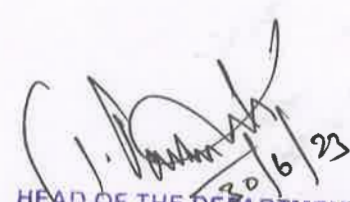## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Minutes of 31st Board of Studies Meeting

29th June 2023

The 31st virtual session of the Board of Studies for the Department of Computer Science and Engineering was held on June 29th, 2023, from 4:00 PM to 6:30 PM.

The following members were present:

1. Dr. T PAVAN KUMAR, PROFESSOR, CHAIRMAN

2. Mr. V. HARI KIRAN, ASSOC.PROFESSOR

3. Dr A SENTHIL, PROFESSOR

4. Dr. ARPITA GUPTA, ASSOC.PROFESSOR

5. Dr K SREERAMA MURTHY, PROFESSOR

6. Dr. K. AMARENDRA, PROFESSOR

7. Dr. GANDHARBA SWAIN, PROFESSOR

8. Dr G PARDHA SARADHI VARAMA, VICE CHANCELLOR

9. Dr. MADHU MUTHYAM, EXTERNAL MEMBER, PROFESSOR IIT, MADRAS

10. Mr. RAMESH KUMAR DACHA, EXTERNAL MEMBER ASSOCIATE DIRECTOR ACCENTURE SOLUTIONS INDIA PVT. LTD., HYDERABAD

11. Dr. AMARALINGESWARA RAO KAKA, EXTERNAL MEMBER, PROGRAM DIRECTOR IBM, HYDERABAD

12. Mr. JAGAN MOHAN CHEVVAKULA, EXTERNAL MEMBER, SR. QA MANAGER, NGA HR PVT LIMITED, HYDERABAD

13. Dr. V. SRIKANTH, PROFESSOR

14. Dr. B. V. APPA RAO, PROFESSOR

15. Dr.A VENKATESWARA RAO, PROFESSOR

16. Dr. M. KAMESWARA RAO, PROFESSOR

17. Dr. B. T. P. MADHAV, PROFESSOR

18. Dr. K SWAPNA, ASSOC.PROFESSOR

19. Dr. V. CHANDRA PRAKASH, PROFESSOR

20. Dr. K. SUBRAHMANYAM, PROFESSOR

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21. Dr. N. SRINIVASU, PROFESSOR

22. Dr K.V.DURGA KIRAN, PROFESSOR

23. Dr MD.MOULANA, PROFESSOR

24. Dr T.SANTHI SRI, PROFESSOR

25. Dr. A.V PRAVEEN KRISHNA , ASSOC.PROFESSOR

26. Dr. M.SRINIVAS , PROFESSOR

27. Dr. VSRK SHARMA, PROFESSOR

28. Dr. M. NAGESWARA RAO, PROFESSOR

29. Dr. G.PRADEEPINI, PROFESSOR

30. Dr. P. RAJARAJESWARI, PROFESSOR

31. Dr. K. BHANU PRAKASH, PROFESSOR

32. Dr. B.VIJAYA BABU, PROFESSOR

33. Dr. K. RAVINDRANATH, ASSOC.PROFESSOR

34. Dr. RAJU ANITHA, ASSOC.PROFESSOR

35. Dr. P.VENKATESWARA RAO, ASSOC.PROFESSOR

36. Dr. K. V. V.SATYANARAYANA, PROFESSOR

37. Dr. S.SAGAR IMAMBI, PROFESSOR

38. Dr. G.SIVANAGESWARA RAO, PROFESSOR

39. Dr E.VAMSIDHAR, PROFESSOR

40. Dr G.RAMA KOTESWARA RAO, PROFESSOR

41. Dr. S KAVITHA, ASSOC.PROFESSOR

42. Dr. TATA RAVI KUMAR, ASSOC.PROFESSOR

43. Dr. YOGESH SHARMA, PROFESSOR

44. Mrs. RAMYA, ASST.PROFESSOR

45. Dr. SANDA SRI HARSHA, ASSOC.PROFESSOR

46. Dr M PRAVEENA, ASST.PROFESSOR

47. Dr DEBNATH BHATTACHARYA, PROFESSOR

48. Dr SURYAKANTH .V GANGASHETTY , PROFESSOR

49. Dr D.GOVIND, PROFESSOR

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50. Dr SANDEEP KUMAR, PROFESSOR

51. Dr K SAMUDRAVIJAYA, PROFESSOR

52. Dr P.VIDYA SAGAR, ASSOC.PROFESSOR

53. Dr M KAVITHA, ASSOC.PROFESSOR

54. Dr. S.TULASI KRISHNA, ASSOC.PROFESSOR

55. Dr.P. PRAVEEN KUMAR, PROFESSOR

56. Mr. VIJAYA KRISHNA SONTHI, ASST.PROFESSOR

57. Dr KUNDA VENKATA PRASAD, ASSOC.PROFESSOR

58. Dr V VISWANATH SHENOI, PROFESSOR

59. Mrs. Y SRILATHA, ASST.PROFESSOR

60. Dr. Y PRASHANTH, PROFESSOR

61. Dr. K BHAGAVAN, ASSOC.PROFESSOR

62. Mr. B SREEDHAR, ASST.PROFESSOR

63. DRT.SAJANA, ASSOC.PROFESSOR

64. Dr U SRI LAKSHMI, PROFESSOR

65. Dr G RAMU, PROFESSOR

66. Dr G S RAGHAVENDRA, ASST.PROFESSOR

67. Dr P SRILATHA, ASSOC.PROFESSOR

68. Dr.V. RAMA KRISHNA, PROFESSOR

69. Dr.AADAPA SRINIVASA RAO, PROFESSOR

70. Dr.JAGJIT SINGH DHATTER WALL, ASSOC.PROFESSOR

71. Dr.ELANGOVAN GURUVA REDDY, ASSOC.PROFESSOR

72. Dr.SUNITHA PACHALA, ASSOC.PROFESSOR

73. Dr.PITTALA RAMESH BABU, ASSOC.PROFESSOR

74. Dr.N.B.ARUNE KUMAR, ASST.PROFESSOR

75. Dr.DYUTI BANERJEE, ASST.PROFESSOR

76. Dr.KV GURUNATHAM NAIDU, ASST.PROFESSOR

77. Mr.M SHASHANK, STUDENT

78. Mr. M RAMA SAI, STUDENT

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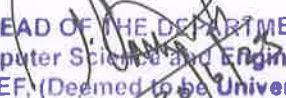Accredited by **NAAC** as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified

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79. Mr.SAI ABHINAV A, STUDENT

80. Miss.KARISHMA, STUDENT
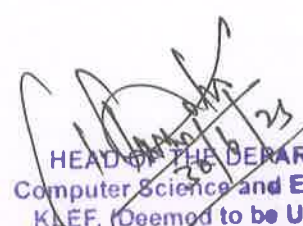
81. Miss.G REEMA, STUDENT

82. Mr.KALYAM CHAKRAVARTHI NARAYANA, STUDENT

The following members were Absent:

1. Dr. DARA VIKRAM, PROFESSOR

2. Dr.B.SREENIVASULU, ASSOC.PROFESSOR

3. Dr. GOPI KRISHNA, ASSOC.PROFESSOR

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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AGENDA and RESOLUTIONS

AGENDA ITEM-1

To Consider and approve DAC minutes held on 28th June,2023 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 28th June,2023 and highlighted the major resolutions of discussion.

  It is resolved to approve the recommendations made by DAC. **Annexure-1 DAC minutes (Dt: 28-06-2023)**

AGENDA ITEM-2

To consider and approve the courses proposed to introduce for 2023-24 admitted batch B. Tech CSE Students based on the feedback received from stakeholders.	Resolution: Approved for introduced courses for B.Tech CSE 2023-24 admitted Batch and the same is recommended to Academic Council.

To consider and introduce courses for 2023-24 admitted batch students based on the stake holder's feedback.

1. Mrs. G Prashanti, Assist. Professor, recommended introducing a course on Numerical Analysis to the curriculum, providing students with comprehensive knowledge of modern computational techniques and algorithms.

   It is resolved to introduce a course "Numerical Analysis" for 2023-24 admitted batch students.

2. Ms. Naga Phani, AT & T, Industry Person, recommended incorporating a course on Computational Geometry into the curriculum, as it will equip students with essential skills to solve complex geometric problems efficiently using computational methods.

   It is resolved to introduce a course "Computational Geometry" for 2023-24 admitted batch students.

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3. Mr. Sai Deep Muvva, Alumni, recommended introducing a course on Computational Physics to the curriculum, focusing on applying numerical methods and computational techniques to solve complex problems in physics.

   It is resolved to introduce a course "Computational Physics" for 2023-24 admitted batch students.

4. Dr. R. Manjula Devi, Professor, Academic Peer, suggested to introduce "Electromagnetism" course to provide students with foundational knowledge and practical skills in understanding electromagnetic principles and their applications.

   It is resolved to introduce a course "Electromagnetism" for 2023-24 admitted batch students.

5. Dr. Siba Kumar Udgata, Professor, Academic Peer, recommended incorporating a course titled "Computational Mechanics for Robotics" into the curriculum, focusing on providing students with the computational skills necessary for designing, analyzing, and optimizing robotic systems effectively.

   It is resolved to introduce a course "Computational Mechanics for Robotics" for 2023-24 admitted batch students.

6. Dr. Benson Raj, Assistant Professor, Academic Peer, recommended introducing a course titled "Physical Chemistry & Thermodynamics" to the curriculum, offering students a comprehensive understanding of the fundamental principles governing chemical processes and thermodynamic phenomena.

   It is resolved to introduce a course "Physical Chemistry & Thermodynamics" for 2023-24 admitted batch students.

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7. Dr V. Ramya Associate Professor, Academic Peer, recommended incorporating a course on "Biochemistry" into the curriculum, providing students with a deep understanding of the chemical processes and molecules fundamental to life.

   It is resolved to introduce a course "Biochemistry" for 2023-24 admitted batch students.

8. Dr Srinivas Reddy, Assistant Professor, Academic Peer, recommended the integration of a course on "Computational Chemistry" into the curriculum. Such a course equips students with essential skills in utilizing computational methods to study and analyze chemical systems, a critical capability highly sought after in various industries including pharmaceuticals, materials science, and chemical engineering.

   It is resolved to introduce a course "Computational Chemistry" for 2023-24 admitted batch students.

9. Mr. Vishnu Sai Teja Kondamudi, Alumni, recommended introducing a course titled "Linux Administration & Automation" to the curriculum. This course will provide students with comprehensive knowledge and practical skills in managing Linux-based systems and automating administrative tasks.

   It is resolved to introduce a course "Linux Administration & Automation" for 2023-24 admitted batch students.

10. Mr. Chalamalasetti Vamsi Krishna, Alumni, recommended introducing a course titled "Full Stack Application Development" to the curriculum.

    It is resolved to introduce a course "Full Stack Application Development" for 2023-24 admitted batch students. The course is approved to offer using React with Node JS in the discussion.

30/6/23

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11. Dr. Kamalesh Narain Singh, Academic Peer, recommended to introduce Distributed Computing through networks concepts course to equip students with essential skills for designing and managing interconnected systems, addressing the growing demand in modern industries.

    It is resolved to introduce a course "Distributed Computing" for 2023-24 admitted batch students.

12. Mr. Pavan Sai Sunkara, Alumni, proposed to introduce a course titled "CI/CD & Cloud DevOps" to the curriculum.

    It is resolved to introduce a course "CI/CD Cloud DevOps" for 2023-24 admitted batch students.

13. Mr. B Elangovan, Faculty, recommended to propose the Theory of Computation course in the curriculum to incorporate contemporary topics like quantum computing and computational complexity theory, ensuring students are equipped with up-to-date knowledge and skills relevant to the evolving field of computer science.

    It is resolved to introduce a course "Theory of Computation" for 2023-24 admitted batch students.

14. Dr. Yamuna Devi, Assoc. Professor, recommended introducing a course "Nature-Inspired Soft Computing" to "Computational Intelligence: Nature-Inspired Algorithms" to better encapsulate its focus on leveraging nature-inspired algorithms for computational problem-solving.

    It is resolved to introduce a course "Nature Inspired Soft Computing" for 2023-24 admitted batch students.

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15. Mr. Sudeep, Cognizant, Industry Person, recommended to introduce the course "Data Science & Statistics" to "Statistical Methods in Data Science" to better reflect its emphasis on statistical techniques within the context of data science. This adjustment enhances clarity for students, highlighting the course's focus on applying statistical methods to analyze and interpret data effectively.

It is resolved to introduce a course "Data Science & Statistics" for 2023-24 admitted batch students.

16. Mr. Venkata Sai Akhil Guntupalli, Alumni, recommended introducing "Generative Deep Learning" as a new course to empower students with advanced techniques for creative AI model development, fostering innovation in areas such as image synthesis and text generation, preparing them for leading roles in AI research and application.
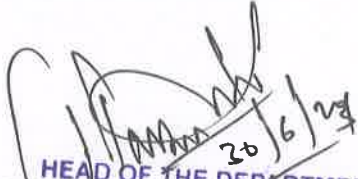
It is resolved to introduce a course "Generative Deep Learning" for 2023-24 admitted batch students.

17. Mr. Sudhakar Reddy, Alumni, strongly recommended to implement "Web 3 Development for Both Private and Public Blockchain" course, providing students with comprehensive skills to navigate and innovate within the evolving landscape of blockchain technology.

It is resolved to introduce a course "Web 3 Development for Both Private and Public Blockchain" for 2023-24 admitted batch students.

18. Mr. Aditya Potluri, Alumni, highly recommended to introduce "AnyPoint Platform Development: Fundamentals" course.

It is resolved to introduce a course "AnyPoint Platform Development: Fundamentals" for 2023-24 admitted batch students.

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19. Ms. N Sri Lakshmi, Alumni, recommended to introduce the course which covers the gap between theoretical knowledge and practical applications. This course equips students with the skills to analyze the data, develop intelligent algorithms, make informed decisions, and prepare them for the demands of a data-driven future. The Artificial Intelligence for Data Science course is revised and recommended to introduce with the title as "Artificial Intelligence and Machine Learning" to ensure both foundational concepts and advanced techniques. This revision should integrate practical applications and case studies, providing students with hands-on experience and a deeper understanding of real-world AI and ML implementations.

    It is resolved to introduce a course "Artificial Intelligence and Machine Learning" for 2023-24 admitted batch students.

20. T Srilatha, Assistant Professor, Faculty, recommended incorporating a course on Digital Design and Computer Architecture as imperative to equip students with a fundamental understanding of hardware components and their organization, vital for comprehending modern computing systems and advancing technological innovations.

    It is resolved to introduce a course "Digital Design and Computer Architecture" for 2023-24 admitted batch students.

21. Dr. V. Ramalingam Scientist CSIR-Indian Institute of Chemical Technology, Hyderabad, recommended the inclusion of the Indian Knowledge System in the curriculum, as it provides a rich and diverse perspective that complements global education.

    It is resolved to introduce courses "Indian Knowledge Systems : Vedic Mathematics", "Indian Knowledge Systems : Engineering Elective" for 2023-24 admitted batch students.

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22. Dr.Vivek S Deshpande, Professor, MIT, Pune, recommended the inclusion of the Indian Knowledge Tradition in the curriculum, as it provides a rich and diverse perspective that complements global education.

    It is resolved to introduce a course "Essence of Indian Knowledge Tradition" for 2023-24 admitted batch students.

23. Mr. Sumanth, Student, recommended the inclusion of the mathematics course which covers fundamentals. It helps especially for Bi. P C students who are taking admission for engineering.

    It is resolved to introduce a course "Fundamentals of Mathematics" for 2023-24 admitted batch students.
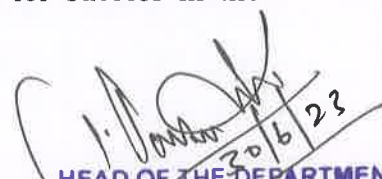
24. Mr. Sai Deep Muvva, Full Stack Dev at Development Bank of Singapore, Alumni, recommended the inclusion of the career development courses which helps professionals to assess and enhance their skills, knowledge, and strategies for career progression.

    It is resolved to introduce a course "Audit Career" for 2023-24 admitted batch students.

25. Mr Sameer, HR, Tech Mahindra, Industry Person, to cover a range of competencies that prepare individuals to effectively lead teams, manage resources, and drive organizational success.

    It is resolved to introduce a course "Leadership and Management Skills" for 2023-24 admitted batch students.

26. Mr. Guru Sai Ram, Alumni, recommended the inclusion of courses to develop corporate readiness skills that equips students with the necessary tools for success in the

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professional world and also participation of conferences, seminars and social activities are useful to improve their confidence levels.

It is resolved to introduce courses "Social Immersive Learning" for 2023-24 admitted batch students.

27. Dr. S.Domnic Professor, Computer Applications, National Institute of Technology, Tiruchirappalli, India, Academic Peer, recommended the inclusion of course in computer science and mathematics, covering key concepts that are essential for understanding computer algorithms, programming, data structures, and complex systems. It focuses on mathematical structures that are discrete rather than continuous, making it highly applicable to areas like cryptography, networking, logic design, and more.

It is resolved to introduce courses "Discrete Structures" for 2023-24 admitted batch students.

28. Ms Girija, Alumni, recommended the inclusion of the course "Fundamentals of IoT and Sensors" in the curriculum as the Internet of Things (IoT) and sensors form the backbone of modern smart systems, enabling real-time data collection, communication, and automation across various industries.

It is resolved to introduce courses "Fundamentals of IoT and Sensors" for 2023-24 admitted batch students.

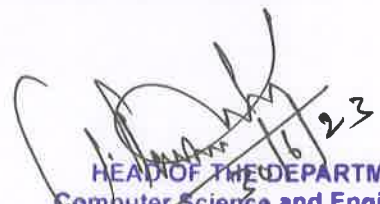29. Mr. Shyam and other focus group students, recommended to review the ESC Category courses as they are very happy in terms of coding. Because they have number of programming related courses, and are practicing coding in variety of platforms as part of courses. Recommending relooking into engineering science courses which gives strong foundation in terms of hardware.

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It is resolved to introduce courses "Basic Electrical and Electronic Circuits" for 2023-24 admitted batch students.

30. Mr. Jagan Mohan (NGA HR Pvt LIMITED, HYDERABAD), Industry person, recommended to design the course which covers security aspects instead of old networks concepts alone.

It is resolved to introduce courses "Network Protocols and Security" for 2023-24 admitted batch students.

31. Mr. Dineshreddy V, Student, recommended for the inclusion of "Adaptive Software Engineering" in the curriculum as this addition aims to equip students with the necessary skills and knowledge to excel in the rapidly evolving field of software engineering.

It is resolved to introduce courses "Adaptive Software Engineering" for 2023-24 admitted batch students.

32. Dr.V. Suryakanth, Faculty, suggested to include "Multimodal Information Processing" in the curriculum to cover speech processing, text processing as it helps the students in research domain.

It is resolved to introduce courses "Multi Modal Information Processing" for 2023-24 admitted batch students.

