONAL EPIDEMIOLOGY	PE-5	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
20CS3273RA	NATURAL LANGUAGE PROCESSING	PE-5	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		

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20CS3274RA	SPEECH PROCESSING	PE-5	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
DATA SCIENCE & BIG DATA ANALYTICS (DS&BDA)													
20CS3275RA	DATA VISUALISATION TECHNIQUES	PE-1	2	0	2	4	4	8	20CS2221& 20CS3037	Retained	EMPLOYABILITY		
20CS3052RA	DATA WAREHOUSING & MINING	PE-2	2	0	2	0	3	4	20CS2104	Retained	EMPLOYABILITY		
20CS3051RA	BIG DATA ANALYTICS	PE-3	2	0	2	4	4	8	20CS2104	Retained	EMPLOYABILITY		
20CS3276RA	BIG DATA OPTIMIZATION	PE-4	2	0	2	0	3	4	20CS2104	Retained	EMPLOYABILITY		
20CS3277RA	BIOINFORMATICS	PE-4	2	0	2	0	3	4	20CS2220	Retained	EMPLOYABILITY		
20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	2	0	2	0	3	4	20CS2221		EMPLOYABILITY		
20CS3283RA	DATA ANALYTICS ON CLOUD	PE-4	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
20CS3284RA	DIGITAL MEDIA ANALYTICS	PE-4	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
20CS3272RA	COMPUTATIONAL EPIDEMIOLOGY	PE-5	2	0	2	0	3	4	20CS2221		EMPLOYABILITY		
20CS3279RA	ADVANCED DATABASES	PE-5	2	0	2	0	3	4	20CS2104	Retained	EMPLOYABILITY		
20CS3289RA	BUSINESS ANALYTICS	PE-5	2	0	2	0	3	4	20CS2104	Retained	EMPLOYAEILITY		

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20CS3280RA	GRAPH & WEB ANALYTICS	PE-5	2	0	2	0	3	4	20CS2221	Retained	EMPLOYABILITY		
CLOUD & EDGE COMPUTING (CEC)													
20CS3037RA	CLOUD INFRASTRUCTURE & SERVICES	PE-1	2	0	2	4	4	8	NIL	Retained	SKILL DEVELOPMENT		
20CS3032RA	ADVANCED OPERATING SYSTEMS	PE-2	2	0	2	0	3	4	20CS2103	Retained	EMPLOYABILITY		
20CS3036RA	FUNCTIONAL & CONCURRENT PROGRAMMING	PE-2	2	0	2	0	3	4	19CS1203	Retained	EMPLOYABILITY		
20CS3086RA	CLOUD DEVOPS	PE-2	2	0	2	0	3	4	20CS2205	Retained	SKILL DEVELOPMENT		
20CS3281RA	CLOUD & SERVERLESS COMPUTING	PE-3	2	0	2	4	4	8	NIL	Retained	EMPLOYABILITY		
20CS3251RA	ADVANCED COMPUTER ARCHITECTURE	PE-4	2	0	2	0	3	4	19EC1202	Retained	EMPLOYABILITY		
20CS3252RA	PARALLEL ALGORITHMS	PE-4	2	0	2	0	3	4	20CS2103 OR 19CS1203	Retained	EMPLOYABILITY		
20CS3285RA	ARCHITECTING CLOUD SOLUTIONS	PE-4	2	0	2	0	3	4	20CS2103 & 20CS2222	Retained	EMPLOYABILITY		
20CS3253RA	EDGE COMPUTING	PE-5	2	0	2	0	3	4	20CS2103	Retained	EMPLOYABILITY		

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20CS3038RA	HIGH PERFORMANCE COMPUTING	PE-5	2	0	2	0	3	4	20CS2103	Retained	EMPLOYABILITY		
CYBERSECURITY & BLOCKCHAIN TECHNOLOGY (CYS&BCT)													
20CS3041RA	CRYPT ANALYSIS & CYBER DEFENSE	PE-1	2	0	2	4	4	8	20CS2222	Retained	SKILL DEVELOPMENT		
20CS3042RA	NETWORK & INFRASTRUCTURE SECURITY	PE-2	2	0	2	0	3	4	20CS2222	Retained	SKILL DEVELOPMENT		
20CS3045RA	INTRODUCTION TO BLOCKCHAIN & CRYPTO CURRENCIES	PE-2	2	0	2	0	3	4	20CS2222	Retained	SKILL DEVELOPMENT		
20CS3259RA	DIGITAL FORENSICS	PE-3	2	0	2	4	4	8	20CS3041	Retained	EMPLOYABILITY		
20CS3260RA	DATABASE & SYSTEM SECURITY	PE-4	2	0	2	0	3	4	20CS2104	Retained	EMPLOYABILITY		
20CS3261RA	PROGRAMMING FOR SMART CONTRACTS	PE-4	2	0	2	0	3	4	20CS3045	Retained	EMPLOYABILITY		
20CS3262RA	SECURE SOFTWARE ENGINEERING	PE-5	2	0	2	0	3	4	20CS2205	Retained	EMPLOYABILITY		
20CS3264RA	WEB SECURITY	PE-5	2	0	2	0	3	4	20CS2222	Retained	EMPLOYABILITY		
20CS3291RA	SECURITY GOVERNANCE & MANAGEMENT	PE-5	2	0	2	0	3	4	NIL	Retained	EMPLOYABILITY		
SOFTWARE MODELLING & DEVOPS (SM&DPS)													

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20CS3062RA	SOFTWARE VERIFICATION & VALIDATION	PE-1	2	0	2	4	4	8	20CS2205	Retained	EMPLOYABILITY		
20CS3064RA	UX DESIGN	PE-2	2	0	2	0	3	4	20UC1102	Retained	EMPLOYABILITY		
20CS3065RA	DESIGN PATTERNS & CLEAN CODING TECHNIQUES	PE-2	2	0	2	0	3	4	19CS1203	Retained	EMPLOYABILITY		
20CS3256RA	CONTINUOUS DELIVERY & DEVOPS	PE-3	2	0	2	4	4	8	20CS2205	Retained	EMPLOYABILITY		
20CS3257RA	SOFTWARE PROJECT MANAGEMENT	PE-4	2	0	2	0	3	4	20CS2205	Retained	EMPLOYABILITY		
20CS3231RA	VISUAL PROGRAMING	PE-4	2	0	2	0	3	4	NIL	Retained	EMPLOYABILITY		
20CS3295RA	SOFTWARE ARCHITECTURE & DESIGN	PE-4	2	0	2	0	3	4	20CS2205	Retained	EMPLOYABILITY		
20CS3258RA	SOFTWARE RELIABILITY	PE-5	2	0	2	0	3	4	20CS2205	Retained	EMPLOYABILITY		
20CS3255RA	CROSS-PLATFORM DEVELOPMENT FRAMEWORKS	PE-5	2	0	2	0	3	4	19CS1203	Retained	EMPLOYABILITY		
	GAME DEVELOPMENT & UX DESIGN (GUX)												
20CS3071RA	PROGRAMMING FOR GAME DEVELOPMENT	PE-1	2	0	2	4	4	8	20CS2103	Retained	ENTREPRENEURSHIP		