33. Dr.Mr.Nagam Anil, Vardhamaan Eng College, Professor, Academic Peer, recommended the inclusion of a course on "Cross-Platform User Experience Design" in the curriculum.

It is resolved to introduce courses "Cross-Platform User Interface Design" for 2023-24 admitted batch students.

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34. Dr. S.Domnic, Professor, Academic Peer, recommended to combine the courses "Universal Human Values" and "Gender Sensitization" to deepen its focus on contemporary societal issues, including diversity, inclusion, and ethical considerations in professional setting.

It is resolved to introduce the course "Human Values, Gender Equality & Professional Ethics" course to 2023-24 admitted batches.

S. No	Course Code	Course Title	Course Type	Credits	Remarks
1	23MT1002	DISCRETE STRUCTURES	BSC	4	Introduced in place of Mathematics for engineering as a Basic Science course
2	23AD20010	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	ESC	4	Introduced in place of AI for data Science in ESC category.
3	23EC1101	FUNDAMENTALS OF IOT AND SENSORS	ESC	5	Introduced in place of IoT Workshop in ESC category.
4	23EC1202	DIGITAL DESIGN & COMPUTER ARCHITECTURE	ESC	4	Introduced in place of Computer Organization and Architecture in ESC category.
5	23EC1203	BASIC ELECTRICAL AND ELECTRONIC CIRCUITS	ESC	2	Introduced in place of Digital Logic and Processors in ESC category.
6	23CS4106	DISTRIBUTED COMPUTING	PCC	2	Introduced in place of Parallel & Distributing Computing course
7	23SDCS11R	LINUX ADMINISTRATION & AUTOMATION	SDC	2	Introduced in place of Python Full Stack Development with Django course
8	23SDCS12R	FULL STACK APPLICATION DEVELOPMENT	SDC	2	Introduced in place of the Mern Stack Web Development course
9	23SDCS13R	CI/CD & CLOUD DEVOPS	SDC	2	Introduced in place of Java Full Stack Development + Microservices course
10	23CS2248F	ANYPOINT PLATFORM DEVELOPMENT: FUNDAMENTALS	FC	3	Introduced as Flexi Core course

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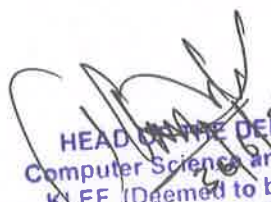**Campus:** Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA

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S. No	Course Code	Course Title	Course Type	Credits	Remarks
11	23CS2249F	WEB 3 DEVELOPMENT FOR BOTH PRIVATE AND PUBLIC BLOCKCHAIN	FC	3	Introduced as Flexi Core course
12	23MT2014	THEORY OF COMPUTATION	BSC	4	Introduced in place of Automata Theory & Formal Languages as a Basic Science course
13	23MT2015	NUMERICAL ANALYSIS	BSC	4	Introduced as a science elective course
14	23MT2016	COMPUTATIONAL GEOMETRY	BSC	4	Introduced as a science elective course
15	23CS3202	NATURE INSPIRED SOFT COMPUTING	BSC	4	Introduced as a science elective course
16	23CS3201	DATA SCIENCE & STATISTICS	BSC	4	Introduced as a science elective course
17	23PH1011	COMPUTATIONAL MECHANICS FOR ROBOTICS	BSC	4	Introduced as a science elective course
18	23PH1009	COMPUTATIONAL PHYSICS	BSC	4	Introduced as a science elective course
19	23PH1010	ELECTROMAGNETISM	BSC	4	Introduced as a science elective course
20	23CY1002	PHYSICAL CHEMISTRY & THERMODYNAMICS	BSC	4	Introduced as a science elective course
21	23BT2103	BIOCHEMISTRY	BSC	4	Introduced as a science elective course
22	23CY1003	COMPUTATIONAL CHEMISTRY	BSC	4	Introduced as a science elective course
23	23UC0027	LEADERSHIP AND MANAGEMENT SKILLS	HAS	2	Introduced in place of Corporate Readiness Skills in HAS category
24	23UC0026	HUMAN VALUES, GENDER EQUALITY & PROFESSIONAL ETHICS	HAS	2	Introduced in place of Universal Human Values & Professional Ethics in HAS category
25	23UC0018	FUNDAMENTALS OF MATHEMATICS	AUC	0	Introduced in AUC Category
26	23UC0017	INDIAN KNOWLEDGE SYSTEMS: VEDIC MATHEMATICS	AUC	0	Introduced in AUC Category
27	23UCXXXX	AUC - CAREER	AUC	0	Introduced in AUC Category

AGENDA ITEM-3

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To consider and approve the courses proposed to introduce for 2022-23 admitted batch B. Tech CSE Students based on the feedback received from stakeholders.	Resolution: Approved for introduced courses for B.Tech CSE 2022-23 admitted Batch and the same is recommended to Academic Council.

To consider and introduce courses for 2022-23 admitted batch students based on the stake holder's feedback.

1. Ms. N Sri Lakshmi, Alumni, recommended to introduce the course which covers the gap between theoretical knowledge and practical applications. This course equips students with the skills to analyze the data, develop intelligent algorithms, make informed decisions, and prepare them for the demands of a data-driven future. The Artificial Intelligence for Data Science course is revised and recommended to introduce with the title as " Data Driven Artificial Intelligent Systems" to ensure both foundational concepts and advanced techniques. This revision should integrate practical applications and case studies, providing students with hands-on experience and a deeper understanding of real-world AI and ML implementations.

   It is resolved to introduce a course "Data Driven Artificial Intelligent Systems" for 2022-23 admitted batch students.

2. Dr. V. Ramalingam Scientist CSIR-Indian Institute of Chemical Technology, Hyderabad, recommended the inclusion of the Indian Knowledge System in the curriculum, as it provides a rich and diverse perspective that complements global education.

   It is resolved to introduce courses "Indian Knowledge Systems : Vedic Mathematics", "Indian Knowledge Systems : Engineering Elective" for 2022-23 admitted batch students.

3. Dr.Vivek S Deshpande, Professor, MIT, Pune, recommended the inclusion of the Indian Knowledge Tradition in the curriculum, as it provides a rich and diverse perspective that complements global education.

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It is resolved to introduce a course "Essence of Indian Knowledge Tradition" for 2022-23 admitted batch students.

4. Mr. Guru Sai Ram, Alumni, recommended the inclusion of courses to develop corporate readiness skills that equips students with the necessary tools for success in the professional world and also participation of conferences, seminars and social activities are useful to improve their confidence levels.

   It is resolved to introduce courses "Social Immersive Learning" for 2022-23 admitted batch students.

5. Mr. Jagan Mohan (NGA HR Pvt LIMITED, HYDERABAD), Industry person, recommended to design the course which covers security aspects instead of old networks concepts alone.

   It is resolved to introduce courses "Network Protocols and Security" for 2022-23 admitted batch students.

6. Mr. Dineshreddy V, Student, recommended for the inclusion of "Adaptive Software Engineering" in the curriculum as this addition aims to equip students with the necessary skills and knowledge to excel in the rapidly evolving field of software engineering.

   It is resolved to introduce courses "Adaptive Software Engineering" for 2022-23 admitted batch students.

7. Damarla Pawan Rahul,TCS, Industry Person, suggested the inclusion of a course on "Processors and Controllers" in the curriculum as it provides students with a solid understanding of the fundamental components that drive modern computing systems.

   It is resolved to introduce courses "Processors and Controllers" for 2022-23 admitted batch students.

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8. Dr.V. Suryakanth, Faculty, suggested to include "Multimodal Information Processing" in the curriculum to cover speech processing, text processing as it helps the students in research domain.

   It is resolved to introduce courses "Multi Modal Information Processing" for 2022-23 admitted batch students.

9. Dr.Mr.Nagam Anil, Vardhamaan Eng College, Professor, Academic Peer, recommended the inclusion of a course on "Cross-Platform User Experience Design" in the curriculum.
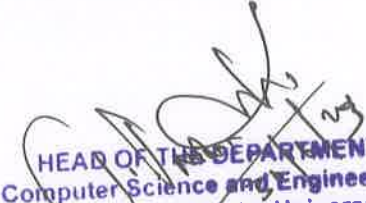
   It is resolved to introduce courses "Cross-Platform User Interface Design" for 2022-23 admitted batch students.

10. T Srilatha, Assistant Professor, Faculty, recommended incorporating a course on Digital Design and Computer Architecture as imperative to equip students with a fundamental understanding of hardware components and their organization, vital for comprehending modern computing systems and advancing technological innovations.

    It is resolved to introduce a course "Digital Design and Computer Architecture" for 2022-23 admitted batch students.

11. Mr. Shyam and other focus group students, recommended to review the ESC Category courses as they are very happy in terms of coding. Because they have number of programming related courses, and are practicing coding in variety of platforms as part of courses. Recommending relooking into engineering science courses which gives strong foundation in terms of hardware.

    It is resolved to introduce courses "Basic Electrical and Electronic Circuits" for 2022-23 admitted batch students.

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12. Ms Girija, Alumni, recommended the inclusion of the course "Fundamentals of IoT and Sensors" in the curriculum as the Internet of Things (IoT) and sensors form the backbone of modern smart systems, enabling real-time data collection, communication, and automation across various industries.

It is resolved to introduce course "Fundamentals of IoT and Sensors" for 2022-23 admitted batch students.

13. Dr. S.Domnic, Professor, Academic Peer, recommended the inclusion of the course "Gender Sensitization with Social Equality" to deepen its focus on contemporary societal issues, including diversity, inclusion, and ethical considerations in professional setting.

It is resolved to introduce course "Gender & Social Equality" course to 2022-23 admitted batch.

S. No	Course Code	Course Title	Course Type	Credits	Remarks
1	22EC2210R	NETWORK PROTOCOLS AND SECURITY	PCC	4	Introduced in place of Computer Networks & Security.
2	22AD2001	DATA DRIVEN ARTIFICIAL INTELLIGENT SYSTEMS	PCC	3	Introduced in place of AI for data Science in PCC category.
3	22EC2106	PROCESSORS & CONTROLLERS	PCC	4.5	Introduced in place PCC category.
4	22CI2001	ADAPTIVE SOFTWARE ENGINEERING	PCC	3	Introduced in place of Software Engineering in PCC category.
5	21CS3120R	MULTIMODAL INFORMATION PROCESSING	PE	3	Introduced in PE category.
6	22UC0019	ESSENCE OF INDIAN KNOWLEDGE TRADITION	AUC	0	Introduced in AUC Category
7	22UC0020	INDIAN KNOWLEDGE SYSTEMS: ENGINEERING ELECTIVE	AUC	0	Introduced in AUC Category
8	22UC0021	SOCIAL IMMERSIVE LEARNING	HAS	1	Introduced in HAS Category

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S. No	Course Code	Course Title	Course Type	Credits	Remarks
9	22UC0022	SOCIAL IMMERSIVE LEARNING	HAS	1	Introduced in HAS Category
10	22UC0023	SOCIAL IMMERSIVE LEARNING	HAS	1	Introduced in HAS Category
11	22UC0024	SOCIAL IMMERSIVE LEARNING	HAS	1	Introduced in HAS Category
12	22UC0016	GENDER AND SOCIAL EQUALITY	AUC	0	Introduced in AUC Category

The detailed syllabus for the list of proposed courses for B. Tech CSE is given in Annexure-2

AGENDA ITEM-4

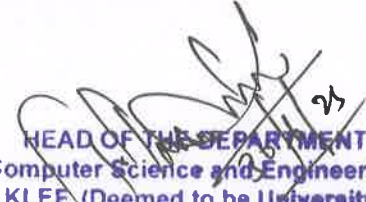| Proposed to revise the syllabus for 2022-23 and 2023-24 admitted batch B. Tech CSE Students based on the feedback received from stakeholders.	Resolution: Approved the revision of syllabus for B.Tech CSE 2022-23 and 2023-24 admitted batch and the same is recommended to Academic Council.

To consider and approve the revision of syllabus for 2022-23 and 2023-24 admitted batch students based on the stake holders feedback.

1. Mrs Lalitha, Assistant Professor, Faculty, suggested updating the syllabus to cover emerging cryptographic techniques, practical cyber defense strategies, and real-world case studies to better prepare students for contemporary cybersecurity challenges.

   It is resolved to approve the revision of syllabus in "Crypt Analysis & Cyber Defense" course to 2022-23 and 2023-24 admitted batches.

2. Mr. Shaik Muhammed, Alumni, recommended to revise the course Deep Learning, as per the new course introduced with Title AI & ML in their second year, enabling students to gain essential expertise and readiness to tackle real-world challenges in the rapidly evolving field of artificial intelligence.

   It is resolved to approve the revision of syllabus in "Deep Learning" course to 2022-23 and 2023-24 admitted batches.

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3. Dr. V Murali Mohan, Associate Professor, Faculty, recommended revising the syllabus of Cloud Infrastructure & Services to include more hands-on experience with leading cloud platforms and emphasizing advanced concepts like containerization and serverless computing.

It is resolved to approve the revision of syllabus in "Cloud Infrastructure & Services" course to 2022-23 and 2023-24 admitted batches.

S. No	Course Code	Course Title	Course Type	Percentage of Revision	Remarks
1	23CSB3101R	CRYPT ANALYSIS & CYBER DEFENSE	PE	12%	Based on Faculty Feedback
2	23CEC3101R	CLOUD INFRASTRUCTURE AND SERVICES	PE	10%	Based on Faculty Feedback
3	23AIP3305R	DEEP LEARNING	PE	10%	Based on Alumni 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-5

To consider and approve the courses proposed to introduce for 2023-24 admitted batch M. Tech CSE Students based on the feedback received from stakeholders.	Resolution: Approved for introduced courses for M.Tech CSE 2023-24 admitted Batch and the same is recommended to Academic Council.

To consider and introduce courses for 2023-24 admitted batch students based on the stake holder's feedback.

1. Dr. Monica C, Assistant Professor, VIT university, Chennai, Academic Peer, recommended an advanced curriculum that includes in-depth coverage of Java programming principles, advanced front-end and back-end development techniques, database management, and software engineering practices. This should also integrate real-world projects and industry-relevant tools to prepare students for professional roles.

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It is resolved to introduce a course "Full Stack Development using Java" course to 2023-24 admitted batch.

2. Dr. C Siva Sankar Associate Professor, Savitha University, Academic Peer, recommended the inclusion of a Python programming course in the curriculum in M. Tech curriculum.

   It is resolved to introduce a course "Problem-Solving Using Python Programming" course to 2023-24 admitted batch.

3. Ms. Lova Kumari, Assistant Professor, JNTU, Academic Peer, recommended the inclusion of Enterprise Programming in the curriculum.
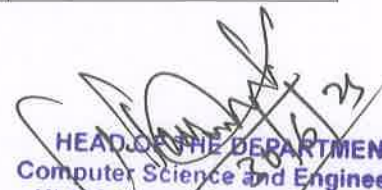
   It is resolved to introduce a course "Enterprise Development Programming" course to 2023-24 admitted batch.

4. Mr SOHAL (EPAM), Industry Person, recommended the inclusion of object-oriented concepts in curriculum of M.Tech.

   It is resolved to introduce a course "Object Oriented Programming" course to 2023-24 admitted batch.

The detailed syllabus for the list of proposed courses for M. Tech CSE is given in Annexure-4

S. No	Course Code	Course Title	Course Type	Credits	Remarks
1	23CS5101	OBJECT ORIENTED PROGRAMMING	PCC	4	Introduced in PCC Category
2	23CS51F1	ENTERPRISE DEVELOPMENT PROGRAMMING	PE	3	Introduced in PE Category
3	23CS52F2	FULL STACK DEVELOPMENT USING JAVA	PE	3	Introduced in PE Category
4	23CS61F5	PROBLEM-SOLVING USING PYTHON PROGRAMMING	PE	3	Introduced in PE Category

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AGENDA ITEM-6

To discuss and approve the Course Structures and Academic flexibilities offered to the 2023-24 Academic Year admitted batch of B. Tech and M. Tech CSE.	Resolution: Approved Course Structures and Academic flexibilities offered to the 2023-24 Academic Year admitted batch of B. Tech and M. Tech CSE and the same is recommended to Academic Council for approval.

Chairman, discussed about course structures proposed for 2023-24 admitted batches of B. Tech - CSE and M. Tech – CSE programs. He also discussed the implementation details of Multi-Entry and Multi-Exit programs for UG students. The implementation of NEP 2020 in the curriculum is reflected through the adoption of a multidisciplinary approach with open electives and flexibility via the Choice-Based Credit System (CBCS). The curriculum integrates skill-based courses, experiential learning, and technology-driven pedagogies like MOOCs and virtual labs to enhance employability and entrepreneurial skills. Continuous and comprehensive evaluation (CCE) has been adopted, emphasizing project-based assessments and innovative grading methods.

BoS chairman discussed on credit requirements of the Programs: Certificate Course in Computational Thinking & Engineering Science with 44 Credits, Diploma in Computer Science and Engineering with 84 Credits, Bachelor of Science - Computer Engineering with 124 Credits, B. Tech – Computer Science and Engineering with 163 Credits, M. Tech – Computer Science and Engineering with 80 Credits. A graduating student of B. Tech CSE, MUST acquire a minimum of total 163 (X) credits and all the 20 flexibilities of the B. Tech program are discussed using the following matrix.

	No MAJOR FLEXIBILITY	HONORS	HTR	HTI	HTE
NO PROGRAM ADD-ON	Total Credits = x	Total Credits = x + 20	Total Credits = x + 20	Total Credits = x + 20	Total Credits = x + 20
SPECIALIZATION	Total Credits = x + 5	Total Credits = x + 30	Total Credits = x + 30	Total Credits = x + 30	Total Credits = x + 30
MINOR	Total Credits = x + 20	Total Credits = x + 40	Total Credits = x + 40	Total Credits = x + 40	Total Credits = x + 40
DOUBLE MAJOR	Total Credits = x + 25	Total Credits = x + 45	Total Credits = x + 45	Total Credits = x + 45	Total Credits = x + 45

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BoS Chairman discussed the courses related to Cross cutting issues, integrating Ecology & Environment, Gender and Social Equality, Human Values and Professional Ethics into the curriculum ensures that students develop a well-rounded perspective on key areas that impact their lives and the world around them. BoS Chairman discussed the Specializations offered through various departments in college of Engineering. All the members agreed to encourage the students to choose any specialization based on their interest (CBCS).

BoS Chairman, discussed the courses offered under Honors Advanced Flexi Core, HTE Flexi Core - Experiential Learning, HTR Flexi Core – Research.

The detailed Course Structure proposed for 2023-24 B.Tech CSE admitted batch students is given in Annexure-5(a).

The detailed Course Structure proposed for 2023-24 M.Tech CSE admitted batch students is given in Annexure-5(b).

The detailed Course Structure proposed for 2023-24 admitting batch Certificate Course in Computational Thinking & Engineering Science is given in Annexure-5(c).

The detailed Course Structure proposed for 2023-24 admitting batch Diploma in Computer Science is given in Annexure-5(d).

The detailed Course Structure proposed for 2023-24 admitting batch Bachelor of Science - Computer Engineering is given in Annexure 5(e).

The detailed list of courses offered under Honors Advanced Flexi Core, HTE Flexi Core - Experiential Learning, HTR Flexi Core – Research is given in Annexure 5(f).

AGENDA ITEM-7

To consider and approve the Program Development Documents (PDDs) of all Certificate to PG programs offered by the CSE department.	Resolution: Approved PDDs and the same is recommended to Academic Council for approval

Chairman-BoS, discussed Y23 PDDs of PG and UG programs.

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The Program Development Document (PDD) for Certificate Course in Computational Thinking & Engineering Science is given in Annexure-6(a).

The Program Development Document (PDD) for Diploma in Computer Science is given in Annexure-6(b).

The Program Development Document (PDD) for Bachelor of Science - Computer Engineering is given in Annexure-6(c).

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

The Program Development Document (PDD) for M.Tech-Computer Science and Engineering is given in Annexure-6(e).
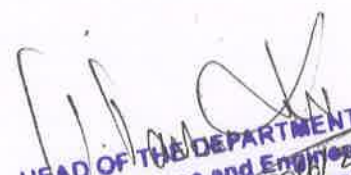
AGENDA ITEM-8

To consider and approve the minor programs proposed to introduce for 2023-24 admitted batch B. Tech Students.	Resolution: Approved for introduced minor programs and with list of courses for B.Tech 2023-24 admitted Batch and the same is recommended to Academic Council.

Chairman BOS discussed minor programs recommended to introduce for B. Tech students. The following Five new minor degree programs are approved for B.Tech students along with computer science and computer science & Engineering minor programs.

➤ Blockchain & Crypto Currencies
➤ Cyber Security & Forensics
➤ Game Development
➤ Quantum Computing
➤ UX Design

The minor programs and its courses recommended for B.Tech students is given in Annexure –7.

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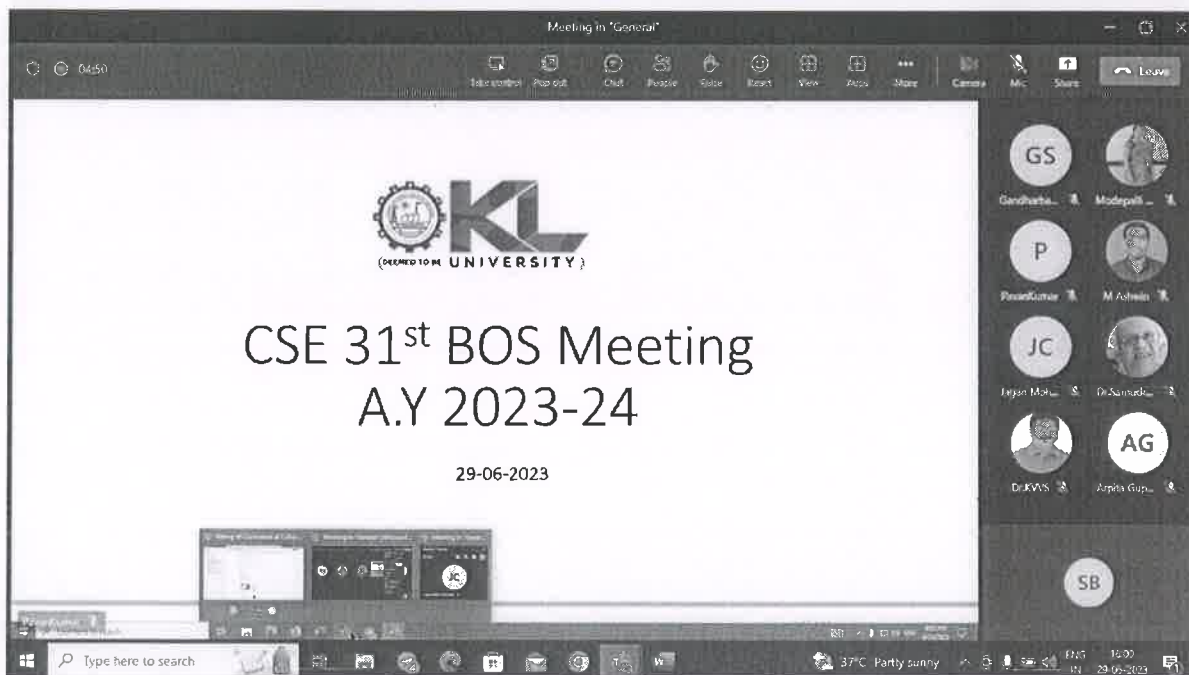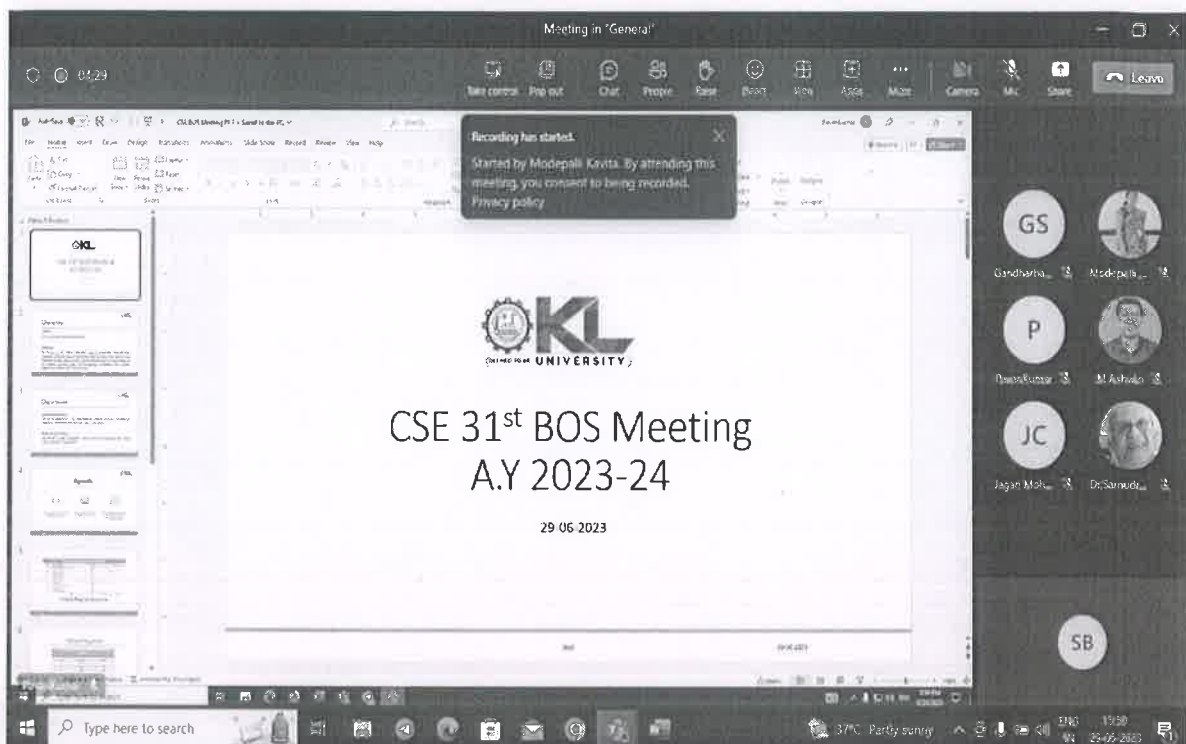Accredited by **NAAC** as **A++** ❖ Approved by AICTE ❖ ISO 21001:2018 Certified
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BoS Meeting (Online) Screenshot:

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BoS - Chairman

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-1

DEPARTMENT ACADEMIC COMMITTEE MEETING MINUTES

Minutes of the 34th DAC meeting Conducted on 28th June 2023 online from 3.00 P.M. to 5:00 PM.

The department head welcomed DAC members and started the meeting by highlighting the university and department's vision and mission statements, as well as the programs' PEOs and PO statements.

Agenda Items:

1. To consider the feedback given by the stakeholders on the program structure of 2023-24 admitted batch students.
2. To discuss the result analysis of 2022-2023 Even Semester courses.
3. To discuss CO-PO Attainment of courses in 2022-2023 Even Semester.
4. To discuss on Gap Analysis report on CO-PO Attainment and Teaching Pedagogy.
5. To discuss course closure minutes of 2022-2023 Even Semester offered courses.
6. To discuss and approve the inclusion of new courses and revision of a selected set of courses in B. Tech CSE 2022-2023 and 2023-2024 admitted batches curriculum.
7. To discuss and approve the inclusion of new courses in the M. Tech CSE 2023-24 admitted batch curriculum.
8. To consider and approve the 2023-2024 admitted batch B.Tech CSE and M.Tech CSE course structures.
9. To discuss and approve the Academic flexibilities offered to the 2023-24 Academic Year admitted batch of B. Tech CSE students.
10. To discuss and approve the inclusion of new minor degree programs for B.Tech students.

The following members were present:

1. Mr. V. HARI KIRAN
2. Dr. K. AMARENDRA
3. Dr. N. SRINIVASU
4. Dr. P. RAJARAJESWARAI

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5. Dr. M. R. NARASINGA RAO

6. Dr. G. PRADEEPINI

7. Dr. K. SUBRAHMANYAM

8. Dr. P. SAI KIRAN

9. Dr. K. THIRUPATHI RAO

10. Dr. M. SREEDEVI

11. Dr. P. VIDYA SAGAR

12. Dr. K. KIRAN KUMAR

13. Dr. Y. PRASANTH

14. Dr. P.V.R.D. PRASADA RAO

15. Dr. VITHYA GANESAN

16. Dr. P. CH. J. SRINIVASA RAO

17. Dr. V. CHANDRA PRAKASH

18. Dr. G. KRISHNA MOHAN

19. Dr. C. M. SHEELA RANI

20. Dr A V PRAVEEN KKRISHNA

21. Dr. SURYAKANTH. V. GANGASHETTY

22. Dr. RUDRA KALYAN NAYAK

23. Dr. DHAWALESWAR RAO Ch

24. Dr. VIJAY KUMAR BURUGARI

25. Dr. T. SAJANA

26. Dr. VIJAYA SRI .K

27. Dr. P. YELLAMMA

28. Dr. S. SAGAR IMAMBI

29. Dr. K. SWARNA

30. Dr. D. GOVIND

31. Dr. P. VIDYULLATHA

32. Dr. T. SANTHI SRI

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33. Dr. E. VAMSIDHAR

34. Dr. A. V. PRAVEEN KRISHNA

35. Dr. PRAGNAYABAN MISHRA

36. Dr. B. CHAITANYA KRISHNA

37. Dr. G. SIVANAGESWARA RAO

38. Dr. K. V. V. SATYANARAYANA

39. Dr. P. LAKSHMI PRASANNA

40. Dr. NILU SINGH

41. Dr. DEBRUP BANERJEE

42. Dr. V. S. R. K. SARMA

43. Dr. CH SMITHA

44. Ms. M.V.B.T. SANTHI

45. Mr. M. VISHNUVARDHAN

46. Mrs. V. DIVYA

47. Mrs. A. ROSHINI

48. Mrs. M. PRAVEENA

49. Mrs. K. RUTH RAMYA

50. Mr. N. RAJESH

51. Mr. VIJAYA KRISHNA SONTHI

52. Mr. P. S. V. S. SRIDHAR

53. Mr. M. VENKATA NARESH

54. Mr. CH. MOHAN KUMAR

55. Mr. P V V S SRINIVAS

56. Mrs. K. MADHURI

57. Mr. N. RAVINDER

58. Mr. J. SURYA KIRAN

59. Mr. K. VAMSI KRISHNA

60. Mr. M V NARESH

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61. Mrs. P. RAMYA

62. Mr. ANDE PAVAN KUMAR

The following points are discussed and resolved:

- Result analysis on 2022-23 Even Semester courses is discussed by chairman DAC and he appreciated all the course coordinators for achieving good results.

- CO-PO Attainment of 2022-2023 Even Semester courses and gap analysis report on CO-PO attainment and teaching pedagogy are discussed.

- The following points are discussed and resolved based on the course closure minutes of the 2022-23 even semester and feedback from faculty on the curriculum of 2022-23 admitted batch students:

- Dr Raja Bhasha, Faculty suggested introducing a skill component for the course Cloud Computing for IoT Engineers. The discussion concluded that as this course is offered under PE-5 and PE-5 courses LTPS is 2-0-2-0. So, students may solve the skill challenges in practical hours.

- Dr T Satish, faculty suggested introducing a skill component for the course Cross-Platform Development Framework and discussion concluded as this course has practical hours, so real-time problem solving may done as part of the practical component.

- Stakeholder feedback collected on 2022-2023 admitted batch students and the 2023-2024 Admitted batch proposed curriculum is discussed for both B. Tech CSE and M. Tech CSE. It is resolved to propose to introduce new courses for B. Tech CSE and M. Tech CSE students and also, it is resolved to revise the selected set of courses in B. Tech-CSE based on the feedback given by all the stakeholders.

The stakeholder's feedback considered to introduce the courses for 2023-2024 admitted batch B. Tech CSE students:

1. Mrs. G Prashanti, Assist. Professor, recommended introducing a course on Numerical Analysis to the curriculum, providing students with comprehensive knowledge of modern computational techniques and algorithms.

2. Ms. Naga Phani, AT & T, Industry Person, recommended incorporating a course on Computational Geometry into the curriculum, as it will equip students with essential skills to solve complex geometric problems efficiently using computational methods.

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3. Mr. Sai Deep Muvva, Alumni, recommended introducing a course on Computational Physics to the curriculum, focusing on applying numerical methods and computational techniques to solve complex problems in physics.

4. Dr. R. Manjula Devi, Professor, Academic Peer, suggested to introduce "Electromagnetism" course to provide students with foundational knowledge and practical skills in understanding electromagnetic principles and their applications.

5. Dr. Siba Kumar Udgata, Professor, Academic Peer, recommended incorporating a course titled "Computational Mechanics for Robotics" into the curriculum, focusing on providing students with the computational skills necessary for designing, analyzing, and optimizing robotic systems effectively.

6. Dr. Benson Raj, Assistant Professor, Academic Peer, recommended introducing a course titled "Physical Chemistry & Thermodynamics" to the curriculum, offering students a comprehensive understanding of the fundamental principles governing chemical processes and thermodynamic phenomena.

7. Dr V. Ramya Associate Professor, Academic Peer, recommended incorporating a course on "Biochemistry" into the curriculum, providing students with a deep understanding of the chemical processes and molecules fundamental to life.

8. Dr Srinivas Reddy, Assistant Professor, Academic Peer, recommended the integration of a course on "Computational Chemistry" into the curriculum. Such a course equips students with essential skills in utilizing computational methods to study and analyze chemical systems, a critical capability highly sought after in various industries including pharmaceuticals, materials science, and chemical engineering.

9. Mr. Vishnu Sai Teja Kondamudi, Alumni, recommended introducing a course titled "Linux Administration & Automation" to the curriculum. This course will provide students with comprehensive knowledge and practical skills in managing Linux-based systems and automating administrative tasks.

10. Mr. Chalamalasetti Vamsi Krishna, Alumni, recommended introducing a course titled "Full Stack Application Development" to the curriculum.

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11. Dr. Kamalesh Narain Singh, Academic Peer, recommended to introduce Distributed Computing through networks concepts course to equip students with essential skills for designing and managing interconnected systems, addressing the growing demand in modern industries.

12. Mr. Pavan Sai Sunkara, Alumni, proposed to introduce a course titled "CI/CD & Cloud DevOps" to the curriculum.

13. Mr. B Elangovan, Faculty, recommended to propose the Theory of Computation course in the curriculum to incorporate contemporary topics like quantum computing and computational complexity theory, ensuring students are equipped with up-to-date knowledge and skills relevant to the evolving field of computer science.

14. Dr. Yamuna Devi, Assoc. Professor, recommended introducing a course "Nature-Inspired Soft Computing" to "Computational Intelligence: Nature-Inspired Algorithms" to better encapsulate its focus on leveraging nature-inspired algorithms for computational problem-solving.

15. Mr. Sudeep, Cognizant, Industry Person, recommended to introduce the course "Data Science & Statistics" to "Statistical Methods in Data Science" to better reflect its emphasis on statistical techniques within the context of data science. This adjustment enhances clarity for students, highlighting the course's focus on applying statistical methods to analyze and interpret data effectively.

16. Mr. Venkata Sai Akhil Guntupalli, Alumni, recommended introducing "Generative Deep Learning" as a new course to empower students with advanced techniques for creative AI model development, fostering innovation in areas such as image synthesis and text generation, preparing them for leading roles in AI research and application.

17. Mr. Sudhakar Reddy, Alumni, strongly recommended to implement "Web 3 Development for Both Private and Public Blockchain" course, providing students with comprehensive skills to navigate and innovate within the evolving landscape of blockchain technology.

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18. Mr. Aditya Potluri, Alumni, highly recommended to introduce "AnyPoint Platform Development: Fundamentals" course.

19. Ms. N Sri Lakshmi, Alumni, recommended to introduce the course which covers the gap between theoretical knowledge and practical applications. This course IOT AND, make informed decisions, and prepare them for the demands of a data-driven future. The Artificial Intelligence for Data Science course is revised and recommended to introduce with the title as "Artificial Intelligence and Machine Learning" to ensure both foundational concepts and advanced techniques. This revision should integrate practical applications and case studies, providing students with hands-on experience and a deeper understanding of real-world AI and ML implementations.

20. T Srilatha, Assistant Professor, Faculty, recommended incorporating a course on Digital Design and Computer Architecture as imperative to equip students with a fundamental understanding of hardware components and their organization, vital for comprehending modern computing systems and advancing technological innovations.

21. Dr. V. Ramalingam Scientist CSIR-Indian Institute of Chemical Technology, Hyderabad, recommended the inclusion of the Indian Knowledge System in the curriculum, as it provides a rich and diverse perspective that complements global education.

22. Dr.Vivek S Deshpande, Professor, MIT, Pune, recommended the inclusion of the Indian Knowledge Tradition in the curriculum, as it provides a rich and diverse perspective that complements global education.

23. Mr. Sumanth, Student, recommended the inclusion of the mathematics course which covers fundamentals. It helps especially for Bi. P C students who are taking admission for engineering.

24. Mr. Sai Deep Muvva, Full Stack Dev at Development Bank of Singapore, Alumni, recommended the inclusion of the career development courses which helps professionals to assess and enhance their skills, knowledge, and strategies for career progression.

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25. Mr Sameer, HR, Tech Mahindra, Industry Person, to cover a range of competencies that prepare individuals to effectively lead teams, manage resources, and drive organizational success.

26. Mr. Guru Sai Ram, Alumni, recommended the inclusion of courses to develop corporate readiness skills that equips students with the necessary tools for success in the professional world and also participation of conferences, seminars and social activities are useful to improve their confidence levels.

27. Dr. S.Domnic Professor, Computer Applications, National Institute of Technology, Tiruchirappalli, India, Academic Peer, recommended the inclusion of course in computer science and mathematics, covering key concepts that are essential for understanding computer algorithms, programming, data structures, and complex systems. It focuses on mathematical structures that are discrete rather than continuous, making it highly applicable to areas like cryptography, networking, logic design, and more.