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20CS3064RA	UX DESIGN	PE-2	2	0	2	0	3	4	20UC1102	Retained	EMPLOYABILITY		
20CS3266RA	AR & VR APPLICATION DEVELOPMENT	PE-3	2	0	2	4	4	8	20CS2103	Retained	EMPLOYABILITY		
20CS3296RA	COMPUTER GRAPHICS	PE-4	2	0	2	0	3	4	NIL	Retained	EMPLOYABILITY		
20CS3297RA	3D MODELLING & ANIMATION	PE-4	2	0	2	0	3	4	NIL	Retained	EMPLOYABILITY		
20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	2	0	2	0	3	4	20MT1101	Retained	EMPLOYABILITY		
20CS3268RA	PRINCIPLES OF GAME DESIGN	PE-5	2	0	2	0	3	4	NIL	Retained	EMPLOYABILITY		
20CS3267RA	BUSINESS OF GAMES & ENTREPRENEURSHIP	PE-5	2	0	2	0	3	4	NIL	Retained	ENTREPRENEURSHIP		
CYBER PHYSICALSYSTEMS & INTERNET OF THINGS (CPS&IOT)													
20CS3117RA	IOT SENSING AND ACTUATING DEVICES	PE-1	2	0	2	4	4	8	NIL	Retained	EMPLOYABILITY		
20CS3118RA	INTERNET OF THINGS: ARCHITECTURES AND PROTOCOLS	PE-2	2	0	2	0	3	4	20CS2222	Retained	EMPLOYABILITY		
20CS3250RA	CLOUD COMPUTING FOR IOT ENGINEERS	PFE-3	2	0	2	4	4	8	NIL	Retained	EMPLOYABILITY		
20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	2	0	2	0	3	4	19SC1202	Retained	EMPLOYABILITY		

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20CS3265RA	WIRELESS SENSOR NETWORKS	PE-5	2	0	2	0	3	4	20CS2222	Retained	EMPLOYABILITY		
20CS3253RA	EDGE COMPUTING	PE-5	2	0	2	0	3	4	NIL	Retained	EMPLOYABILITY		
FLEXICORE COURSES													
20CS3064RA	UX DESIGN	FXC	2	0	2	0	3	4	20UC1102		EMPLOYABILITY		
20CS3060RA	CONTINUOUS DELIVERY & DEVOPS	FXC	2	0	2	0	3	4	20CS2205	Retained	EMPLOYABILITY		
20CS3116RA	SIGNAL PROCESSING	FXC	2	2	0	0	4	4	20CS2221	Retained	EMPLOYABILITY		
20CS3015RA	EMBEDDED SYSTEMS	FXC	2	0	2	0	3	4	19EC1202	Retained	EMPLOYABILITY		
20CS3133RA	DATA VISUALIZATION TECHNIQUES	FXC	2	0	2	0	3	4	20CS2221	Retained	SKILL DEVELOPMENT		
20CS3234RA	APPLICATION DEVELOPMENT ON CLOUD	FXC	2	0	2	0	3	4	20CS2107	Retained	EMPLOYABILITY		
20CS3235RA	SOLUTIONS ARCHITECTING ON CLOUD	FXC	2	0	2	0	3	4	20CS2103 & 20CS2222	Retained	EMPLOYABILITY		
20CS3045RA	INTRODUCTION TO BLOCKCHAIN AND CRYPTO CURRENCIES	FXC	2	2	0	0	4	4	NIL	Retained	SKILL DEVELOPMENT		
20CS3042RA	NETWORK & INFRASTRUCTURE SECURITY	FXC	2	0	2	0	3	4	20CS2222	Retained	SKILL DEVELOPMENT		

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20CS3119RA	INTERNET OF THINGS	FXC	2	0	2	0	3	4	NIL	Retained	EMPLOYABILITY		
20CS3214RA	AUTOMATA THEORY AND COMPILER DESIGN	FXC	3	2	0	0	5	5	NIL	Retained	EMPLOYABILITY		
SKILLING COURSES													
20TS2101S	MEA(R)N STACK WEB DEVELOPMENT	SDC	0	0	0	8	2	8	19CS1203	New	SKILL DEVELOPMENT	Industry Person	Equips students with the latest web development technologies, enhancing their career prospects and keeping our curriculum up-to-date.
20TS2290RA	PYTHON FULL STACK DEVELOPMENT	SDC	0	0	0	8	2	8	19CS1203	10%-Revised	SKILL DEVELOPMENT	Industry Person	To empower students with the most relevant skills and tools needed to excel in full-stack development, covering front-end and back-end development, databases, frameworks, and

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-Req Course Code	New/Revised /Retained	EES	Stake holders	Justification for Considering the feedback
													deplcyment strategies.
20TS3101RA	JAVA FULL STACK DEVELOPMENT+MIC RO SERVICES	SDC	0	0	0	8	2	8	19CS1203	New	SKILL DEVELOPMENT	Industry Person	Provide students with comprehensive skills in full-stack web development, encompassing both frontend and backend technologies
20TS3292S	TS-SDP4 (CLOUD DEVOPS)	SDC	0	0	0	8	2	8	20CS2205R	Retained	SKILL DEVELOPMENT		
20TS3291S	TS-SDP4 (CLOUD BASED SOLUTIONS ARCHITECT)	SDC	0	0	0	8	2	8		Retained	SKILL DEVELOPMENT		
20TS3293S	TS-SDP4 (CLOUD BASED SECURITY SPECIALITY)	SDC	0	0	0	8	2	8		Retained	SKILL DEVELOPMENT		
20TS3294S	TS-SDP4 (CERTIFIED GAME DEVELOPER)	SDC	0	0	0	8	2	8		Retained	SKILL DEVELOPMENT		
20TS3295S	TS SDP-4 (CLOUD BASED AI/ML SPECIALITY)	SDC	0	0	0	8	2	8		Retained	SKILL DEVELOPMENT		
20TS3296S	TS SDP-4 (CLOUD BASED DATA ANALYTICS SPECIALITY)	SDC	0	0	0	8	2	8		Retained	SKILL DEVELOPMENT		