28. Ms Girija, Alumni, recommended the inclusion of the course "Fundamentals of IoT and Sensors" in the curriculum as the Internet of Things (IoT) and sensors form the backbone of modern smart systems, enabling real-time data collection, communication, and automation across various industries.

29. Mr. Shyam and other focus group students, recommended to review the ESC Category courses as they are very happy in terms of coding. Because they have number of programming related courses, and are practicing coding in variety of platforms as part of courses. Recommending relooking into engineering science courses which gives strong foundation in terms of hardware.

30. Mr. Jagan Mohan (NGA HR Pvt LIMITED, HYDERABAD), Industry person, recommended to design the course which covers security aspects instead of old networks concepts alone.

31. Mr. Dineshreddy V, Student, recommended for the inclusion of "Adaptive Software Engineering" in the curriculum as this addition aims to equip students with the necessary skills and knowledge to excel in the rapidly evolving field of software engineering.

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32. Dr.V. Suryakanth, Faculty, suggested to include "Multimodal Information Processing" in the curriculum to cover speech processing, text processing as it helps the students in research domain.

33. Dr.Mr.Nagam Anil, Vardhamaan Eng College, Professor, Academic Peer, recommended the inclusion of a course on "Cross-Platform User Experience Design" in the curriculum.

34. Dr. S.Domnic, Professor, Academic Peer, recommended to combine the courses "Universal Human Values" and "Gender Sensitization" to deepen its focus on contemporary societal issues, including diversity, inclusion, and ethical considerations in professional settings.

The stakeholder's feedback considered to introduce the courses for 2022-2023 admitted batch B. Tech CSE students:

1. Ms. N Sri Lakshmi, Alumni, recommended to introduce the course which covers the gap between theoretical knowledge and practical applications. This course equips students with the skills to analyze the data, develop intelligent algorithms, make informed decisions, and prepare them for the demands of a data-driven future. The Artificial Intelligence for Data Science course is revised and recommended to introduce with the title as " Data Driven Artificial Intelligent Systems" to ensure both foundational concepts and advanced techniques. This revision should integrate practical applications and case studies, providing students with hands-on experience and a deeper understanding of real-world AI and ML implementations.

2. Dr. V. Ramalingam Scientist CSIR-Indian Institute of Chemical Technology, Hyderabad, recommended the inclusion of the Indian Knowledge System in the curriculum, as it provides a rich and diverse perspective that complements global education.

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30/6/23

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4. Mr. Guru Sai Ram, Alumni, recommended the inclusion of courses to develop corporate readiness skills that equips students with the necessary tools for success in the professional world and also participation of conferences, seminars and social activities are useful to improve their confidence levels.

5. Mr. Jagan Mohan (NGA HR Pvt LIMITED, HYDERABAD), Industry person, recommended to design the course which covers security aspects instead of old networks concepts alone.

6. Mr. Dineshreddy V, Student, recommended for the inclusion of "Adaptive Software Engineering" in the curriculum as this addition aims to equip students with the necessary skills and knowledge to excel in the rapidly evolving field of software engineering.

7. Damarla Pawan Rahul,TCS, Industry Person, suggested the inclusion of a course on "Processors and Controllers" in the curriculum as it provides students with a solid understanding of the fundamental components that drive modern computing systems.

8. Dr.V. Suryakanth, Faculty, suggested to include "Multimodal Information Processing" in the curriculum to cover speech processing, text processing as it helps the students in research domain.

9. Dr.Mr.Nagam Anil, Vardhamaan Eng College, Professor, Academic Peer, recommended the inclusion of a course on "Cross-Platform User Experience Design" in the curriculum.

10. T Srilatha, Assistant Professor, Faculty, recommended incorporating a course on Digital Design and Computer Architecture as imperative to equip students with a fundamental understanding of hardware components and their organization, vital for comprehending modern computing systems and advancing technological innovations.

11. Mr. Shyam and other focus group students, recommended to review the ESC Category courses as they are very happy in terms of coding. Because they have number of programming related courses, and are practicing coding in variety of platforms as

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13. Dr. S.Domnic, Professor, Academic Peer, recommended the inclusion of the course "Gender Sensitization with Social Equality" to deepen its focus on contemporary societal issues, including diversity, inclusion, and ethical considerations in professional settings.

The stakeholder's feedback considered to revise the syllabus of the courses for 2022-23 and 2023-24 admitted batch B. Tech CSE students:

1. Mrs Lalitha, Assistant Professor, Faculty, suggested updating the syllabus to cover emerging cryptographic techniques, practical cyber defense strategies, and real-world case studies to better prepare students for contemporary cybersecurity challenges.

2. Mr. Shaik Muhammed, Alumni, recommended to revise the course Deep Learning, as per the new course introduced with Title AI & ML in their second year, enabling students to gain essential expertise and readiness to tackle real-world challenges in the rapidly evolving field of artificial intelligence.

3. Dr. V Murali Mohan, Associate Professor, Faculty, recommended revising the syllabus of Cloud Infrastructure & Services to include more hands-on experience with leading cloud platforms and emphasizing advanced concepts like containerization and serverless computing.

The stakeholder's feedback considered to introduce the courses for 2023-2024 admitted batch M. Tech CSE students:

1. Dr. Monica C, Assistant Professor, VIT university, Chennai, Academic Peer, recommended an advanced curriculum that includes in-depth coverage of Java

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programming principles, advanced front-end and back-end development techniques, database management, and software engineering practices. This should also integrate real-world projects and industry-relevant tools to prepare students for professional roles.

2. Dr. C Siva Sankar Associate Professor, Savitha University, Academic Peer, recommended the inclusion of a Python programming course in the curriculum in M. Tech curriculum.

3. Ms. Lova Kumari, Assistant Professor, JNTU, Academic Peer, recommended the inclusion of Enterprise Programming in the curriculum.

4. Mr SOHAL (EPAM), Industry Person, recommended the inclusion of object-oriented concepts in the curriculum of M.Tech.

Chairman, DAC discussed about course structures proposed for 2023-24 admitted batches of B. Tech - CSE and M. Tech – CSE programs. He also discussed the implementation details of Multi-Entry and Multi-Exit programs for UG students. He also discussed the academic flexibilities offered to the students.

DAC chairman discussed on credit requirements of all the offered Programs. A graduating student of B. Tech CSE, MUST acquire a minimum of total 163 (X) credits and all the 20 flexibilities of the B. Tech program are discussed using the following matrix.

	No MAJOR FLEXIBILITY	HONORS	HTR	HTI	HTE
NO PROGRAM ADD-ON	Total Credits = x	Total Credits = x + 20	Total Credits = x + 20	Total Credits = x + 20	Total Credits = x + 20
SPECIALIZATION	Total Credits = x + 5	Total Credits = x + 30	Total Credits = x + 30	Total Credits = x + 30	Total Credits = x + 30
MINOR	Total Credits = x + 20	Total Credits = x + 40	Total Credits = x + 40	Total Credits = x + 40	Total Credits = x + 40
DOUBLE MAJOR	Total Credits = x + 25	Total Credits = x + 45	Total Credits = x + 45	Total Credits = x + 45	Total Credits = x + 45

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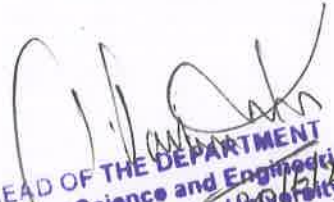Guntur District, Andhra Pradesh

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Chairman DAC discussed minor programs recommended to introduce for B. Tech students.

The following Five new minor degree programs are proposed along with the existing two minor degree programs (computer science and computer engineering) under B. Tech-CSE.

➤ Blockchain & Crypto Currencies

➤ Cyber Security & Forensics

➤ Game Development

➤ Quantum Computing

➤ UX Design

The following courses are recommended under the minor degree programs.

**MINOR DEGREE IN BLOCKCHAIN & CRYPTO CURRENCIES**

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH
1	23CSB3203R	INTRODUCTION TO BLOCKCHAIN & CRYPTOCURRENCIES	2	0	2	0	3	4
2	23CSB3304R	DIGITAL FORENSICS	3	0	2	4	5	9
3	23CSB3406M	PROGRAMMING FOR SMART CONTRACTS	3	0	0	0	3	3
4	23CSB3510	SECURITY GOVERNANCE & MANAGEMENT	3	0	0	0	3	3
5	23CSB3405M	DATABASE SYSTEM AND SECURITY	3	0	0	0	3	3
6	23SDCS05A	CLOUD-BASED SECURITY SPECIALITY	0	0	6	4	4	10

**MINOR DEGREE IN CYBER SECURITY & FORENSICS**

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH
1	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	R	3	0	2	4	5
2	23SC1203	COMPUTATIONAL THINKING FOR OBJECT-ORIENTED DESIGN	R	2	0	2	4	4
3	23CS2103R	ADVANCED OBJECT-ORIENTED PROGRAMMING	R	3	0	2	4	5
4	23CS2205R	DESIGN & ANALYSIS OF ALGORITHMS	R	3	0	2	4	5
5	23SDCS12A	FULL STACK APPLICATION DEVELOPMENT	A	0	0	6	4	4

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MINOR DEGREE IN GAME DEVELOPMENT

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH
1	23CS2104R	OPERATING SYSTEMS	R	3	0	2	0	4
2	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	R	3	0	2	4	5
3	23SC1203	COMPUTATIONAL THINKING FOR OBJECT ORIENTED DESIGN	R	2	0	2	4	4
4	23GDU3101R	PROGRAMMING FOR GAME DEVELOPMENT	R	3	0	2	4	5
5	23SDCS06A	CERTIFIED GAME DEVELOPER	A	0	0	6	4	4

MINOR DEGREE IN QUANTUM COMPUTING

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH
1	23MT1001	LINEAR ALGEBRA AND CALCULUS FOR ENGINEERS	R	2	2	0	0	4
2	23AD2001O	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	R	3	0	2	0	4
3	23CS3203	QUANTUM COMPUTING	R	2	2	0	0	4
4		QUANTUM MACHINE LEARNING FOR DATA SCIENTISTS	R	2	0	2	4	4
5	23SDCS07A	CLOUD BASED AI/ML SPECIALITY	A	0	0	6	4	4

MINOR DEGREE IN UX DESIGN

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH
1	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	R	3	0	2	4	5
2	23SC1203	COMPUTATIONAL THINKING FOR OBJECT-ORIENTED DESIGN	R	2	0	2	4	4
3	23CS2103R	ADVANCED OBJECT-ORIENTED PROGRAMMING	R	3	0	2	4	5
4	23CS2205R	DESIGN & ANALYSIS OF ALGORITHMS	R	3	0	2	4	5
5	23SDCS12A	FULL STACK APPLICATION DEVELOPMENT	A	0	0	6	4	4

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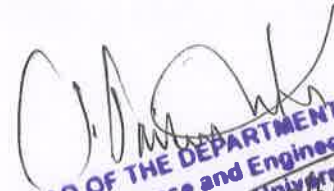Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified

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Annexures

1. Detailed stakeholder feedback analysis is given in Annexure 1.

2. Result analysis of 2022-2023 Even Semester courses is given in Annexure-2.

3. CO-PO Attainment of 2022-2023 Even Semester courses are given in Annexure-3.

4. Course closure minutes of 2022-2023 Even Semester offered courses are given in Annexure-4.

5. The list of courses recommended for BoS approval to introduce for B. Tech CSE and M.Tech CSE based on stakeholder feedback is given in Annexure -5.

6. The list of courses recommended for BoS approval to revise for B. Tech CSE based on stakeholder feedback is given in Annexure -6.

7. Course structures recommended for B.Tech CSE and M.Tech CSE programs of 2023-24 admitted batch students are given in Annexure -7.

8. The list of minor degree programs recommended for BoS approval to introduce for B. Tech CSE is given in Annexure -8.

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Annexure-2

Course Code: 23UC0027   **Course Name:** LEADERSHIP AND MANAGEMENT SKILLS

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand basic leadership, skills and perspectives and leadership styles	2	PO9
CO2	Understand different managerial skills and apply them to develop high performance teams	3	PO11
CO3	Analyse effective communicative strategies and apply them in team tasks	3	PO10
CO4	Apply strategic planning fundamentals and decision-making techniques, throughexercises and case studies	3	PO11

Syllabus

Fundamentals of Leadership Skills Understanding Leadership and its Importance, Traits and Models/styles of Leadership, Perspectives on Leadership: Bipolarity-Unidimensionality - Bidimensionality-Hierarchical: Management within Leadership - Hierarchical: Leadership within Management, Basic Leadership Skills: Motivation, Teamwork, Negotiation & Networking, Emotional intelligence.

Managerial Skills - Basic Managerial Skills - Planning for effective management, Recruiting and Retaining Talent - Delegation of tasks - Learn to Coordinate, Organising, Building and Leading high-performance Teams

Effective Communication Strategies for Leaders and Managers - Self-Management Skills: Understanding Self-Concept - Developing Self-Awareness -Self-Examination - Self-Regulation, Active Listening and Feedback Techniques, Conflict Management & Conflict Resolution - Negotiation skills, Role-playing and Group activities

Strategic Planning and Decision-Making - Fundamentals of Strategic Planning and Decision-Making - Setting Goals & Objectives for the Organization, Strategic Tools: SWOT, PEST, FORCE FIELD, SCENARIO PLANNING and SIX THINKING HATS, etc., Simulation Exercises and Strategic Planning Case Studies

Reference Books

1 The Emotionally Intelligent Manager: How to Develop and Use the Four Key Emotional Skills of Leadership ,Caruso, D. R. and Salovey P, First edition, 2004, JohnWiley & Sons.

2 Training in Interpersonal Skills: Tips for Managing People at work, Stephen P. Robbins, Phillip L. Hunsaker, 6edition, 2015, Pearson Education.

3 Learning to Lead: A Workbook on Becoming a Leader, Bennis, W.and Goldsmith, J, 4 edition, 2010, Reading,Mass. : Addison-Wesley.

4 Strategic Management: Concepts and Cases, Fred R. David and Forest R. David, 17th Edition, 2017, Pearson.

5 Interpersonal Skills in Organizations, Suzanne de Janasz, Karen Dowd, and Beth Schneider, 6th Edition, 2018,McGraw-Hill Education.

6 Human Resource Management", Gary Dessler and Biju Varkkey, 15th Edition, 2020, Pearson Education.

7 "Leadership: Theory and Practice", Peter G. Northouse, 8th Edition, 2021, SAGE Publications.

8 Case Studies in Strategic Management: A Practical Approach", Sanjay Mohapatra and R. Sridhar, 1st Edition (2012), Pearson Education.

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Course Code: 23BT2103 **Course Name:** BIOCHEMISTRY

L-T-P-S: 3-0-2-0 **Credits: 4** **Prerequisite:** Nil

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Relate the importance of biological buffers and its preparation, explain cellular thermodynamics, structure, function and metabolism of carbohydrates; the association between structure and function of carbohydrate at a chemical level with a biological perspective with a hands-on approach on laboratory techniques	2	PO1, PO2, PO4, PSO1
CO2	Make use of the information about the folding, conformation, dynamics and intrinsic properties of proteins and apply the knowledge to learnt about abnormalities related with protein dysfunction and their clinical importance	3	PO1, PO2, PO4, PSO1
CO3	Apply the structural and biological roles that nucleic acids and lipids play in cellular physiology, and application of that knowledge in bio techniques to identify these bimolecular and discuss about disorders related with nucleotide metabolism	3	PO1, PO2, PO4, PSO1
CO4	Categorize enzymes, catalysis, kinetics, applications; immobilized enzymes and their catalytic mechanisms	4	PO1, PO2, PO4, PSO1
CO5	Analyze the bimolecular from various sources by employing experimental techniquesand laboratory studies	4	PO1, PO2, PO4, PSO1

Syllabus

Types of the chemical bonds in bimolecular, Principles of biophysical chemistry pH, buffer, Henderson-Hasselbalch equation, colligative properties of solution. Composition, structure, and function of carbohydrates: monosaccharide's, disaccharides and polysaccharides (homo polysaccharides and hetero polysaccharides). Ring structure and autorotation, stereo isomers and optical isomers, disorder of carbohydrate metabolism. Principle of bioenergetics and introduction to cellular thermodynamics, Gibbs free energy, Enthalpy, Entropy, Concept of free energy, and standard free energy change, Biological oxidation-reduction reactions, Glycolysis & oxidation of Pyruvate, Krebs (TCA) cycle, its function in energy generation, Role of vitamin and Inhibitors of TCA cycle, Pentose phosphate pathway, Gluconeogenesis, electron transport and Oxidative phosphorylation, Inhibitors of ETC cycle.

Amino acids and Metabolism: Classification and Characteristics, Zwitter ion, is electric pH of amino acids, Amino acid biosynthetic pathway; Amino acid biodegradation: Deamination, transamination, Urea Cycle, Blood urea clinical importance, Amino acid as neurotransmitter. Peptide & Protein: peptide bond and pI values of peptides, solid-phase peptide synthesis, Ramachandran plot, structural organization of proteins, protein stability and folding, native structure of protein(Myoglobin, Hemoglobin and collagen), conjugated proteins, Abnormalities associated with Hemoglobin.

Lipids: Fats and lipids Introduction, Essential fatty acids. Fatty acid synthesis. beta oxidation of fatty acids. Nucleic acids Synthesis of Purines, Pyrimidines. Catabolism of purine and pyrimidine nucleotides.