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20TS3290S	TS-SDP4 (CLOUD BASED IOT DEVELOPER)	SDC	0	0	0	8	2	8		Retained	SKILL DEVELOPMENT		
	SCIENCE ELECTIVE COURSES												
18PH4101	QUANTUM PHYSICS FOR ENGINEERS	BSE	3	0	0	0	3	3		Retained	EMPLOYABILITY/ SKILL DEVELOPMENT		
18CY1005	CHEMISTRY FOR ENGINEERS	BSE	3	0	0	0	3	3		Retained	EMPLOYABILITY		
	OPEN ELECTIVES, FOREIGN LANGUAGE ELECTIVES, MANAGEMENT ELECTIVES												
20FL3054	FRENCH LANGUAGE	FE	2	0	0	0	2	2		Retained	SKILL DEVELOPMENT		
20MB4053	MANAGING PERSONAL FINANCES	ME	3	0	0	0	3	3		Retained	EMPLOYABILITY		
20MB4055	ORGANIZATION MANAGEMENT	ME	3	0	0	0	3	3		Retained	EMPLOYABILITY		
20CS40A7	FUNDAMENTALS OF SOFTWARE ENGINEERING	OE	3	0	0	0	3	3		Retained	EMPLOYABILITY		
20CS40A6	FUNDAMENTALS OF DBMS	OE	3	0	0	0	3	3		Retained	EMPLOYABILITY		
20CS40A8	FUNDAMENTALS OF IT	OE	3	0	0	0	3	3		Retained	EMPLOYABILITY		
20MB4056	Resources Safety and Quality Management	OE-2	2	0	0	0	2	2		Retained	EMPLOYABILITY		

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20MB4058	Construction Project Management	OE-2	2	0	0	0	2	2		Retained	EMPLOYABILITY		
20ME4037	Hybrid Electric Vehicles	OE-3	3	0	0	0	3	3		Retained	EMPLOYABILITY		
20ME40B4	DIGITAL MARKETING	OE-3	3	0	0	0	3	3		Retained	EMPLOYABILITY		
20ME40B5	Mechatronics	OE-3	3	0	0	0	3	3		Retained	SKILL DEVELOPMENT		
TOOL BASED LEARNING													
20TS1005	CLOUD FOUNDATIONS-AWS(CF)	TBL	0	0	0	4	1	4	NIL	New	EMPLOYABILITY	Alumni	Gives practical experience in utilizing contemporary cloud tools, enhancing their hands-on skills and industry ready.
20TS2006	BLUEPRISM(BP)	TBL	0	0	0	4	1	4	NIL	New	EMPLOYABILITY	Alumni	To incorporate the latest industry-relevant tools and techniques, ensuring that students are equipped with cutting-edge skills.
20TS1006	GOOGLE CLOUD(GC)	TBL	0	0	0	4	1	4	NIL	New	EMPLOYABILITY	Alumni	Gives practical experience in

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Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-Req Course Code	New/Revised /Retained	EES	Stake holders	Justification for Considering the feedback
													utilizing contemporary cloud tools, enhancing their hands-on skills and industry ready.
20TS2007	UI PATH(UP)	TBL	0	0	0	4	1	4	NIL	New	EMPLOYABILITY	Faculty	Facilitates hands-on experience with industry-standard tools, enhancing students' practical programming skills and preparing them for real-world challenges.
20TS2008	ROBOTIC PROCESS AUTOMATION(RPA)	TBL	0	0	0	4	1	4	NIL	New	EMPLOYABILITY	Alumni	To incorporate the latest industry-relevant tools and techniques, ensuring that students are equipped with cutting-edge skills.

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Percentage of Syllabus Revision = (Total No. of courses revised + new courses) * 100/Total Courses
= (14+7) * 100/133=15.78%

Percentage of Courses focusing on Employability= 91*100/133=68.421

Percentage of Courses focusing on Entrepreneurship= 3*100/133=2.255

Percentage of Courses focusing on Skill Development = 39*100/133=29.323

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-5(b)

M.Tech-CSE 2020-21 Admitted Batch Category Wise Course Structure

Sl No	Course Code	Course Name	L	T	P	S	Cr	CH
1	18CS5101	MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE	3	2	0	0	5	5
2	18CS5102	COMPUTER ORGANIZATION & ARCHITECTURE	3	2	0	0	5	5
3	18CS5103	DATA STRUCTURES & ALGORITHMS	3	0	2	0	4	5
4	18CS5104	DISTRIBUTED DATABASE MANAGEMENT SYSTEMS	3	0	2	0	4	5
5	18CS51A5	ELECTIVE-1	3	0	0	0	3	3
6	18CS51B5	ELECTIVE-2	3	0	0	0	3	3
7	18IE5149	SEMINAR	0	0	4	0	2	4
8	18CS5205	OPERATING SYSTEM DESIGN	3	2	0	0	5	5
9	18CS5206	COMPUTER NETWORKS & SECURITY	3	2	0	0	5	5
10	18CS5207	OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	2	0	4	5
11	18CS5208	ENTERPRISE PROGRAMMING	3	0	2	0	4	5
12	18CS52M1	Elective-III	3	0	4	4	6	11
13	18CS52M2	Elective-IV	3	0	4	4	6	11

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Sl No	Course Code	Course Name	L	T	P	S	Cr	CH
14	18IE5250	TERM PAPER	0	0	4	0	2	4
15	18IE6050	DISSERTATION	0	0	72	0	36	72
		Total Credits	36	8	96	8	94	148
		LIST OF ELECTIVES						
		ELECTIVE - 1						
16	18CS51A1	SOFT COMPUTING	3	0	0	0	3	3
17	18CS51A2	MACHINE LEARNING AND PATTERN CLASSIFICATION	3	0	0	0	3	3
18	18CS51A3	DATA MINING	3	0	0	0	3	3
19	18CS51A4	NATURAL LANGUAGE PROCESSING	3	0	0	0	3	3
20	18CS51A5	MACHINE LEARNING	3	0	0	0	3	3
		ELECTIVE - 2						
21	18CS51B1	REQUIREMENTS ENGINEERING	3	0	0	0	3	3
22	18CS51B2	PRINCIPLES OF PROGRAMMING LANGUAGES	3	0	0	0	3	3
23	18CS51B3	COMPILER DESIGN	3	0	0	0	3	3
24	18CS51B4	SOFTWARE TESTING & QUALITY ASSURANCE	3	0	0	0	3	3