Enzymes:nomenclature and classification of enzymes, enzyme kinetics (Michaelis-Menten and Lineweaver-Burk plot),influencing elements for enzyme activity, cofactor, coenzymes and allosteric modulators, enzyme inhibitionand types, Immobilization of enzymes.employing experimental techniques and laboratory studies

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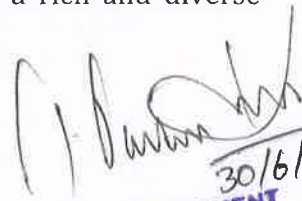Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in

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Reference Books

1. Harper's Illustrated Biochemistry, Murray RK, Granner DK, Mayes PA, Rodwell VW, 2022, McGraw-Hill Publishers.

2. Lehninger Principles of Biochemistry, Nelson DL, Cox MM, HoskinsAA, 2021, Macmillan Publishing.

3. Biochemistry, Satyanarayana U, Chakrapani U, 2020, Elsevier Publishing.

4. Essentials of Biochemistry, Naik P , 2022, Jaypee Brothers Medical Publishers.

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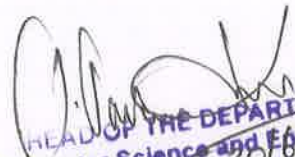Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified

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Course Code: 23BT2103 **Course Name:** NATURE INSPIRED SOFT COMPUTING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand a diverse array of optimization algorithms, each distinguished by its specific approach and techniques aimed at achieving optimal solutions to complex problems.	2	PO1, PO2, PO3, PSO1
CO2	Apply a diverse set of meta heuristic optimization algorithms, showcasing their efficacy in tackling complex problems through comprehensive simulations and practical case studies.	3	PO1, PO2, PO3, PO5, PSO1
CO3	Analyze a range of advanced neural network architectures and computational intelligence techniques to solve complex problems in machine learning and pattern recognition, demonstrating practical proficiency through implementation and evaluation.	4	PO1, PO2, PO3, PSO1
CO4	contrast in between Apply a variety of advanced computational intelligence techniques and hybrid algorithms to address complex optimization and problem- solving challenges, showcasing practical proficiency through implementation and evaluation.	4	PO1, PO2, PO4, PSO1
CO5	Design and Build bio inspired algorithms for Function Optimization to solve numerical problems.	3	PO1, PO3, PO4, PSO1

Syllabus

Genetic Algorithms (GAs) Evolution Strategies (ES) Genetic Programming (GP) Differential Evolution (DE) Particle Swarm Optimization (PSO) Ant Colony Optimization (ACO) Artificial Bee Colony (ABC) algorithms Grey Wolf Optimizer (GWO) Cuckoo Search (CS) Bat Algorithm (BA)

Particle Swarm Optimization (PSO) Ant Colony Optimization (ACO) Artificial Bee Colony (ABC) algorithms Firefly Algorithm (FA) Grey Wolf Optimizer (GWO) Cuckoo Search (CS) Bat Algorithm (BA) Flower Pollination Algorithm (FPA) Whale Optimization Algorithm (WOA) Brainstorm Optimization Algorithm (BOA)

Feedforward Neural Networks (FNNs) Convolutional Neural Networks (CNNs) Recurrent Neural Networks (RNNs) Long Short-Term Memory (LSTM) networks Restricted Boltzmann Machines (RBMs) Self-Organizing Maps (SOMs) Deep Belief Networks (DBNs) Auto encoders Neuro evolution Neuro-fuzzy Systems

Genetic-Fuzzy Systems Neuro-fuzzy Systems Memetic Algorithms Cultural Algorithms Biogeography-Based Optimization (BBO) Imperialist Competitive Algorithm (ICA) Artificial Immune Systems (AIS) Hybrid Evolutionary Algorithms Hybrid Swarm Intelligence Algorithms Hybrid Neural Network Models

Reference Books

1. Principles of Soft Computing , S N. Sivanandam, S. N. Deepa , Edition -1 2007, Wiley India.
2. Fundamentals of Neural Networks , Laurene Fausett , Edition -1 1994, Pearson.
3. Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications , Rajasekaran and G.A. Vijayalakshmi Pai , Edition-1, 2014, PHI Learning.
4. Bio-inspired Algorithms for Engineering , Alma Y. Alan?s, Nancy Arana-Daniel, Carlos Lopez-Franco, Edition -1 , 2018, oreilly .
5. Evolutionary Algorithms for Solving Multi-Objective Problems, Carlos A. Coello Coello, Edition -1 2002, Springer.

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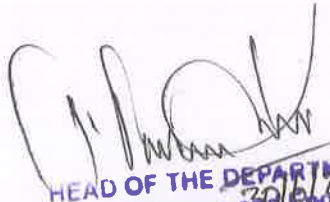## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CY1002   **Course Name:** PHYSICAL CHEMISTRY AND THERMODYNAMICS

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basic concepts of physical chemistry and thermodynamics	2	PO1
CO2	Apply the laws of thermodynamics to various systems to evaluate their efficiency	3	PO2
CO3	Apply the principles of chemical reactions to understand the phase transitions and rate of reaction	3	PO2
CO4	Apply the concepts of kinetic theory of gases to understand the behaviour of mixture of gases	3	PO2
CO5	Verify the gas laws, reaction rates and perfromance of different thermal systems using simulation softwares	3	PO3

Syllabus

Introduction to Physical Chemistry: Overview of physical chemistry and its applications in engineering. Key concepts: states of matter, properties of gases, liquids, and solids. Thermodynamics Fundamentals: Systems, surroundings, and states. Concepts of heat, work, enthalpy. Zeroth and First Laws of Thermodynamics.

Second and Third Laws of thermodynamics, concept of entropy and its relationship to disorder, Reversible and irreversible processes, Heat engines and refrigerators, Carnot cycle and efficiency.

Chemical Thermodynamics: Spontaneity, Helmholtz and Gibbs free energies, Solid-liquid-gas transitions, phase diagrams, and critical points. Heat of reactions: Enthalpy of formation of molecules and ions. Effect of temperature and pressure on enthalpy of reaction.

Gas Mixtures: Internal energy, specific heat, enthalpy and entropy of gas mixtures, Maxwell and Tds Equations, Joule Kelvin Effect, Calusius-Calpeyron Equation, Equation of state, Mixture of variable compositions, Gibbs Phase rule, Typesof Equilibrium, condition for stability.

Reference Books

1 Physical Chemistry, Peter Atkins and Julio de Paula, 11th Edition:2018, Oxford University Press.

2 Chemical Kinetics and Dynamics, Jeffrey I. Steinfeld, Joseph S. Francisco, and William L. Hase, 2nd Edition:1999,Pearson.

3 Thermodynamics: An Engineering Approach, Yunus A. ?engel and Michael A. Boles, 9th Edition:2019

4 Electrochemical Methods: Fundamentals and Applications, Allen J. Bard and Larry R. Faulkner, 2nd Edition:2022,Wiley.

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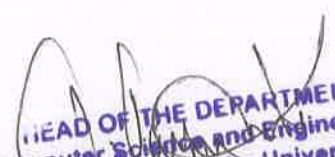## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CY1003   **Course Name:** COMPUTATIONAL CHEMISTRY

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Interpret the importance and applications of computational techniques in solving chemical problems.	3	PO1, PO3
CO2	Interpret simulation results to predict molecular behavior, reaction mechanisms, and material properties.	3	PO1, PO3
CO3	Apply frequency calculations, and molecular dynamics, and leveraging cheminformatics tools for data mining in chemistry.	3	PO1, PO3, PO5
CO4	Utilize computational resources to address and solve contemporary chemical challenges.	3	PO1, PO3
CO5	Analyze results to gain insights into molecular behaviors, reaction mechanisms, and properties.	4	PO1, PO5

Syllabus

Introduction to Computational Chemistry: Overview of computational chemistry-Importance and applications-Basic concepts: Quantum mechanics, molecular mechanics-Computational Methods-Ab initio methods-Density functional theory (DFT)-Molecular dynamics (MD)-Simulations-Monte Carlo simulations.

Molecular Modeling and Simulations-Molecular modeling software-Building molecular models-Running simulations: energy minimization, Frequency calculations molecular dynamics.

Cheminformatics: Introduction to cheminformatics - Data mining in chemistry-Molecular descriptors and databases. Applications of Computational Chemistry & Current Trends: Drug discovery and design-Material science-Environmental chemistry.

Computational Tools and Software-Introduction to computational chemistry software (e.g., Gaussian, Autodock)- Practical sessions on using software for chemical analyses and predictions.

Reference Books

1. Introduction to Computational Chemistry, Frank Jensen, 3rd Edition, 2017, Wiley.

2. Essentials of Computational Chemistry: Theories and Models, Christopher J Cramer, 2nd Edition, 2004, Wiley.

3. Molecular Modelling: Principles and Applications, Andrew Leach, 2nd Edition, 2001, Pearson.

4. Computational Chemistry: A Practical Guide for Applying Techniques to Real World Problems, David Young, 1st edition, March 2001, Wiley.

5. Computational Chemistry: Introduction to the Theory and Applications of Molecular and Quantum Mechanics, Errol G. Lewars, 2nd Edition, 2011, Springer.

6. Comprehensive Computational Chemistry, Russell J. Boyd, Manuel Yanez, 1st edition, October 2023, Elsevier.

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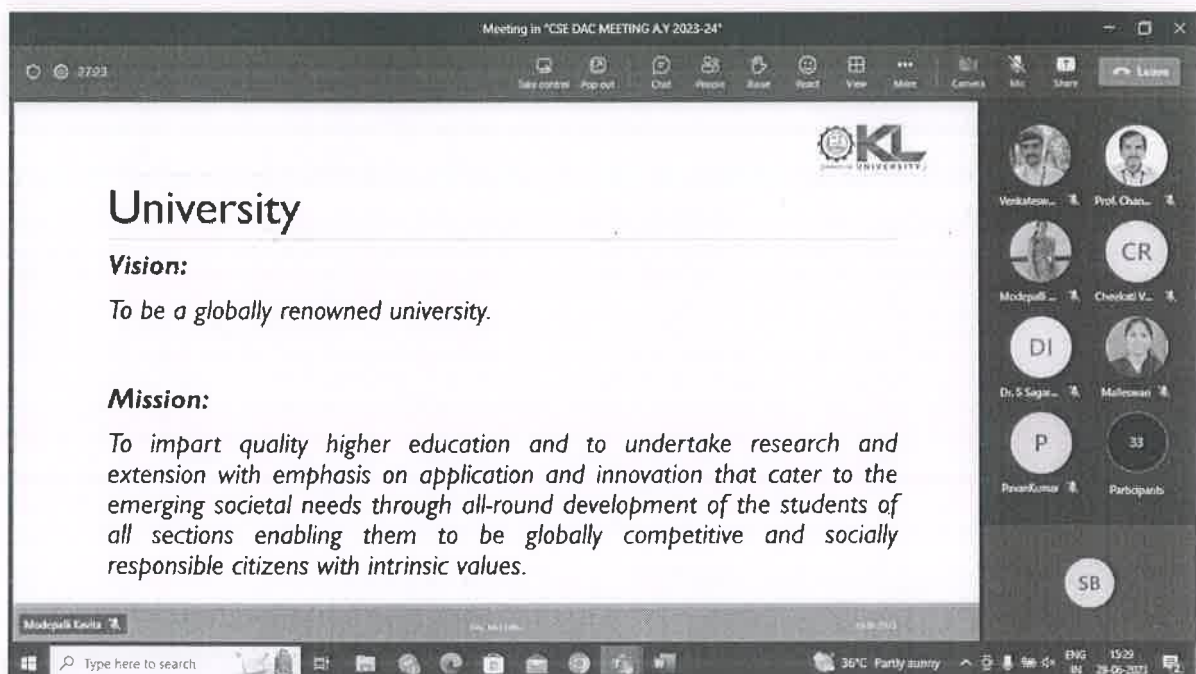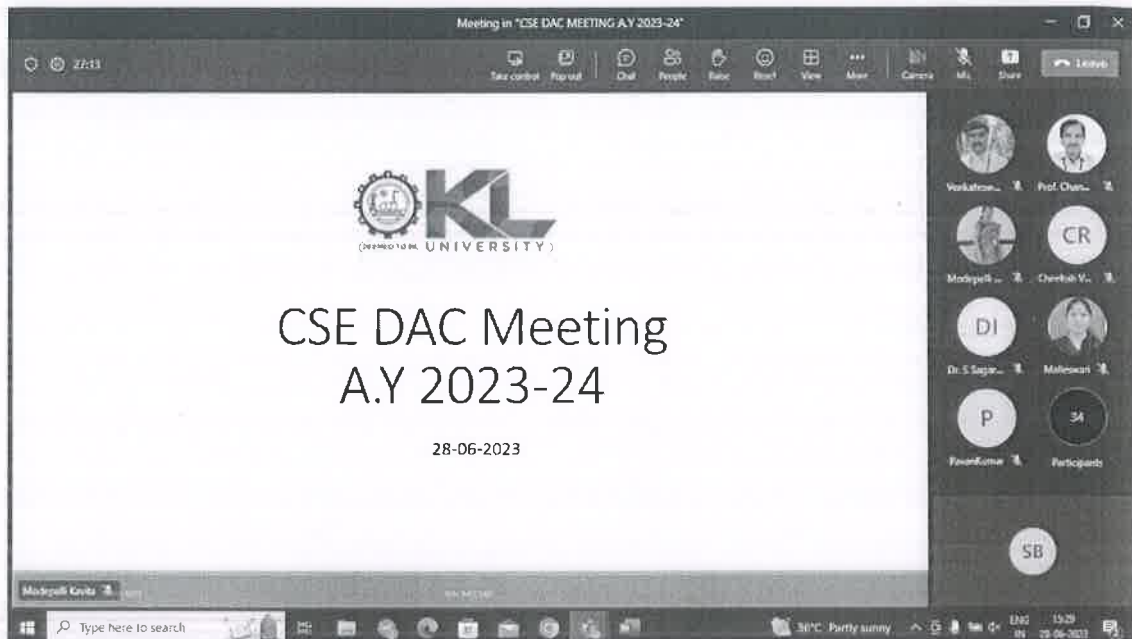Accredited by NAAC as A++ ❖ Approved by AICTE ❖ ISO 21001:2018 Certified

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23MT2014   **Course Name:** THEORY OF COMPUTATION

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Identify how finite automata (DFA & NFA) recognize regular languages, their equivalence to regular expressions (Arden\'s Theorem), and DFA minimization techniques.	3	PO1, PO2, PO3
CO2	Analyze context-free languages using closure properties to prove languages are non-regular and derive normal forms	4	PO1, PO2, PO3
CO3	Examine context-free languages and their recognition by pushdown automata (PDA) and differentiate between decidable and undecidable langauges using Turing machines.	4	PO1, PO2, PO3
CO4	Explore interactibility by exploring complexity classes, and polynomial-time reductions.	4	PO1, PO2, PO3

Syllabus

Finite Automata and Regular Languages: DFA, NFA and equivalence, Regular Expression, Equivalence of Regular expression with FA: Arden\'s Theorem, Minimization of DFA.

Closure properties of Regular Languages. Pumping Lemma and its use to prove non regularity of language, Context Free Grammar: CFG,Derivation, Parse Trees, Ambiguity, Simplification of CFG: Eleminating useless symbols, Unit Productions, epsilon production, Chomsky Normal Form and Greibach Normal Form.

Pushdown Automata: Definition, Instantineous Description of PDA, Notion of Acceptance for PDA: by final states and by empty stack, CFG-PDA equivalence, Pumping Lemma for CFL and clousure properties of CFL, Linear bound automata. Turing Machines: Turing machine model, techniques for Turing machine construction, Turing machines as language acceptors, combining Turing machines, Undecidability: Definition of recursive and recursively enumerable languages, universal Turing machine, Chomsky Hierarchy of Languages.

Variants of TM: Multi-Tape and NDTM, Time and space measures of complexity, complexity classes P,NP, NP-Hard, NP-Complete, Co-NP, the P vs NP conjecture, PSPACE, Reducibility

Reference Books

1. Introduction to Theory of Computation, Sipser J Michael , Third Edition - 2015, cengage.

2. An Introduction to Formal Languages and Automata, Linz, Peter, Sixth Edition - 2016, Jones and Bartlett.

3. Introduction to Languages and Theory of Computation, Martin Jhon, Third Edition - 2016, PHI.

5. Theory of Computer Science: Automata Languages and Computation, KL P Mishra and Chandrasekharan, Third Edition - 2008, PHI.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23PH1009   **Course Name:** COMPUTATIONAL PHYSICS

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Describe computational principles, historical context, and practical applications in computer science and scientific computation	2	PO1, PSO1
CO2	Understanding of integration using stochastic methods, including quadraturetechniques such as direct fit polynomials	2	PO2, PSO1
CO3	Explain solid grasp of sampling and integration techniques, including the Metropolis algorithm, its applications in statistical physics	2	PO2, PSO1
CO4	Summarize general behavior of classical systems, basic methods for many-body systems, including the Verlet algorithm	2	PO2, PSO1
CO5	Analysing the data by apply the knowledge of physics to executethe relatedexperiments and develop some inter disciplinaryprojects	3	PO2, PSO2

Syllabus

Computation and science, The emergence of modern computers, Computer algorithms and languages, Exercises,Approximation of a function, Interpolation, Least-squares approximation, The Millikan experiment, Spline approximation

Integration using stochastic methods. Quadrature - Direct fit polynomials; Quadrature methods on equal subintervals; Newton-Cotes formula; Romberg Extrapolation; Gaussian quadrature; Adaptive step size; Special cases

Sampling and integration, The Metropolis algorithm, Applications in statistical physics, Critical slowing down and block algorithms, Varational quantum Monte Carlo simulations

General behavior of a classical system, Basic methods for many body systems, The Verlet algorithm, Structure of atomicclusters, The Gear predictor corrector method

Sketch 2 D and 3D plots, Eigen values and Eigen vectors, Gauss elimination method, Matrix factorization problem, Matrix diagonalization and Fourier transform, Numerical integration on Trapezoidal rule, Numerical integration on Simpsons 1 3rd rule, An harmonic Oscillator, Implementation of nonlinear root finding techniques

Reference Books

1   Computational Physics: Problem Solving with Computer , R. H. Landau, M. J. Paez and C. C. Bordeianu, 2 nd

1   Edition, Wiley-VCH, 2007.

2   Understanding Molecular Simulation, D. Frenkel and B. Smit, 2nd Edition, 1996, Academic Press.

4   Computer Simulation of Liquids, M. P. Allen and D. J. Tildesley, 3rd ed.,, Clarendon Press, Oxford, 1991.

5   Computational Methods for Physics, Joel Franklin, 1st ed.,, Cambridge University Press,2024.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23PH1010   **Course Name:** ELECTROMAGNETISM

L-T-P-S: 3-0-2-0   **Credits:** 4   **Prerequisite:** LACE

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the concept of Electromagnetic theory: similarities and differences, free-space propagation, and the classification of photons and electrons.	3	PO2
CO2	Understand the concept of nonlinear optics and it applications.	3	PO1, PO4
CO3	Understand the concept of Photonic Crystals.	3	
CO4	Understand the concepts of Allications of Nanophotonics	3	PO5
CO5	Undersgtand the experimental techniques	3	

Syllabus

CO1: Foundations for Nanophononics: Photons and Electrons: Similarities and Differences, Free-Space Propagation, Confinement of Photons and Electrons, Cooperative Effects for Photons and Electrons, Nanoscale Optical Interactions, Axial Nanoscopic Localization, Lateral Nanoscopic Localization, Nanoscale Confinement of Electronic Interactions, Nanoscopic Interaction Dynamics.

CO2: Non-Linear Optics: Non-Linear Optics introduction, Harmonic Generation in nonlinear Optics, Phase Matching in Non-Linear Optics, Third Harmonic Generation of Light in Non-Linear Optics, Optical mixing in Non-Linear Optics, Parametric Generation of Light in Non-Linear Optics, Self-focusing of light in Non-linear Optics, Kerr Effect.

CO3: Photonic Crystals: Basic Concepts, Theoretical Modelling of Photonics, Features of Photonics, Methods of fabrication, Non-Linear Photonic crystals, Photonic crystal fibres, Photonic crystals and optical communications, photonic crystal sensors.

CO4: Medical Sensors: bright field, dark field, phase contrast and interferometric contrast, Fluorescence contrast mechanism, Nonlinear microscopy based on second harmonic generation and coherent anti-Stokes Raman scattering, farfield methods: 4Pi microscopy, microscopy on a mirror and stimulated emission depletion, Near field methods.

Reference Books

1 Principles of Nanophotonics. New York, USA: CRC Press-Taylor & Francis Group, 2008, Motoichi Ohtsu, Kiyoshi Kobayashi, Tadashi Kawazoe, Takashi Yatsui and Makoto Naruse,, 2008, springer.

2 Principals of Nanophotonics (Optics and Optoelectronics), M. Ohtsu, K. Kobayashi, T. Kawazoe and T. Yatsui, University of Tokyo,Japan,, 2003, Earthscan/James & James publication.