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Sl No	Course Code	Course Name	L	T	P	S	Cr	CH
25	18CS51B5	SOFTWARE VERIFICATION & VALIDATION	3	0	0	0	3	3
		ELECTIVE - 3						
26	18CS52C1	CRYPTOGRAPHY & NETWORK SECURITY	3	0	0	0	3	3
27	18CS52C2	MOBILE COMPUTING	3	0	0	0	3	3
28	18CS52C3	HIGH PERFORMANCE COMPUTING	3	0	0	0	3	3
29	18CS52C4	NETWORK MANAGEMENT SYSTEMS	3	0	0	0	3	3
30	18CS52M1	CONTINUOUS DELIVERY & DEVOPS	3	0	4	4	6	11
		ELECTIVE - 4						
31	18CS52D1	SERVICE ORIENTED ARCHITECTURE	3	0	0	0	3	3
32	18CS52D2	VISUAL PROGRAMMING	3	0	0	0	3	3
33	18CS52D3	DIGITAL IMAGE PROCESSING	3	0	0	0	3	3
34	18CS52M2	BIG DATA ANALYTICS	3	0	4	4	6	11

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech - Digital Forensics and Cyber Security 2020-21 Admitted Batch Category Wise Course Structure

Sl No	Course Code	Course Name	L	T	P	S	Cr	CH	New/Revised/ Retained	EES	Stake holders	Justification for Considering the feedback
1	18CS5117	INTRODUCTION TO CYBER SECURITY & ICS	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
2	18CS5118	DIGITAL FORENCIES	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
3	18CS5119	ADVANCE NETWORK SECURITY & INVESTIGATIONS	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
4	18CS5120	SOFTWARE SECURITY	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
		ELECTIVE - 1	3	0	0	0	3	3				
		ELECTIVE - 2	3	0	0	0	3	3				
5	18IE5149	SEMINAR	0	0	4	0	2	2	Retained	SKILL DEVELOPMENT	No Changes	
6	18CS5221	CRYPTOGRAPHY FOR CYBER DEFENSE	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
7	18CS5222	MALWARE ANALYSIS & REVERSE ENGINEERING	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
8	18CS5223	CYBER INCIDENT RESPONSE & RESILIENCE	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
9	18CS5224	CYBER LAB, GOVERNANCE & COMPLIANCE	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	

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Sl No	Course Code	Course Name	L	T	P	S	Cr	CH	New/Revised/ Retained	EES	Stake holders	Justification for Considering the feedback
		Elective - 3	3	0	4	4	6	11				
		Elective - 4	3	0	4	4	6	11				
10	18IE5250	TERMPAPER	0	0	4	0	2	4	Retained	SKILL DEVELOPMENT	No Changes	
11	18IE6050	DISSERTATION	0	0	72	0	36	72	Retained	EMPLOYABILITY	No Changes	
TOTAL CREDITS			**36**	**0**	**104**	**8**	**90**	**146**				
LIST OF ELECTIVES												
ELECTIVE - 1												
12	18CS 51I1	MOBILE DEVICE THREATS & INVESTIGATION	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
13	18CS 51I2	FUNDAMENTALS OF E-DISCOVERY	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
14	18CS51E3	FUZZY SETS AND FUZZY LOGIC	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
15	18CS51E4	CLOUD COMPUTING	3	0	0	0	3	3	NEW	SKILL DEVELOPMENT	Industry Person	To equip students with essential skills in managing and leveraging cloud technology, a critical component of modern IT infrastructure
ELECTIVE - 2												

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16	18CS 51J1	INTRODUCTION TO BIG DATA ANALYTICS	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
17	18CS 51J2	SOCIAL MEDIA FORENSICS	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	Nc Changes	
18	18CS 51J3	CRITICAL INFORMATION INFRASTRUCTURE SECURITY	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
		ELECTIVE - 3										
19	18CS 52K1	INFRASTRUCTURE ATTACKS AND DEFENSE	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
20	18CS 52K2	SOFTWARE VULNERABILITY ANALYSIS	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
21	18CS 52K3	PARALLEL & CLOUD COMPUTING	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
22	18CS52M3	CLOUD SYSTEM INFRASTRUCTURE	3	0	4	4	6	11	NEW	EMPLOYABILITY	Academic Peer	To equip students with essential skills in managing and leveraging cloud technology
		ELECTIVE - 4										
23	18CS 52L1	APPLIED CRYPTOGRAPHY	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
24	18CS 52L2	SOFTWARE MODELING	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	

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Sl No	Course Code	Course Name	L	T	P	S	Cr	CH	New/Revised/ Retained	EES	Stake holders	Justification for Considering the feedback
25	18CS 52L3	DIGITAL IMAGE PROCESSING	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
26	18CS52L4	PROGRAMMING FOR BLOCK CHAIN	3	0	4	4	6	11	NEW	SKILL DEVELOPMENT	Industry Person	To educate students about this transformative technology, fostering a deep understanding of its applications, security considerations

Percentage of Syllabus Revision = (Total No. of courses revised + new courses) * 100/Total Courses

= (3+0) * 100/26=11.53%

Percentage of Courses focusing on Employability= 18*100/26=69.23%

Percentage of Courses focusing on Skill Development = 8*100/26=30.76%

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M.Tech- (Machine Learning and Computing) 2020-21 Admitted Batch Category Wise Course Structure

Sl No	Course Code	Course Name	L	T	P	S	Cr	CH	New/Revised / Retained	EES	Stake holders	Justification for Considering the feedback
1	18CS5109	OPTIMIZATION TECHNIQUES	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
2	18CS5110	APPLIED STATISTICS	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
3	18CS5121	DATA WAREHOUSING & MINING	3	0	2	0	4	5	NEW	EMPLOYABILITY	Academic Peer	To implement a robust data governance framework and incorporate advanced analytics for improved decision-making and competitiveness.
4	18CS5112	MATRIX COMPUTATION	3	0	2	0	4	5	Retained	SKILL DEVELOPMENT	No Changes	
		ELECTIVE-1	3	0	0	0	3	3				
		ELECTIVE-1	3	0	0	0	3	3				
5	18IE5149	SEMINAR	0	0	4	0	2	4	Retained	SKILL DEVELOPMENT	No Changes	
6	18CS5113	EVOLUTIONARY AND NATURAL COMPUTING	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
7	18CS5114	DISCRETE MATHEMATICS	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Sl No	Course Code	Course Name	L	T	P	S	Cr	CH	New/Revised / Retained	EES	Stake holders	Justification for Considering the feedback
8	18CS5115	PATTERN RECOGNITION AND MACHINELEARNING	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
9	18CS5116	COMPUTER MODELING &SIMULATION	3	0	2	0	4	5	Retained	EMPLOYABILITY	No Changes	
		ELECTIVE-3	3	0	0	0	3	3				
		ELECTIVE-4	3	0	0	0	3	3				
10	18IE5250	TERMPAPER	0	0	4	0	2	4	Retained	SKILL DEVELOPMENT	No Changes	
11	18IE6050	DISSERTATION	0	0	72	0	36	72	Retained	EMPLOYABILITY	No Changes	
TOTAL CREDITS			36	0	90	0	81	126				
LIST OF ELECTIVES												
ELECTIVE - 1												
12	18CS51E1	COMPUTER VISION AND IMAGE PROCESSING	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
13	18CS51E2	SERVICE ORIENTED ARCHITECTURE	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
14	18CS51E3	DATA ANALYSIS	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
15	18CS51E4	CLOUD COMPUTING	3	0	0	0	3	3	NEW	SKILL DEVELOPMENT	Industry Person	To equip students with essential skills in managing and leveraging cloud

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												technology, a critical component of modern IT infrastructure
						ELECTIVE - 2						
16	18CS51F1	ARTIFICIAL NEURAL NETWORKS	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
17	18CS51F2	APPLICATION DEVELOPMENT FRAMEWORKS	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
18	18CS51F3	BIG DATA ANALYTICS	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
19	18CS51F4	CLOUD SECURITY	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
20	18CS51A5	MACHINE LEARNING	3	0	0	0	3	3	NEW	EMPLOYABILITY	Industry Person	To include machine learning concepts is essential to ensure a strong foundation in this rapidly evolving field for M.Tech Students
						ELECTIVE - 3						
21	18CS52G1	CONTROL THEORY	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
22	18CS52G2	WEB SEMANTICS	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	

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23	18CS52G3	MAP REDUCE DESIGN PATTERN	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
24	18CS52G4	DATA CENTRE VIRTUALIZATION	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
25	18CS52M3	CLOUD SYSTEM INFRASTRUCTURE	3	0	4	4	6	11	NEW	EMPLOYABILITY	Academic Peer	To equip students with essential skills in managing and leveraging cloud technology
		ELECTIVE - 4										
26	18CS52H1	REINFORCEMENT LEARNING	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
27	18CS52H2	MULTI AGENT SYSTEMS	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
28	18CS52H3	NETWORK SECURITY	3	0	0	0	3	3	Retained	EMPLOYABILITY	No Changes	
29	18CS52H4	CLOUD APPLICATION ARCHITECTURES	3	0	0	0	3	3	Retained	SKILL DEVELOPMENT	No Changes	
30	18CS52M4	DEEP LEARNING	3	0	4	4	6	11	NEW	EMPLOYABILITY	Industry Person	To equip students with essential to excel in the field of artificial intelligence.

Percentage of Syllabus Revision= (Total No. of courses revised + new courses) * 100/Total Courses = (5+0) * 100/30=16.66%
Percentage of Courses focusing on Employability=18 *100/30=60.00%
Percentage of Courses focusing on Skill Development = 12*100/30=40.00%

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-5(c)

B.Tech - CSE

LIST OF COURSES OFFERED IN ADVANCE AND PEER MENTOR MODE

FOR 2020-21 ADMITTED BATCH

Sl No	Course Code	Course Title	Category	Mode	L	T	P	S	Cr	CH	Pre-requisite
1	20CS2105	MATHEMATICAL PROGRAMMING - 1	BS	A/P	3	2	2	0	6	7	MFC
2	20CS2210RA	MATHEMATICAL PROGRAMMING - 2	BS	A/P	3	2	2	0	6	7	MP1
3	20CS2104S	DATABASE MANAGEMENT SYSTEMS	PC	A/P	4	0	4	2	6.5	10	CTSD
4	20CS2205R	ELEMENTS OF SOFTWARE CONSTRUCTION	PC	A/P	3	2	2	0	6	7	NIL
5	20CS2103S	OPERATING SYSTEMS DESIGN	PC	A/P	4	0	4	2	6.5	10	COA
6	20CS2222RA	COMPUTER NETWORKS & SECURITY	PC	A/P	4	1	2	0	6	7	NIL
7	20CS2221RA	AI FOR DATA SCIENCE	PC	A/P	4	0	4	4	7	12	MFC
8	20CS2220RA	DESIGN & ANALYSIS OF ALGORITHMS	PC	A/P	4	0	4	4	7	14	DS
9	20CS2107RB	ENTERPRISE PROGRAMMING	PC	A/P	3	0	4	4	6	11	OOP
10	20IE4150	CAPSTONE PROJECT-1	PJ	A	0	0	16	0	8	16	TP
11	20IE4250	CAPSTONE PROJECT-2	PJ	A	0	0	16	0	8	16	PJ1
12	20CS3020RB	MACHINE LEARNING	PE-1	A/P	3	0	4	4	6	11	20CS2221
13	20CS3022RA	SOFT COMPUTING	PE-2	P	3	0	4	0	5	7	20CS2221
14	20CS3026RA	ARTIFICIAL NEURAL NETWORKS	PE-2	P	3	0	4	0	5	7	20CS2221