3 Nanophotonics, P N Prasad, John Wiley & Sons (2004), P N Prasad, John, 2004, "John willey & sons ld Wiley & Sons Ltd Wiley & Sons Ltd Wiley & Sons Ltd John Wiley & Sons Ltd ".

4 Environmental Nanotechnology applications, Mark. R, Weisner and Jean-Yves Bottero, 2007, The McGraw-Hill Companies.

5 Nanotechnology: Global Strategies, Industry Trends and Applications, Jurgen Schulte, 2005, JohnWiley & Sons Ltd.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23PH1011   **Course Name:** COMPUTATIONAL MECHANICS FOR ROBOTICS

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand fundamental concepts in computational mechanics and their relevance to robotics	2	PO1, PO2, PSO1
CO2	Apply the proficiency in modeling for robotic systems development	3	PO1, PO2, PSO1
CO3	Apply the various methods of trajectory planning for motion control in robotics.	3	PO2, PO3, PSO1
CO4	Apply computational techniques to solve practical problems in robotics	3	PO2, PO3, PSO1
CO5	Analyze the Robot navigation and path following using simulation software	4	PO5, PSO1

Syllabus

Overview of robotics: history, applications, and challenges. Role of computational mechanics in robotics. Review of Multivariable Calculus, Series and Sequences, Vector Calculus, linear algebra, and differential equations

Forward kinematics: position and orientation. Inverse kinematics: solving for joint variables. Differential kinematics: Computing the Jacobian, Jacobian in Kinematics and velocity analysis, Relationship Between Joint Velocities and End- Effector Velocities
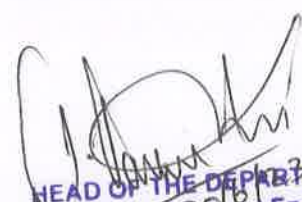
Newton-Euler equations of motion. Lagrange's equations. Dynamic modeling of robot manipulators. Interpolation methods: linear, cubic spline. Path planning algorithms: potential field, RRT. Time-parameterization techniques

PID control: basics and tuning. Model predictive control (MPC), Components of MPC, Constraints in MPC, Solving the MPC Problem, Advanced Topics in MPC, Optimization Techniques, Nonlinear control techniques

Physics-based simulation: rigid body dynamics. Numerical integration methods. Collision detection and avoidance. Introduction to ROS (Robot Operating System). Use of simulation environments: V REP. Programming robotic systems in ROS

Reference Books

1. Robot Modeling and Control, Mark W. Spong, Seth Hutchinson, M. Vidyasagar, 2005, 2nd Edition, Wiley.
2. Modern Robotics: Mechanics, Planning, and Control, Kevin M. Lynch, Frank C. Park, 2017, 1st Edition, Cambridge University Press.
3. Introduction to Robotics: Mechanics and Control, John J. Craig, 2004, 1st Edition, Pearson.
4. Robotics: Modelling, Planning and Control, Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, 2009, 1st Edition, Springer.
5. Robotics, Vision and Control: Fundamental Algorithms in MATLAB, Peter Corke, 2007, 1st Edition, Springer.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23SC3201   **Course Name:** DATA SCIENCE AND STATISTICS

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the fundamental principles of data science and statistics	2	PO1, PO2, PSO2
CO2	Gain basic understanding the role of data science in various scenarios in the real-world problems.	3	PO2, PO4, PSO2
CO3	Apply probabilistic predictions and decisions based on data analysis.	3	PO2, PO4, PSO2
CO4	Implement and apply proficiency in statistical inference techniques	4	PO3, PSO2

Syllabus

Data science combines math, coding, and real-world knowledge to extract meaning from data. It\'s used in finance, healthcare, and more to solve problems. There are challenges like big data and privacy, but data science offers exciting opportunities. Data scientists, analysts, and engineers all play a role in this field, using methodologies like CRISP-DM to guide their work. Software engineering practices are important for data science projects, and DataOps and MLOps help automate tasks to make data science more efficient.

Data comes in structured formats like tables (financial data) or unstructured formats like text (social media). Data wrangling ensures this data is clean and usable. Data models define how data is organized, while data pipelines automate the flow of data from source to destination (cleaning, transforming, loading). Modern infrastructure like cloud platforms and big data tools enable efficient handling of large datasets. Data scientists use tools to build models that automate data cleaning tasks.

Probability helps understand how likely events are (coin flips, customer arrivals). It uses concepts like chance, distributions (how likely different outcomes are), and different distribution types for various situations (number of successes in trials, time until an event). Statistics helps summarize data. It uses measures of central tendency (mean, median, mode) to find the \'middle\' of the data, and measures of dispersion (variance, standard deviation) to see how spread out the data is. The type of data you have determines which measures are most useful. These tools together let you analyze the randomness in data and make sense of it.

Statistical inference lets you make educated guesses about a whole population (like all customers) based on a smaller sample (data you collect). It uses hypothesis testing (is there a difference?) and confidence intervals (likely range for a population value) to analyze this. There are different tests for different situations: t-tests compare group means, chi- square tests analyze relationships between categories, and ANOVA compares means of more than two groups. Regression analysis explores how one variable affects another. These tools help you go beyond just describing data and use it to understand relationships and make predictions.

Reference Books

1 Introduction to Data Science: Practical Approach with R and Python Paperback , B. Uma Maheswari, R. Sujatha, 1st, Mar 10, 2024 , Wiley.

2 Probability & Statistics for Data Science, Dr. D.C. Agarwal, Dr. Pradeep K. Joshi, 1st, 1 January 2022, Wiley.

3 Applied Statistics and Probability for Engineers, 6ed, ISV Paperback , Douglas C. Montgomery, George C. Runger,

4 The Data Science Handbook, Wiley, 2nd, 14 February 2024, John Wiley & Sons, Inc..

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23AD20010   **Course Name:** ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** LACE

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply a variety of artificial intelligence algorithms and techniques to effectively solve complex problems in diverse real-world environments	3	PO2, PO3, PO4, PSO1
CO2	Solve constraint satisfaction problems, employ knowledge engineering principles to perform inferencing, reasoning and probability theory.	3	PO2, PO3, PO4, PSO1
CO3	Apply various machine learning techniques to analyze and solve real-world problems	3	PO2, PO3, PO4, PSO1
CO4	solve complex real-world problems using advanced supervised and unsupervisedlearning techniques.	3	PO2, PO3, PO4, PSO1
CO5	Evaluate solutions for various AI & ML related problems.	5	PO3, PO4, PO5, PSO1

Syllabus

Introduction to Artificial Intelligence: Overview of AI, history, and applications; Agents and Environments; Problem Solving through search: Uninformed Search Algorithms: Breadth-first search, Depth-first search, Iterative deepening search, Depth Limit Iterative deepening search Bi-Directional Search; Informed Search: Heuristic search, Best First Search, A* algorithm, Local Search algorithms: Hill Climbing Algorithm, Simulated Annealing, Adversarial Search: Minimax algorithm, Alpha-beta pruning;

Constraint Satisfaction: Problem formulation, Constraint propagation, Backtracking algorithms, Knowledge Engineering: propositional Logic, Predicate Logic, Inferencing through propositional and Predicate Logic: Introduction, Inferencing rules, Inferencing Mechanisms: Entitlement, Resolution, Lifting, Reasoning, Implementing inferencing: Forward Checking and Backward Chaining; Introduction to probability theory, Introduction to uncertainty Bayes Theorem;

Machine Learning: Introduction to Machine Learning, Types of Machine Learning; Introduction to Data Preprocessing: Data Cleaning, Data Splitting, Data Normalization, Data Batching, Data Shuffling, Overfitting and Underfitting; Performance metrics: Confusion matrix, Accuracy, F-score, Precession and Recall, Cross Validations; Supervised learning: Linear regression, Logistic Regression, Naive Bayes Classification, Bayesian Belief Networks; Decision Trees, KNN; Support Vector Machines (SVM), Introduction to Ensemble methods.

Ensemble methods: Bagging: Random Forest, Boosting: XG Boosting, Ada-Boosting, Unsupervised learning algorithms: K-Means clustering, Hierarchical Clustering Artificial Neural Networks (ANN): Introduction to ANN: Weights and Bios, Bios Vs Variance, McCulloch Pits, Perceptron, Applications of ANN, Types of ANN: Single-Layer Perceptron, Multi-Layer Perceptron, Feedforward and Backwards ANNs, Recurring RNN, Basics of ANN: Structure of ANN, Functionality of ANN, Learning ANNs, ANN techniques: Activation functions, Error computation (Loss Functions), Error distribution(Optimization), and Prediction using ANN.

Reference Books

1   Artificial Intelligence   , Russel and Norvig   , 2015, Pearson Education, PHI   .

2   Machine Learning   , Tom M.Mitchell   , 2017, Tata McGraw-Hill Edition   .

3   Artificial Intelligence   , Elaine Rich & Kevin Knight   , 2017, Tata McGraw-Hill Edition

4   Machine Learning an Algorithmic Perspective   , Stephen Marsland   , 2014, CRC Press

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23EC1101   **Course Name:** FUNDAMENTALS OF IOT AND SENSORS

L-T-P-S: 3-0-4-0   **Credits: 5**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the basic concepts of IoT and its implementation using the DevelopmentHardware	3	PO1, PO2, PSO1
CO2	Apply the different sensors interfacing with Development Hardware	3	PO2, PO3, PSO1
CO3	Apply the different actuators interfacing with Development Hardware	3	PO2, PO3, PSO1
CO4	Analyze the IoT concept to solve real time insights	4	PO2, PO3, PO4, PSO1
CO5	Analyze the concept of IoT by interfacing with sensors and Development Hardware	4	PO2, PO3, PSO1

Syllabus

Introduction Characteristics, Architecture , Applications, Development Hardware, multiplexer (74LS153), de-multiplexer (74155), encoder (SN74LS148), decoder (74LS138), microcontroller (ATMEGA328P), Arduino Introduction Types Features Pin Description IDE Applications, Arduino GPIO Programming

Sensors and its interfacing Definition Types Classification, Temperature Sensors Thermistor Thermistor types InterfacingLM35 interfacing, Light Dependent Resistor Interfacing, Interfacing and implementation for various applications Infra- Red Sensor, PIR, Ultrasonic Sensor and Gas Sensor.

Actuators and its interfacing Introduction Types DC Motor and its applications ServoMotor and its applications Stepper Motor and its applications Motor Driver circuit Relay optocouplers

Introduction Features Pin Description GPIO Programming, Displays and its interfacing 7 Segment and its types LCD pin description commands, IoT Case Studies Home Automation Smart Irrigation Smart Health care, (Self-Learning Topics Smart Lighting Intrusion Detection Smoke Detectors Smart Parking Air Pollution)

Introduction to IoT Application and   Architecture, Arduino Programming and GPIO, Digital Output Configuration of Digital Output, Concept of Delay, Introduction to LED, different connection methods of LED.

Reference Books

1. Internet of Things, Rajkamal, 2nd, Tata McGraw Hill .

2. Internet of things(A-Hand-on-Approach), Madisetti and ArshdeepBahga, ArshdeepBahga1st Edition, Universal Press2

3. The Internet of Things Connecting Objects , Hakima Chaouchi, 2nd, Wiley.

4. Design of Secure IoT Systems: A Practical Approach Across Industries, Sumeet Arora, Ramachandra Gambheer, Meenakshi Vohra, 2021, Mc Graw Hill.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23EC1202   **Course Name:** DIGITAL DESIGN & COMPUTER ARCHITECTURE

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Build the combinational and programmable digital logic circuits using logic gates and optimization methods	3	PO1, PO2, PSO1
CO2	Construct the sequential and memory circuits using flip-flops	3	PO1, PO2, PSO1
CO3	Organize computer architecture and instructions sequence	3	PO1, PO2, PSO1
CO4	Model the Memory Architecture and I/O Organization modules	3	PO1, PO2, PSO1
CO5	Develop and analyze computer architecture modules using basic combinational,sequential and memory logics	4	PO1, PO3, PO5, PSO1

Syllabus

Combinational Digital Logic Circuits: Boolean algebra, Digital Logic SOP/POS representation and optimization techniques. Adders, Subtractors, Multiplexers, De-Multiplexers, Decoder, Encoder. Programmable Logic Devices: PROM, PAL, and PLA design. Implementation of CPLD (Macrocells) and FPGA (CLB/LUT) based digital logic modules and their applications.

Design of Sequential and Memory Circuits: Latches and Flip-Flops, Modeling of memory and registers, Timing and sequence control modules using Asynchronous/Synchronous counters, Ring and Johnson counter as timing and control units. Shift registers, Random Access Memory (RAM) and Memory decoding.

Basic Computer Architecture and Instructions: Features of Micro Computer, Operands, Addressing modes, Instruction formats, Machine cycle, Instruction sets, subroutine call and return mechanisms. Instruction set architectures - CISC and RISC architectures. Hardwired realization vs micro-programmed realization, multi-cycle implementation. Instruction level parallelism, instruction pipelining and pipeline hazards.

Memory Architecture and I/O Organization: Storage systems, introduction to memory hierarchy: importance of temporal and spatial locality; main memory organization, cache memory: address mapping, block size, replacement, and store policies; virtual memory system: page table and TLB. External storage; IO fundamentals: handshaking, buffering, programmed IO, interrupt driven IO.

Reference Books

1   Computer System Architecture, M. Moris Mano , 2017, Pearson/PHI.

2   Fundamentals of Digital Logic with Verilog HDL, Stephen Brown and ZvonkoVranesic, 2013, Mc Graw Hill.

3   Computer Organization and Design, DA Patterson and JL Hennessy, 2007, Morgan Kaufmann Publisher.

4   Computer Architecture and Organization, JBaljinder Singh, 2019, Mc Graw Hill.

5   Digital Circuits and Design, S. Salivahanan and S. Arivazhahan, 2018, Oxford Press.

6   Computer Organization and Architecture, W. Stalling, 2006, PHI.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23EC1203   **Course Name:** BASIC ELECTRICAL AND ELECTRONIC CIRCUITS

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basic concepts of circuits and its fundamentals	2	PO1, PSO1
CO2	Grasp the principles of AC circuits, including sinusoidal waveforms, impedance, and power factor.	2	PO1, PSO1
CO3	Comprehend the behavior of basic electronic components, such as diodes, andtransistors.	2	PO1, PSO1
CO4	Understand the basic functional Principles of analog and digital ICs.	2	PO1, PSO1

Syllabus

Basic circuit elements, Circuit fundamental: Mesh analysis and Nodal analysis, Thevenin\'s theorem, Norton\'s theorem, Superposition theorem, Maximum power transfer theorem.

AC fundamentals: RMS value, Average Values, Form & Peak factor, Steady state analysis (R, L, C, etc), Reactance,Impedance, Phase & Phase difference, Real power, Reactive power, Power factor.

Operation of the diode, Diode as a switch, Rectifiers, Clipper, Clampers, Zener Diode as a regulator, Operation ofTransistor, Transistor as a switch.

Analog & Digital ICs: Voltage regulators 7805, 7905, and LM723, Operational Amplifiers IC 741, Timer IC 555,Comparators LM 339.

Reference Books

1. Electrical Circuit Theory and Technology, John Bird, 2009, Routledge publishers.

2. Electronic Devices and Circuit Theory, Robert L. Boylestad, 2011, Pearson.

3. Electronic Devices and Circuits, David A. Bell, 2015, Oxford Press.

4. Circuits and Networks: Analysis and Synthesis, A Sudhakar, Shyam Mohan S Palli, 2010, MG Hill.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CI2001   **Course Name:** ADAPTIVE SOFTWARE ENGINEERING

L-T-P-S: 3-1-0-0   **Credits: 4**   **Prerequisite: NIL**

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Demonstrate understanding of software development life cycle, associated process models, and reverse engineering techniques.	3	PO1, PO2, PO3, PSO2
CO2	Apply requirement modeling, Agile, and Extreme Programming methodologies.	3	PO2, PO3, PO4, PSO2
CO3	Analyze Agile models including Scrum, Kanban, and SAFe methodology, analyze the use of JIRA for project monitoring, and identify appropriate design patterns for project development.	4	PO2, PO3, PSO2
CO4	Analyze testing strategies and evaluate risk management factors	4	PO1, PO2, PO3, PSO2

Syllabus

Software and Software Engineering: Nature of software, software application domains, unique nature of web applications, software engineering, software process, product and 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

Requirements elicitation, documenting business requirements, defining user requirements, and related concepts such as requirement analysis techniques, stakeholder engagement, and requirement validation processes

Agile methodologies like Scrum and Kanban, SAFe for scaling agile, project monitoring with JIRA, and design patterns including architectural and model-driven approaches. Agile project management, scaling frameworks, tool usage for tracking progress, and advanced software design principles for robust architectures.

A strategic approach to software testing, strategic issues, test strategies for conventional software, Black-Box and White-Box testing, validation testing, system testing. RISK MANAGEMENT

Reference Books

1 Software Requirements, Karl Wiegers and Joy Beatty, 3 (2012), Microsoft Press..

2 Scaling Lean & Agile Development: Thinking and Organizational Tools for Large-Scale Scrum, Craig Larman and Bas Vodde, 1 (2008), Addison-Wesley Professional.

3 The Mythical Man-Month: Essays on Software Engineering, Fred Brooks, Anniversary Edition,(1995), Addison-Wesley Professional.

4 Code Complete: A Practical Handbook of Software Construction, Steve McConnell, 2 (2004), Microsoft Press.

5 The Art of Software Testing, Glenford J. Myers, Corey Sandler, and Tom Badgett, 3rd Edition (2011

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23EC2210R   **Course Name:** NETWORK PROTOCOLS AND SECURITY

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the knowledge of communication to understand the concepts of physical layerand datalink layer.	3	PO1, PO2, PO3, PSO2
CO2	Analyze various MAC protocols and apply IP addressing concepts to subnet a network.	4	PO2, PO3, PSO2
CO3	Analyze static and dynamic routing algorithms and transport layer protocols.	4	PO2, PO3, PSO2
CO4	Analyze application layer protocols and various cryptographic algorithms.	4	PO2, PO3, PSO2
CO5	Analyze the functionality of the network using different protocols and working of various cryptographic algorithms.	4	PO2, PO5, PSO2

Syllabus

Introduction to Computer networks and Data Link Layer: Use of Computer Networks, Network Hardware, Network software, Reference models: OSI and TCP/IP, Physical Layer: The theoretical basis for Data Communication, Guided and Unguided Transmission Media, Switching. Data Link Layer: DLL design issues. Error Detection and Correction, Elementary data link protocols, sliding window protocols.

Medium Access Control Sub layer: Channel allocation problem, multiple access protocols, Design issues of Networklayer, Inter-networking Devices: Distinguishing of Networking Devices and Inter-networking Devices, VLANS, Addressing: IP addressing (IPV4 & IPV6), subnetting; IP Tunneling, NAT,PAT

ARP, DHCP Types of Routing: static, default and dynamic. Networking Protocols: RIP, OSPF, BGP; Access Control list for IPV4, IPV6, Other Protocols: Transport Layer: Process to Process Delivery; UDP; TCP; Stream Control Transmission Protocol (SCTP); Congestion Control: Open Loop, Closed Loop Choke Packets; Quality of Service: Techniques to Improve QoS: Leaky bucket algorithm, Token bucket algorithm.