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15	20CS3269RA	DEEP LEARNING	PE-3	A/P	3	0	4	4	6	11	20CS2221
16	20CS3270RA	COGNITIVE COMPUTING	PE-4	P	3	0	4	0	5	7	20CS2221
17	20CS3271RA	PERCEPTION AND COMPUTER VISION	PE-4	P	3	0	4	0	5	7	20CS2221
18	20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	P	3	0	4	0	5	7	19SC1202
19	20CS3282RA	MACHINE LEARNING ON CLOUD	PE-4	P	3	0	4	0	5	7	20CS3020
20	20CS3272RA	COMPUTATIONAL EPIDEMIOLOGY	PE-5	P	3	0	4	0	5	7	20CS2221
21	20CS3273RA	NATURAL LANGUAGE PROCESSING	PE-5	P	3	0	4	0	5	7	20CS2221
22	20CS3274RA	SPEECH PROCESSING	PE-5	P	3	0	4	0	5	7	20CS2221
23	20CS3275RA	DATA VISUALISATION TECHNIQUES	PE-1	A/P	3	0	4	4	6	11	20CS2221 & 20CS3037
24	20CS3052RA	DATA WAREHOUSING & MINING	PE-2	P	3	0	4	0	5	7	20CS2104
25	20CS3051RA	BIG DATA ANALYTICS	PE-3	A/P	3	0	4	4	6	11	20CS2104
26	20CS3276RA	BIG DATA OPTIMIZATION	PE-4	P	3	0	4	0	5	7	20CS2104
27	20CS3277RA	BIOINFORMATICS	PE-4	P	3	0	4	0	5	7	20CS2220
28	20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	P	3	0	4	0	5	7	20CS2221
29	20CS3283RA	DATA ANALYTICS ON CLOUD	PE-4	P	3	0	4	0	5	7	20CS2221
30	20CS3284RA	DIGITAL MEDIA ANALYTICS	PE-4	P	3	0	4	0	5	7	20CS2221
31	20CS3272RA	COMPUTATIONAL EPIDEMIOLOGY	PE-5	P	3	0	4	0	5	7	20CS2221
32	20CS3279RA	ADVANCED DATABASES	PE-5	P	3	0	4	0	5	7	20CS2104

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33	20CS3289RA	BUSINESS ANALYTICS	PE-5	P	3	0	4	0	5	7	20CS2104
34	20CS3280RA	GRAPH & WEB ANALYTICS	PE-5	P	3	0	4	0	5	7	20CS2221
35	20CS3037RA	CLOUD INFRASTRUCTURE & SERVICES	PE-1	A/P	3	0	4	4	6	11	NIL
36	20CS3032RA	ADVANCED OPERATING SYSTEMS	PE-2	P	3	0	4	0	5	7	20CS2103
37	20CS3036RA	FUNCTIONAL & CONCURRENT PROGRAMMING	PE-2	P	3	0	4	0	5	7	19CS1203
38	20CS3086RA	CLOUD DEVOPS	PE-2	P	3	0	4	0	5	7	20CS2205
39	20CS3281RA	CLOUD & SERVERLESS COMPUTING	PE-3	A/P	3	0	4	4	6	11	NIL
40	20CS3251RA	ADVANCED COMPUTER ARCHITECTURE	PE-4	P	3	0	4	0	5	7	19EC1202
41	20CS3252RA	PARALLEL ALGORITHMS	PE-4	P	3	0	4	0	5	7	20CS2103 OR 19CS1203
42	20CS3285RA	ARCHITECTING CLOUD SOLUTIONS*	PE-4	P	3	0	4	0	5	7	20CS2103 &20CS2222
43	20CS3253RA	EDGE COMPUTING	PE-5	P	3	0	4	0	5	7	20CS2103
44	20CS3038RA	HIGH PERFORMANCE COMPUTING	PE-5	P	3	0	4	0	5	7	20CS2103
45	20CS3041RA	CRYPT ANALYSIS & CYBER DEFENSE	PE-1	A/P	3	0	4	4	6	11	20CS2222
46	20CS3042RA	NETWORK & INFRASTRUCTURE SECURITY	PE-2	P	3	0	4	0	5	7	20CS2222
47	20CS3045RA	INTRODUCTION TO BLOCKCHAIN & CRYPTO CURRENCIES	PE-2	P	3	0	4	0	5	7	20CS2222
48	20CS3259RA	DIGITAL FORENSICS	PE-3	A/P	3	0	4	4	6	11	20CS3041
49	20CS3260RA	DATABASE & SYSTEM SECURITY	PE-4	P	3	0	4	0	5	7	20CS2104

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50	20CS3261RA	PROGRAMMING FOR SMART CONTRACTS	PE-4	P	3	0	4	0	5	7	20CS3045
51	20CS3287RA	CLOUD SECURITY	PE-4	P	3	0	4	0	5	7	20CS2222
52	20CS3262RA	SECURE SOFTWARE ENGINEERING	PE-5	P	3	0	4	0	5	7	20CS2205
53	20CS3264RA	WEB SECURITY	PE-5	P	3	0	4	0	5	7	20CS2222
54	20CS3291RA	SECURITY GOVERNANCE & MANAGEMENT	PE-5	P	3	0	4	0	5	7	NIL
55	20CS3062RB	SOFTWARE VERIFICATION & VALIDATION	PE-1	A/P	3	0	4	4	6	11	20CS2205
56	20CS3064RA	UX DESIGN	PE-2	P	3	0	4	0	5	7	20UC1102
57	20CS3065RA	DESIGN PATTERNS & CLEAN CODING TECHNIQUES	PE-2	P	3	0	4	0	5	7	19CS1203
58	20CS3256RA	CONTINUOUS DELIVERY & DEVOPS	PE-3	A/P	3	0	4	4	6	11	20CS2205
59	20CS3257RA	SOFTWARE PROJECT MANAGEMENT	PE-4	P	3	0	4	0	5	7	20CS2205
60	20CS3231RA	VISUAL PROGRAMING	PE-4	P	3	0	4	0	5	7	NIL
61	20CS3295RA	SOFTWARE ARCHITECTURE & DESIGN	PE-4	P	3	0	4	0	5	7	20CS2205
62	20CS3258RA	SOFTWARE RELIABILITY	PE-5	P	3	0	4	0	5	7	20CS2205
63	20CS3255RA	CROSS-PLATFORM DEVELOPMENT FRAMEWORKS	PE-5	P	3	0	4	0	5	7	19CS1203
64	20CS3071RA	PROGRAMMING FOR GAME DEVELOPMENT	PE-1	A/P	3	0	4	4	6	11	20CS2103
65	20CS3064RA	UX DESIGN	PE-2	P	3	0	4	0	5	7	20UC1102
66	20CS3266RA	AR & VR APPLICATION DEVELOPMENT	PE-3	A/P	3	0	4	4	6	11	20CS2103