Application Layer: DNS, SMTP, SNMP Introduction to Security, Security goals, Security Attacks, Security Services and Mechanisms, A Security Model, Asymmetric & Symmetric key Ciphers, Substitution Techniques, Transposition Techniques, DES, RSA algorithm, Secure Socket Layer.

Reference Books

1   Data Communication and Networking, Behrouz A. Forouzan, 5th Edition, (2012), TMH.

2   Cryptography and Network Security , William Stallings , 6th Edition, 2015   , Pearson Education.

3   Computer Networks -- A Systems Approach , Peterson, LL and Davie BS , 5th edition-(2012) , Morgan Kaufmann, Elsevier.

4   Computer Networks   , A.S.Tanenbaum, David J. Weteral   , 5 th edition. 2013   , Pearson Education.

5   Computer Networking: A Top-Down Approach   , Kurose, J and Ross, K   , 6th edition-(2012)   , Addison-Wesley.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23SDCS11R   **Course Name:** LINUX ADMINISTRATION AND AUTOMATION

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understanding Redirection and creating and managing files using VIM Editor and Managing Users and Groups	2	PO2, PSO1
CO2	Understanding Process Management SSH connections, Network Fundamentals, Managing Network utility and utilize Automation tools for Process Scheduling	2	PO5, PSO1
CO3	Managing Network utility and utilize Automation tools for Process Scheduling and Apply Package Management and File system and Analyze Booting Process with Red hatLinux and design running of Containers	3	PO5, PSO1

Syllabus
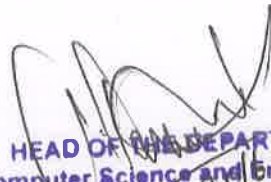
Manage Files from the Command Line, Get Help in Red Hat Enterprise Linux, Create, View, and Edit Text Files, Manage Local Users and Groups

Control Access to Files, Monitor and Manage Linux Processes, Control Services and Daemons, Configure and Secure SSH, Analyze and Store Logs, Manage Networking, Archive and Transfer Files, Install and Update Software Packages, Access Linux File Systems, Analyze Servers and Get Support

Improve Command-line Productivity, Schedule Future Tasks, Tune System Performance, Manage SELinux Security, Manage Basic Storage, Manage Storage Stack, Access Network-Attached Storage, Control the Boot Process, Manage Network Security, Install Red Hat Enterprise Linux, Run Containers

Reference Books

1 Red Hat Enterprise Linux System Administrator Guide Deployment configuration and administration of RHEL, Red hat, 2024, Redhat Inc.

2 Red Hat RHCSA 8 Cert Guide: EX200, Sander van Vugt, 2021, Pearson IT Certification.

3 Red Hat Certified System Administrator & Engineer: Training Guide and a Quick Deskside Reference, Exams EX200,Asghar Ghori, 2022, Redhat Inc.

4 Red Hat Certified System Administrator (RHCSA), William Maning, 2022, Emereo Publishing.

5 RHCSA/RHCE Red Hat Linux Certification Study Guide (Exams EX200 & EX300), Jang Michael, 2024, McGraw Hill Education India.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23SDCS12R   **Course Name:** FULL STACK APPLICATION DEVELOPMENT

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Students will gain a thorough understanding of Maven for project management and building automation and Hibernate for ORM in Java applications. They will learn to manage dependencies, automate builds, perform CRUD operations, write advanced queries, and handle inheritance in ORM, effectively integrating Java applications with databases.	3	PO5, PO9, PSO2
CO2	Students will gain a solid foundation in the Spring framework, including its architecture, core principles like Dependency Injection and Inversion of Control, and web development applications. They will be proficient in developing Spring-based web applications, performing CRUD operations, and integrating with relational databases, using Spring's features to create robust, maintainable Java applications.	3	PO5, PO9, PSO2
CO3	Students will gain a comprehensive understanding of Spring Boot and React JS for backend and frontend development. They will be proficient in building full-stack web applications, integrating RESTful web services, managing data with Spring Data JPA, and using React features like Hooks and Redux for state management.	3	PO5, PO9, PSO2
CO4	Students will understand both monolithic and microservices architectures and gain practical skills in building, deploying, and managing microservices with Spring Boot and Spring Cloud. They will be equipped to design and implement scalable, resilient, cloud-native applications using industry best practices and tools.	3	PO5, PO9, PSO2

Syllabus

Maven-Introduction to Build Tools, Maven Build Tool and its advantages, Project Object Model(POM). Dependencies And Repositories, Maven Build Life Cycles, Phases and Goals, Maven Archetypes. Hibernate-Introduction to ORM, JPA and its advantages. JDBC Vs Hibernate. Hibernate Architecture.

Hibernate CRUD operations based on Persistence Object. Hibernate Query Language (HQL) & its operations. Hibernate Criteria Query Language (HCQL) & its operations. Generator Classes in Hibernate. Hibernate Inheritance Mapping. Spring-Introduction to Spring and its advantages. Spring Architecture and modules. Dependency Injection and Inversion of Control with Primitive Data Types and Non-Primitive Data types using XML & Annotations. Autowiring using Dependency Injection and IoC. Spring Web Application MVC Architecture, JDBC Vs Hibernate Template.

Spring Boot-Introduction to Spring Boot and Spring Vs Spring Boot. Spring Boot Architecture. Spring Boot Dependency Injection (DI) and Inversion of Controller (IoC). Spring Boot with Rest Controller and Controller. Spring Boot with Restful Web Services or REST API & Annotations. Spring Boot Web Application MVC Architecture

Spring Data JPA & Repositories. DAO Layer, Repository Layer and Service Layer. Spring Boot Web MVC CRUD Application with Spring Data JPA. Spring Boot Web MVC with Pagination. React JS Component-based Architecture, React Hooks, Fetch/Axios API and React Router. Spring Boot Rest API CRUD operations with React JS. Spring Boot Web MVC CRUD Application with React JS.

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Reference Books

1 Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js, Greg Lim, 4, Greg Lim-2020.

2 Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 1, 2

Apress - 2019..The Full-Stack Developer, Chris Northwood,1,APRESS.

3 Web Technologies: Concepts, Methodologies, Tools, and Applications, Information Science Reference, Arthur

Tatnall, 4,IGI Global.

4 MERN Quick Start Guide: Build web applications with MongoDB, Express.js, React, and Node.js, Eddy Wilson Iriarte

Koroliova, 1st Edition, Packt Publishing-2019.

5 Full-Stack React Projects: Learn MERN stack development by building modern web apps using MongoDB, Express,

React, and Node.js, Shama Hoque, 1st Edition, Packt Publishing-2020.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23SDCS13R   **Course Name:** CI/CD & CLOUD DEVOPS

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basic concepts of Networks,Cloud and Devops Identify the Need of DevOps in SDLC and Cloud Infrastructure in DevOps, Apply Version Control System to track the latest version of Software	2	PO5, PO6, PSO2
CO2	Inspect Configuration Management using Infrastructure as Code	4	PO5, PO6, PSO2
CO3	Analyze need of Containerization in SDLC and Examine the Kubernetes Pod Configuration.	4	PO4, PO5, PO6, PSO2

Syllabus

Networking Fundamentals: Network Fundamentals, Storage Fundamentals, Databases Fundamentals,Webservers (NGINX), LINUX Basic and Admin Importance of Linux in DevOps, Linux Basic CommandUtilities, Shell Scripting

Cloud Fundamentals, AWS fundamentals, SDLC, DevopsFundamentals: Git,Maven.

Overview, Terraform with AWS, Terraform -variables, conditions,iterator, provisioner, functions, modules, workspace,backends

Reference Books

1   DevOps for Web Development , MiteshSoni, 2016, PACKT Publishing .

2   Beginning DevOps with Docker , Joseph Muli, , 2018, PACKT Publishing.

3   Docker for Developers_ Develop and run yourapplication with Docker containers using DevOps tools for continuous delivery (, RichardBullington-McGuire, Andrew K. Dennis, Michael Schwartz , 2020, Packt Publishing.

4   DevOps With Kubernetes , - Hideto Saito, Hui-Chuan Chloe Lee, Cheng-Yang,, 2019, PACKT Publishing, .

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23AIP3305R   **Course Name:** GENERATIVE DEEP LEARNING

L-T-P-S: 3-0-2-4   **Credits: 5**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand Generative AI and its real time applications	2	PO1, PSO1
CO2	Apply Advanced generative models like WGAN,StyleGAN,Cycle GAN for real time applciations for image generation	3	PO3, PSO1
CO3	Build text generation pipelines using advanced techniques such as Long Short-Term Memory (LSTM) networks, BERT, and attention mechanisms	3	PO1, PO3, PO4, PSO2
CO4	Apply Cross-modal generation models like ATttnGan, MuseGAN	3	PO4, PSO2
CO5	Implement real time applcation using Generative AI using Cycle Gan, StyleGAnMuseGan	5	PO3, PO5, PSO2
CO6	Experiment with real time applcation using Generative AI using Cycle Gan, StyleGAn MuseGan, AttnGan, AIchat, and develop application.	5	PO3, PO5, PSO2

Syllabus

" Introduction to Generative AI , Applications in generative models, Varational Autoencoder, GANs, Conditional Variational Autoencoders (CVAEs),Adversarial Variational Bayes (AVB),Importance of latent space in VAEs "

" Advanced GAN Architectures:, Wasserstein GANs (WGANs) and WGAN-GP, CycleGAN , paired and unpaired style transfer -StyleGAN and StyleGAN2, Progressive Growing GANs (PGGANs) "

Build several text generation pipelines based on LSTMs, BERT, Attention Mechanisms: Self-attention mechanism,Transformer architecture,Analysis of Rnn with Attention

Text-to-Image Generation,Text-to-image synthesis techniques, AttnGAN: Attentional Generative Adversarial Networks for image generation from textual descriptions, Cross-modal generation models,Analysis of MuseGAN

Reference Books

1   Generative AI, David Foste , 2019, O Relly publications.

2   Generative AI with Python and TensorFlow 2, Joseph Babcock and Raghav Bal , 2020, Packt.

3   Modern Generative AI with ChatGPT and OpenAI Models: Leverage the capabilities of OpenAI's LLM for productivity and innovation with GPT3 and GPT4 By Valentina Alto, Valentina Alto, 2023, Packt.

4   Deep Generative Modeling, Jakub M. Tomczak, 2022, Springer.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23UC0017   **Course Name:** INDIAN KNOWLEDGE SYSTEMS: VEDIC MATHEMATICS

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	List all the 16 sutras in Vedic Mathematics, Using Vedic mathematics sutras toperform basic arithmetic operations	2	PO1
CO2	Develop the critical thinking skills to solve Shakuntala Devi Puzzles.	3	PO1

Syllabus

Introduction to Indian knowledge system, Indian mathematicians and their contribution to the world, Vedic Mathematics: origin of Vedic mathematics, 16 sutras of Vedic Mathematics by swami Bharti Krishna Tirthji Maharaj, Ekadhiken Purvena, Nikhilam Navatacharamam Dasatah, Antyayoradaskaepi, Base method for multiplication (with base 10,100,1000,1000),Base method for multiplication (with base 50) Urdhva-tiryagbhyam ,Basic arithmetic operation by Vedic sutras by addition by subtraction, Puranapuranabhyam Antyayoradaskaepi, Yavadunam, , Paravartya Yojayet, Nikhilam method.

Numbers, Ratio, Proportion, Variation, Averages, Percentages, Profit and loss, Time and Distance, Time and Work, Sets and Venn diagrams,logical connectives, Blood Relations and related Shakuntala Devi Puzzles. Deductions, Linear and circular arrangements. Clocks, Calendars, Cubes, Number and letter series, Coding and Decoding, Symbolic representations of given data, Binary Logic, Logical connectives, logical deductions,Non-Verbal reasoning and related Shakuntala Devi Puzzles.

Reference Books

1. .Math Sutras:The art of Vedic Speed calculations,, Gaurav Tekariwal, 2023, Penguin Group.

2. Vedic Mathematics or Sixteen simple Mathematical Formulae from the Vedas, SWAMI SRI BHARATI KRSNA TIRTHAJI MAHARAJA, , -, Motilal Banarasi Das Press,.

3. R. S. Agarwal, A Modern Approach to Verbal and Non-verbal Reasoning, , s chand, 2022, s chand publication.

4. Shakuntala Devi Puzzles, , Shakuntala Devi , -, -.

5. .Indian Knowledge System, Vol-1&2,, Kapil Kapoor and Avadhesh Kumar Singh,D. K, -, print world press.

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Course Code: CADCATL1V1   **Course Name:** CAREER ADVANCEMENT: CAT, GMAT TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply mathematical concepts to solve complex quantitative problems and interpret various data formats effectively.	3	PO10, PO12
CO2	Apply their understanding of vocabulary, grammar, and logical reasoning to analyze complex texts, evaluate arguments, and solve challenging verbal reasoning problems.	3	PO10, PO12

Syllabus

Fundamentals of Quantitative Aptitude and Data Interpretation : Essential mathematical concepts such as number systems, arithmetic, algebra, geometry, and data interpretation. Topics will include properties of numbers, fractions, decimals, percentages, ratios, proportions, equations, inequalities, coordinate geometry, tables, graphs, and data analysis.

Verbal Ability and Logical Reasoning: This module will focus on developing verbal and logical reasoning skills. Topics will include reading comprehension, vocabulary, grammar, critical reasoning, and verbal reasoning. Students will learn to analyze passages, draw inferences, identify main ideas, improve vocabulary, understand grammatical rules, evaluate arguments, and solve logical puzzles.

Reference Books

1   Quantitative Aptitude for CAT, Arun Sharma, 11, McGrawHill.

2   How To Prepare For Verbal Ability & Reading Comprehension For CAT, Arun Sharma, Meenakshi Upadhyay, 11, McGrawHill.

3   How to Prepare for Data Interpretation for CAT, Arun Sharma, 8, McGrawHill.

4   Verbal Ability and Reading Comprehension for CAT, Nishit K. Sinha, 4, Pearson Education.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CADCORL1V1   **Course Name:** CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply advanced domain-specific concepts and emerging trends to address industry challenges and innovations.	3	PO1, PO2
CO2	Apply advanced problem-solving and strategic decision-making techniques to manage complex projects within the core domain.	3	PO1, PO2

Syllabus

Core Concepts, theories, and frameworks of the specific domain (e.g., finance, IT, healthcare, engineering), Advanced Domain-Specific Tools, innovations and their impact on the core domain, Real-world examples of how new trends are being applied within the domain

Domain specific challenges, Practical exercises to resolve complex issues in the domain, best practices for managing projects within the domain, Case Studies and Simulations.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CADCORL2V2   **Course Name:** CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply effective leadership styles and strategies to lead cross-functional teams and influence key stakeholders in domain-specific roles.	3	PO1, PO2
CO2	Apply industry-relevant practices to implement innovation and manage organizational change while fostering a culture of continuous improvement.	3	PO1, PO2

Syllabus

Leadership approaches in industry-specific environments, negotiation techniques with stakeholders, strategies to lead cross-functional teams, leadership strategies from domain leaders and industry executives.

Change in domain-specific projects, technology transitions, or organizational transformations, Case Studies on Innovation and Change, Industry Regulations and Compliance, Risk Management Techniques, Interactive sessions with domain experts.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code:CADENTL1V CourseName:CAREER ADVANCEMENT:ENTREPRENEURIA CAREERPATHWAY TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply essential entrepreneurial qualities such as resilience, innovation, and risk- taking, enabling them to pursue entrepreneurial career paths in various contexts, including startups, corporate roles, and freelancing.	3	PO9, PO11
CO2	Develop the skills to recognize potential business opportunities, conduct thorough market research, and validate ideas by addressing customer needs and evaluating feasibility, preparing them to create sustainable business solutions.	3	PO9, PO11

Syllabus

Defining entrepreneurship: What it means to be an entrepreneur; The distinction between entrepreneurial and traditional career paths; The entrepreneurial mindset: resilience, risk-taking, innovation, and adaptability; Exploring entrepreneurial career pathways in startups, corporate environments, freelancing, and social ventures.

Spotting opportunities: How to find unmet needs and gaps in the market; Market research: Tools and techniques for understanding trends and customer needs; Idea validation: Testing the feasibility of your business idea; Problem-solving for innovation: Leveraging customer pain points and inefficiencies.

Reference Books

1 The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Eric Ries, 1st (2011), Crown Business.

2 The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company, Steve Blank, Bob Dorf, 2nd (2020), K&S Ranch Press.

3 Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Alexander Osterwalder, Yves Pigneur, 1st (2010), Wiley.

4 The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, Clayton M. Christensen, 1st (1997), Harvard Business Review.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CADGATL1V1 **Course Name:** CAREER ADVANCEMENT: GATE TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply advanced mathematical concepts and techniques to solve complex engineering problems	3	PO1, PO2
CO2	Apply their understanding of verbal ability, numerical ability, and general awarenessto solve problems in a variety of contexts	3	PO1, PO2
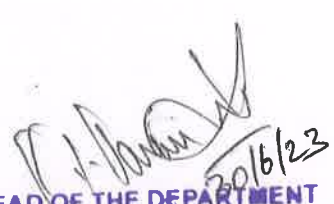
Syllabus

This module will cover advanced topics in mathematics relevant to engineering disciplines. Topics may include linear algebra, calculus, differential equations, probability and statistics, numerical methods, and complex analysis. Students will learn to apply these concepts to solve engineering problems, analyze data, and develop mathematical models.

This module will focus on developing verbal ability, numerical ability, and general awareness. Topics may include reading comprehension, vocabulary, grammar, quantitative aptitude, logical reasoning, data interpretation, and currentaffairs. Students will learn to communicate effectively, solve mathematical problems, analyze data, and demonstrate general knowledge.

Reference Books

1 A Modern Approach To Verbal & Non-Verbal Reasoning, Dr. R.S. Aggarwal, 2024, S.Chand.

2 Advanced Engineering Mathematics, Erwin Kreyszig, 2015, Wiley.

3 Introductory Statistics, Sheldon M. Ross, 2017, Academic Press.

4 Quantitative Aptitude, R. S. Aggarwal, 2017, S. Chand Limited.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CADGREL1V1   **Course Name:** CAREER ADVANCEMENT: GRE, TOEFL & IELTS TRAINING ING

L-T-P-S: 0-0-0-8   **Credits: 0**   **Prerequisite:** N

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply vocabulary, reading comprehension strategies, and analytical writing techniques to solve verbal reasoning questions and compose structured essays across standardized test scenarios.	3	PO9, PO10
CO2	Apply effective time management, critical thinking, and communication strategies in listening, speaking, and writing tasks during test simulations to improve performance in real-world exam settings.	3	PO9, PO10

Syllabus

vocabulary building, reading comprehension strategies, critical thinking for analytical writing, and problem-solving techniques. Listening will focus on understanding academic conversations and lectures, while speaking skills emphasize fluency, coherence, and pronunciation. Writing will include essay structuring, argument development, and responding to prompts effectively.