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67	20CS3296RA	COMPUTER GRAPHICS	PE-4	P	3	0	4	0	5	7	NIL
68	20CS3297RA	3D MODELLING & ANIMATION	PE-4	P	3	0	4	0	5	7	NIL
69	20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	P	3	0	4	0	5	7	20MT1101
70	20CS3268RA	PRINCIPLES OF GAME DESIGN	PE-5	P	3	0	4	0	5	7	NIL
71	20CS3267RA	BUSINESS OF GAMES & ENTREPRENEURSHIP	PE-5	P	3	0	4	0	5	7	NIL
72	20CS3117RA	IOT SENSING AND ACTUATING DEVICES	PE-1	A/P	3	0	4	4	6	11	NIL
73	20CS3118RA	INTERNET OF THINGS: ARCHITECTURES AND PROTOCOLS	PE-2	P	3	0	4	0	5	7	20CS2222
74	20CS3278RA	DIGITAL VIDEO PROCESSING	PE-4	P	3	0	4	0	5	7	19SC1202
75	20CS3250RA	CLOUD COMPUTING FOR IOT ENGINEERS	PE-5	P	3	0	4	0	5	7	NIL
76	20CS3265RA	WIRELESS SENSOR NETWORKS	PE-5	P	3	0	4	0	5	7	20CS2222
77	20CS3253RA	EDGE COMPUTING	PE-5	P	3	0	4	0	5	7	NIL
78	20CS3064RA	UX DESIGN	FXC	P	3	0	4	0	5	7	20UC1102
79	20CS3060RA	CONTINUOUS DELIVERY & DEVOPS	FXC	P	3	0	4	0	5	7	20CS2205
80	20CS3116RA	SIGNAL PROCESSING	FXC	P	3	2	2	0	6	7	20CS2221
81	20CS3015RA	EMBEDDED SYSTEMS	FXC	P	3	0	4	0	5	7	19EC1202
82	20CS3133RA	DATA VISUALIZATION TECHNIQUES	FXC	P	3	0	4	0	5	7	20CS2221
83	20CS3234RA	APPLICATION DEVELOPMENT ON CLOUD	FXC	P	3	0	4	0	5	7	20CS2107

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84	20CS3235RA	SOLUTIONS ARCHITECTING ON CLOUD	FXC	P	3	0	4	0	5	7	20CS2103 &20CS2222
85	20CS3045RA	INTRODUCTION TO BLOCKCHAIN AND CRYPTO CURRENCIES	FXC	P	3	2	2	0	6	7	NIL
86	20CS3042RA	NETWORK & INFRASTRUCTURE SECURITY	FXC	P	3	0	4	0	5	7	20CS2222
87	20CS3119RA	INTERNET OF THINGS	FXC	P	3	0	4	0	5	7	NIL
88	20CS3204RA	COMPILER DESIGN	FXC	P	3	0	4	0	5	7	20CS3061
89	20CS3061RA	AUTOMATA THEORY AND FORMAL LANGUAGES	FXC	P	3	1	2	0	5	6	Nil
90	20TS2101S	MEA(R)N STACK WEB DEVELOPMENT	SDC	A/P	0	0	0	16	4	16	OOP
91	20TS2290RA	PYTHON FULL STACK DEVELOPMENT	SDC	A/P	0	0	0	16	4	16	OOP
92	20TS3101RA	JAVA FULL STACK DEVELOPMENT+MICRO SERVICES	SDC	A/P	0	0	0	16	4	16	OOP
93	20TS3292S	TS-SDP4 (CLOUD DEVOPS)	SDC	P	0	0	0	16	4	16	SOFTWARE ENGINEERING, OOP
94	20TS3291S	TS-SDP4 (CLOUD BASED SOLUTIONS ARCHITECT)	SDC	P	0	0	0	16	4	16	CLOUD INFRASTRUCTURE AND SERVICES
95	20TS3293S	TS-SDP4 (CLOUD BASED SECURITY SPECIALITY)	SDC	P	0	0	0	16	4	16	COMPUTER NETWORKS & SECURITY
96	20TS3294S	TS-SDP4 (CERTIFIED GAME DEVELOPER)	SDC	P	0	0	0	16	4	16	PROGRAMMING FOR GAME DEVELOPMENT
97	20TS3295S	TS SDP-4 (CLOUD BASED AI/ML SPECIALITY)	SDC	P	0	0	0	16	4	16	ARTIFICIAL INTELLIGENCE

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Sl No	Course Code	Course Title	Category	Mode	L	T	P	S	Cr	CH	Pre-requisite
98	20TS3296S	TS SDP-4 (CLOUD BASED DATA ANALYTICS SPECIALITY)	SDC	P	0	0	0	16	4	16	DATA SCIENCE
99	20TS3290S	TS-SDP4 (CLOUD BASED IOT DEVELOPER)	SDC	P	0	0	0	16	4	16	NIL

23/6/20

HEAD OF THE DEPARTMENT
Computer Science and Engineering
KLEF, (Deemed to be University)
Green Fields, VADDESWARAM-522 302.
Guntur District, Andhra Pradesh

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 21001:2018 Certified
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-7

B.Tech - CSE

2021-22 Admitted Batch MOOCS COURSES

S. No	Course Code	Course Title	Category	Mode	L	T	P	S	Cr	CH	Pre-requisite
1	20FL3055M	GERMAN LANGUAGE	FE	M	3	0	0	0	3	3	NIL
2	20FL3052M	LEARN SPANISH: BASIC SPANISH VOCABULARY	FE	M	3	0	0	0	4	4	NIL
3	20FL3060M	RUSSIAN FOR BEGINNERS	FE	M	3	0	0	0	4	4	NIL
4	20FL3063M	KOREAN LANGUAGE	FE	M	3	0	0	0	4	4	NIL
5	18FL3064M	JAPANESE LANGUAGE	FE	M	4	0	0	0	4	4	NIL
6	20FL3053M	LEARN CHINESE: HSK TEST PREPARATION	FE	M	3	0	0	0	4	4	NIL
7	20MB4058M	SIX SIGMA YELLOW BELT	ME	M	4	0	0	0	4	4	NIL
8	20MB4059M	SEARCH ENGINE OPTIMIZATION	ME	M	4	0	0	0	4	4	NIL
9	20MB4060M	FINTECH: FINANCE INDUSTRY TRANSFORMATION AND REGULATION	ME	M	4	0	0	0	4	4	NIL
10	20MB4061M	AN INTRODUCTION TO MICROECONOMICS	ME	M	4	0	0	0	4	4	NIL
11	20OE4001M	GRAPHIC DESIGN	OE-1	M	4	0	0	0	4	4	NIL
12	18OE4002M	PHOTOGRAPHY BASICS AND BEYOND FROM SMART PHONE TO DSLR	OE-1	M	4	0	0	0	4	4	NIL
13	20OE4003M	EXPLORING OUR RESPONSES TO CLIMATE CHANGE	OE-1	M	4	0	0	0	4	4	NIL
14	20OE4004M	PATENT LAW FOR ENGINEERS AND SCIENTISTS	OE-1	M	4	0	0	0	3	3	NIL
15	20OE4224M	SELF DRIVING CARS	OE-2	M	4	0	0	0	4	4	NIL
16	20OE4005M	ENERGY PRODUCTION, DISTRIBUTION & SAFETY	OE-2	M	4	0	0	0	4	4	NIL

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S. No	Course Code	Course Title	Category	Mode	L	T	P	S	Cr	CH	Pre-requisite
17	20OE4221M	CONSTRUCTION MANAGEMENT	OE-2	M	4	0	0	0	4	4	NIL
18	20OE4007M	GEOGRAPHIC INFORMATION SYSTEMS	OE-2	M	4	0	0	0	4	4	NIL
19	20OE4008M	NON-CONVENTIONAL ENERGY RESOURCES	OE-2	M	4	0	0	0	4	4	NIL
20	20OE4232M	LEADING SUSTAINABLE COMMUNITY TRANSFORMATION	OE-3	M	4	0	0	0	4	4	NIL
21	20OE4231M	DIGITAL MARKETING	OE-3	M	4	0	0	0	4	4	NIL
22	20ME40B6M	EDUCATION FOR SUSTAINABLE DEVELOPMENT	OE-3	M	4	0	0	0	4	4	NIL
23	20OE4234M	INNOVATION MANAGEMENT	OE-3	M	4	0	0	0	4	4	NIL
24	19PH4002M	OPTICAL ENGINEERING	BSE	M	3	0	0	0	3	3	NIL
25	19PH4003M	SEMICONDUCTOR DEVICES	BSE	M	3	0	0	0	3	3	NIL

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-5

B.Tech - CSE

2021-22 Admitted Batch VALUE ADDED COURSES

S. No	Course Code	Name of the Course
1	20CC3000	AWS CERTIFIED CLOUD PRACTITIONER (CLF-C01)
2	20CC3010	MICROSOFT CERTIFIED: AZURE DEVELOPER ASSOCIATE (AZ-204)
3	20CC3011	MICROSOFT CERTIFIED: AZURE FUNDAMENTALS (AZ-900)
4	20CC3020	MONGODB CERTIFIED DBA ASSOCIATE LEVEL (C100DBA)
5	20CC3021	MONGODB CERTIFIED DEVELOPER ASSOCIATE (C100DEV)
6	20CC3040	RED HAT CERTIFIED ENTERPRISE APPLICATION DEVELOPER
7	20CC3001	AWS CERTIFIED DEVELOPER ASSOCIATE
8	20CC3002	AWS CERTIFIED SOLUTIONS ARCHITECT ASSOCIATE
9	20CC3012	MICROSOFT CERTIFIED: AZURE AI FUNDAMENTALS (AI-900)
10	20CC3030	CODECHEF CERTIFIED DSA(CCDSAP-FOUNDATION LEVEL)
11	20CC3223	PCAP™ – CERTIFIED ASSOCIATE IN PYTHON PROGRAMMING
12	20CC3224	C++ CERTIFIED ASSOCIATE PROGRAMMER (CPA)
13	20CC3225	C PROGRAMMING LANGUAGE CERTIFIED ASSOCIATE (CLA)
14	20CC3226	CODECHEF CERTIFIED DATA STRUCTURE & ALGORITHMS PROGRAMME
15	20CC3063	WIPRO TALENT NEXT JAVA FULL STACK CERTIFICATION
16	20CC3062	WIPRO TALENT NEXT J2EE CERTIFICATION
17	20CC3015	TENSORFLOW DEVELOPER CERTIFICATE
18	20CC3227	SERVICENOW CERTIFIED SYSTEM ADMINISTRATOR
19	20CC3228	SERVICENOW CERTIFIED DEVELOPER
20	20CC3229	SALESFORCE ADMINISTRATOR CERTIFICATION EXAM (CRT101)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

S. No	Course Code	Name of the Course
21	20CC3230	SALESFORCE DEVELOPER CERTIFICATION EXAM
22	20CC3231	PEGA CERTIFIED SYSTEM ARCHITECT
23	20CC3232	PEGA CERTIFIED SENIOR SYSTEM ARCHITECT
24	20CC3058	PALO ALTO NETWORKS CERTIFIED CYBERSECURITY ENTRY-LEVEL TECHNICIAN (PCCET)
25	20CC3233	ORACLE CLOUD INFRASTRUCTURE CERTIFICATION
26	20CC3234	MULESOFT CERTIFIED DEVELOPER
27	20CC3235	MONGODB ASSOCIATE DBA EXAM
28	20CC3016	MONGODB ASSOCIATE DEVELOPER EXAM
29	20CC3236	MICROSOFT CERTIFIED: DEVOPS ENGINEER EXPERT (AZ-400)
30	20CC3237	MICROSOFT CERTIFIED: AZURE SOLUTIONS ARCHITECT EXPERT
31	20CC3012	MICROSOFT CERTIFIED: AZURE DEVELOPER ASSOCIATE (AZ-204)
32	20CC3238	MICROSOFT CERTIFIED: AZURE AI ENGINEER ASSOCIATE
33	20CC3239	MICROSOFT CERTIFIED: AZURE NETWORK ENGINEER ASSOCIATE
34	20CC3240	MICROSOFT CERTIFIED: AZURE SECURITY ENGINEER ASSOCIATE
35	20CC3241	MICROSOFT CERTIFIED: AZURE DATA ENGINEER ASSOCIATE
36	20CC3061	JUNIPER NETWORKS CERTIFIED ASSOCIATE, JUNOS(JNCIA-JUNOS)
37	20CC3242	GOOGLE CLOUD ASSOCIATE CLOUD ENGINEER (GCP-ACE)
38	20CC3243	CAMBRIDGE ASSESSMENT ENGLISH BEC-PRELIMINARY
39	20CC3244	AWS CERTIFIED SOLUTIONS ARCHITECT - ASSOCIATE (AWS-SAA)
40	20CC3010	AWS CERTIFIED DEVELOPER - ASSOCIATE (AWS-DA)
41	20CC3000	AWS CERTIFIED CLOUD PRACTITIONER (AWS-CP)
42	20CC3245	AWS CERTIFIED MACHINE LEARNING SPECIALITY
43	20CC3246	AWS CERTIFIED DATABASE SPECIALITY

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