Advanced reading of complex texts, mastering time management, and refining both written and spoken responses. verbal reasoning, quantitative reasoning Practice through mock tests

Reference Books

1   The Official Guide to the GRE General Test, ETS, 2022, Educational Testing Service.

2   The Complete Guide to the TOEFL Test, Bruce Rogers, 2019, Cengage Learning.

3   Cambridge IELTS 16 Academic Student's Book with Answers, CUP, 2021, Cambridge University Press.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CADUPSL1V1   **Course Name:** CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAMTRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understanding the basics of Indian History and it\'s evolution	2	PO6, PO7, PO8, PSO2
CO2	Understanding the basics of Indian Geography	2	PO6, PO7, PO8, PSO2
CO3	Understanding the Evolution of Indian Constitution.	2	PO6, PO7, PO8, PSO2
CO4	Understanding the evolution of Indian Economy	2	PO6, PO7, PO8, PSO2

Syllabus

Ancient Indian History- IVC,Rig Vedic, Later Vedic, Buddhism, Jainism, Mahajanapadas, Mouryan Empire, GuptanEmpire, Harshavardhana empire, Sangam Age.
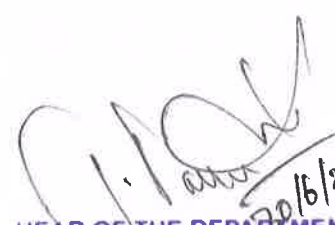
Exploring The Physical and Social Geography of India: The Universe, Big Bang Theory, Solar system, Geological TimeScale, Earth\'s Interior, Earth\'s Magnetic Feild.

Indian Polity and Constitution: Sailent featuresof Indian constitution, Preamble, Fundamental RIghts, DirectrivePrinciples of State Policy, Fundamental Duties , Indian Parliament.

Understanding India\'s Economy - Indian Economic Development, National Income, Public Finance, Indian Budget.

Reference Books

1   Indian Polity, M. Laxmikanth, 7, Tata Mc Graw Hill.

2   Indian Economy, Nitin Singhania, 5, Mc Graw Hill.

3   Ancient and Medieval India, Poonam Dalal Dahiya, 3, Mc Graw Hill.

4   Fundamentals of Physical Geography, Husain Majid, 5, Mc Graw Hill.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CADUPSL2V2 **Course Name:** CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAMTRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand and Evaluate the significant political, cultural, and social changes and it\'s influence in contemporary society	2	PO6, PO7, PO8
CO2	Understand and assess the interactions between human activities and economicsystems in shaping geographic landscapes.	2	PO6, PO7, PO8
CO3	Understand and analyze the structure and functioning of India\'s parliamentary and federal systems, including the intricacies of centre-state relations.	2	PO6, PO7, PO8
CO4	Understand and able to critically evaluate the key components of the Indian economy.	2	PO6, PO7, PO8

Syllabus

Medieval Indian History: Vijayanagaras, Kakatiyas, Delhi Sultanate, Mughal Empire and Later Mughals.
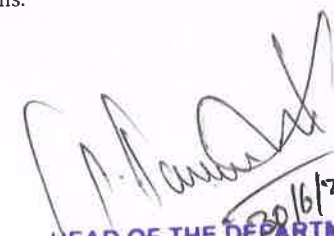
Human and Economic Geography: Population, Migration, Trade, Human settlements, Resources, Minerals and Industrial Development.

Indian Polity: Parliamentary system, Federal system, Centre-state relations, Emergency Provisions.

Indian Economy: Money and Banking, Inclusive Growth & Development, Agriculture ,Subcidies, PDS, Food Security Industries,

Reference Books

1   Medieval Indian History, Satish Chandra, 5, Mc Graw Hill.

2   Indian Constitution, D D Basu, 27, Lexicon.

3   Indian Economy, Ramesh Singh, 15, Mc Graw Hill.

4   Physical, Human and Economic Geography, D R Khuller, 2, GKP/ Access Publications.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTCODL1V1 **Course Name:** CAMPUS RECRUITMENT: LOGIC BUILDING SKILLSTRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply logical principles and critical thinking skills to analyze and evaluate arguments,solve problems, and make informed decisions.	3	PO1, PO2
CO2	Identify various logical reasoning techniques to solve complex problems, identify patterns, and draw valid conclusions	3	PO1, PO2

Syllabus

Introduction to Logic and Critical Thinking: fundamentals of logic, including the concepts of statements, propositions, truth values, logical connectives (AND, OR, NOT, IF-THEN, IF-AND-ONLY-IF), truth tables, and logical equivalence. Students will learn to identify and analyze different types of arguments, including deductive and inductive reasoning. They will also develop critical thinking skills, such as evaluating evidence, identifying assumptions, and recognizing fallacies

Logical Reasoning and Problem-Solving: applying logical reasoning techniques to solve various types of problems. Students will learn about different problem-solving strategies, including problem decomposition, pattern recognition, working backward, and using analogies. They will practice solving logic puzzles, brain teasers, and real-world problems that require logical thinking. Additionally, students will explore the concepts of syllogisms, Venn diagrams, and conditional reasoning to enhance their problem-solving abilities

Reference Books

1. Introduction to Logic, Irving M. Copi, Carl Cohen, Victor Rodych, 2014, Routledge.

2. Critical Thinking, Richard Paul, Linda Elder, 2019, Pearson.

3. The Art of Logical Thinking; Or, The Laws of Reasoning, William Walker Atkinson, 2013, Public domain in the

4. Symbolic logic and The game of logic, Carroll, Lewis, 1958, Dover Publications.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTCODL2V2   **Course Name:** CAMPUS RECRUITMENT: CODING SKILLS TRAINING -DATA STRUCTURES

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Make use of arrays, linked lists, stacks, and queues to solve a variety of programming problems efficiently	3	PO1, PO2
CO2	Apply the knowledge of trees, graphs, heaps, and hash tables to design andimplement efficient algorithms for complex data-intensive applications	3	PO1, PO2
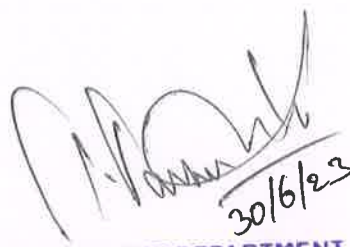
Syllabus

This module will cover the basic building blocks of data structures. Students will learn about arrays, linked lists, stacks, and queues, their characteristics, operations, and applications. They will also practice implementing these data structures in a programming language and solving problems using them.

This module will delve into more complex data structures. Students will explore trees, graphs, heaps, and hash tables, their properties, algorithms, and use cases. They will learn to analyze and choose the appropriate data structure for a given problem and implement efficient solutions using these structures.

Reference Books

1. Data Structures and Algorithms Made Easy in Java, Narasimha Karumanchi, 2011, CareerMonk.

2. Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, 2009, Open Source.

3. CRACKING the CODING INTERVIEW, Gayle Laakmann McDowell, 2015, CareerCup.

4. Algorithms, Robert Sedgewick and Kevin Wayne , 2024, Addison Wesley.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTCODL3V3   **Course Name:** CAMPUS RECRUITMENT: CODING SKILLS TRAINING -ALGORITHMS

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Identify various searching and sorting algorithms to efficiently solve problems involving large datasets	3	PO1, PO2
CO2	Design and implement dynamic programming algorithms to solve problems with overlapping subproblems	3	PO1, PO2

Syllabus

This module introduces essential algorithms and data structures for problem-solving. Topics include searching algorithms (linear search, binary search), sorting algorithms (bubble sort, insertion sort, selection sort, merge sort, quicksort), recursion, divide-and-conquer, greedy algorithms, and basic data structures (arrays, linked lists, stacks,

This module delves into more complex algorithms and techniques. Topics include dynamic programming (Fibonacci sequence, knapsack problem), graph algorithms (breadth-first search, depth-first search, Dijkstra\'s algorithm, minimumspanning trees), backtracking (n-queens problem, Sudoku solver), branch-and-bound (traveling salesman problem), and algorithmic analysis (time complexity, space complexity).

Reference Books

1 Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, 2009, Open Source.

2 Algorithms, Robert Sedgewick and Kevin Wayne, 2011, Addison-Wesley Professional.

3 Data structures and algorithms in Java, Goodrich, Michael T, 2020, Jojn Wiley and Sons.

4 Cracking the Coding Interview, Gayle Laakmann McDowell, 2015, CareerCup.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTCSSL1V1   **Course Name:** CAMPUS RECRUITMENT: COMMUNICATION SKILLSTRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply knowledge of communication of different types and techniques while analyzing body language and tone to enhance overall communication effectiveness.	3	PO10
CO2	apply active listening and feedback techniques, and analyzing effective participation in group discussions, while exploring roles in teamwork and strategies for managing conflicts, alongside professional communication practices such as writing emails and conducting meetings.	3	PO9

Syllabus

Communication: Basics, significance, types, verbal & non-verbal communication techniques, effective speaking and presentation skills tone and pacing in verbal interactions

Interpersonal skills, listening skills, feedback techniques, group communication and dynamics, group discussion, conflict management in professional communication, E-mail writing, report writing, presentations, interview skills.

Reference Books

1 Business Communication: A Problem-Solving Approach, Louis E. Boone & David L. Kurtz, 3rd Edition, McGraw Hill Education.

2 The Complete Guide to Business School Presentations", Jennifer D. D. McDonald, 2nd Edition, Pearson.

3 Listening: The Forgotten Skill", Geoffrey M. Cohen, 1st Edition, University Press of America.

4 Business Communication: Process and Product", Mary Ellen Guffey & Dana Loewy, 8th Edition, Cengage Learning.

5 Effective Communication Skills" Author, John Adair, 2nd Edition, Pan Macmillan.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTCSSL2V2   **Course Name:** CAMPUS RECRUITMENT: SOFT SKILLS TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	applyi and practice empathy, critical thinking, problem-solving, decision-making, effective communication, and interpersonal skills through real-life scenarios and interactive activities.	3	PO10
CO2	apply group discussion techniques, interview skills, and mock interviews through practical exercises, encouraging learners to practice and refine these skills in realisticsettings.	3	PO9
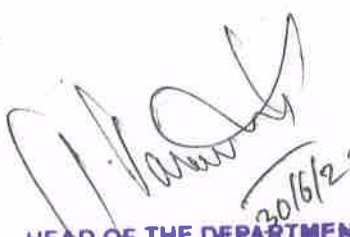
Syllabus

Critical thinking, problem soving, decision making, communication skills, interpersonal skills Grooming,

group discussions, story narrations, interview skills, mock interviews

Reference Books

1. Personality Development and Soft Skills", Barun K. Mitra, 2nd Edition, Oxford University Press.

2. Communication Skills for Engineers", C. Muralikrishna & Sunita Mishra, 1st Edition, Pearson Education.

3. Developing Soft Skills", Robert L. Katz, 1st Edition, McGraw Hill Education.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTINDL1V1   **Course Name:** CAMPUS RECRUITMENT: INDUSTRY-SPECIFIC TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Demonstrate knowledge of industry-specific practices and standards relevant to their field of study through practical exposure and engagement in real-world projects.	3	PO9, PO10
CO2	Develop foundational technical skills by applying theoretical concepts in hands-on tasks, enabling them to contribute effectively in a professional environment.	3	PO9, PO10

Syllabus

overview of various industries, workplace ethics, and safety protocols. Students will also learn about industry-specific tools and technologies through hands-on workshops. Essential project management techniques will be covered, along with the development of soft skills such as communication, teamwork, and time management.

selecting a real-world project that allows them to apply their knowledge and skills collaboratively. presentation of project outcomes, demonstrate understanding of industry practices and work effectively in teams.

Reference Books

1. Engineering Management: Challenges in the New Millennium, C. M. Chang, 2007, Cengage Learning.

2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Eric Ries, 2011, Crown Business.

3. Project Management for Engineering and Technology, John M. Nicholas and Herman Steyn, 2017, Taylor & Francis.

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Course Code: CRTINDL2V2   **Course Name:** CAMPUS RECRUITMENT: INDUSTRY-SPECIFIC TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Exhibit advanced problem-solving abilities by analyzing complex industry challenges and proposing innovative solutions based on their training experiences.	3	PO9, PO10
CO2	Enhance professional communication skills by effectively presenting technical information and collaborating with industry professionals, demonstrating an understanding of workplace dynamics.	3	PO9, PO10
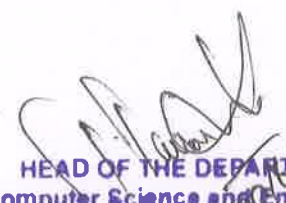
Syllabus

advanced industry practices and technical problem-solving. Key topics include current industry trends and innovations, quality assurance processes, and an understanding of regulatory requirements. Students will analyze real-world challenges through case studies and learn innovative solution development techniques, utilizing data analysis tools for informed decision-making.

professional communication and networking strategies, including effective presentation skills and writing technical reports. In the capstone project, students will identify and work on a complex industry-related project in collaboration with professionals, culminating in a final presentation to stakeholders to showcase their findings and solutions.

Reference Books

1   Quality Control and Industrial Statistics, Acheson J. Duncan, 1986, Duxbury Press.

2   Technical Communication, John M. Lannon and Laura J. Gurak, 2017, Pearson.

3   Problem Solving: A Complete Guide, John M. Carroll, 2005, Springer.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTTOLL1V1 **Course Name:** CAMPUS RECRUITMENT: TOOL BASED TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply foundational knowledge of various software tools to perform basic tasks and create simple projects	3	PO1, PO2, PO5
CO2	Apply digital tools to create professional-quality content and presentations.	3	PO1, PO2, PO5
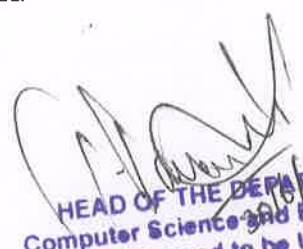
Syllabus

Productivity Tools: This module will introduce students to essential productivity tools like Microsoft Office Suite (Word, Excel, PowerPoint), Google Workspace (Docs, Sheets, Slides), and project management tools (Asana, Trello). Students will learn to use these tools efficiently for tasks such as document creation, data analysis, presentations, and project planning.

Communication Tools: This module will cover communication tools like email, social media platforms (LinkedIn, Twitter), video conferencing software (Zoom, Microsoft Teams), and collaboration tools (Slack, Google Chat). Students will learn effective communication strategies and best practices for using these tools professionally.

Reference Books

1. Microsoft Office 365: In Practice, Randy Nordell, 2021, McGraw-Hill Education.

2. Mastering Collaboration: Make Working Together Less Painful and More Productive, Gretchen Anderson, 2019, O'Reilly Media.

3. The Definitive Guide to Google Workspace, Scott La Counte, 2021, ClydeBank Media LLC.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTTOLL2V2   **Course Name:** CAMPUS RECRUITMENT: TOOL BASED TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Utilize advanced features of software tools to create complex and customized digital projects for professional applications.	3	PO5, PO9, PO10
CO2	Critically evaluate and apply specialized digital tools to solve real-world problems and improve workflow efficiency.	3	PO5, PO9, PO10
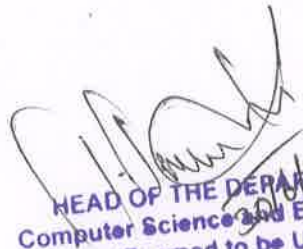
Syllabus

project management tools like Microsoft Project and Trello, advanced document and multimedia tools such as PowerPoint and Adobe Photoshop, and customization techniques using APIs and automation. Students will explore the integration of multiple tools for industry-specific applications like data analytics, design, and content creation.

data management with Excel and Power BI, process automation with tools like Zapier, and streamlining workflows in remote environments. Students will engage in hands-on projects, case studies, and a capstone project to apply digital tools in solving practical challenges.

Reference Books

1   Mastering Microsoft Project 2019, Cindy M. Lewis, 2019, Sybex (Wiley).

2   Adobe Photoshop Classroom in a Book, Andrew Faulkner & Conrad Chavez, 2020, Adobe Press.

3   Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking, Foster Provost & Tom Fawcett, 2020, O'Reilly Media.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTVQRL1V1   **Course Name:** CAMPUS RECRUITMENT: VERBAL APTITUDE TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply and practice grammatical concepts like sentence formation, identifying odd words, using one-word substitutions, while enhancing understanding of idioms, phrases, spellings, and structures.	3	PO10
CO2	apply concepts like paragraph formation, sentence completion, reading comprehension, sentence correction, and correcting jumbled sentences, while enhancing word selection and sentence structure accuracy.	3	PO10
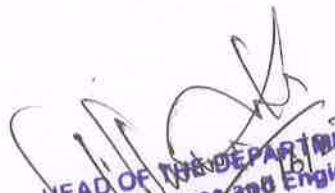
Syllabus

Synonyms, Antonyms, odd words, parts of speech, idioms and phrases, one word substitutions, odd words, formation of sentences

sentence completion, sentence correction, jumbled sentences, paragraph formation, reading comprehension, andsentence selection

Reference Books

1   The Pearson Guide to Verbal Ability and Logical Reasoning for the CAT", Nishit K. Sinha, 2nd Edition, Pearson.

2   Objective General English", S.P. Bakshi, 3rd Edition, Arihant Publications.

3   English Grammar in Use", Raymond Murphy, 5th Edition, Cambridge University Press.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTVQRL2V2 **Course Name:** CAMPUS CAMPUS RECRUITMENT: QUANTITATIVE APTITUDE TRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply principles of quantitative techniques to solve problems on Simple Equations, Simple & Compound Interest etc	3	PO9, PO10
CO2	Apply principles of quantitative techniques to solve problems on Divisibility, Functions, Surds & Indices etc	3	PO9, PO10
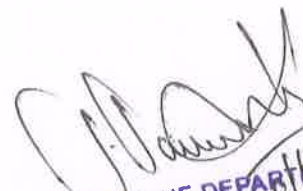
Syllabus

Simple Equations, Problem on Ages, Ratio & Proportion, Variation& Partnership, Percentages, Profit, Loss& Discounts,Simple & Compound Interest, Averages & Allegations or Mixtures

Numbers, Divisibility, Decimal Fractions, LCM & HCF, Simplification, Sequence, Series & Progressions, Linear Algebra, Quadratic Equations & Inequalities, Theory of Equations. Sets, Relations & Functions, Surds & Indices, Logarithms

Reference Books

1   Quantitative Aptitude by R.S. Agarwal, SCHAND Publications, R.S. Agarwal, 2021, SCHAND Publications.

2   A Modern Approach to Verbal Reasoning by R.S. Agarwal, SCHAND Publications, R.S. Agarwal, 2021, SCHAND Publications.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: CRTVQRL3V3   **Course Name:** CAMPUS RECRUITMENT: REASONING APTITUDETRAINING

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

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply principles of deductive logic to solve problems on syllogisms, Venn diagrams,etc	3	PO9, PO10
CO2	Apply principles of inductive logic to solve problems on assumptions and conclusions	3	PO9, PO10
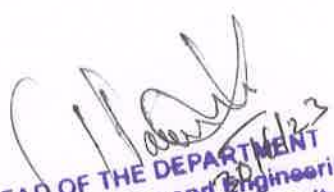
Syllabus

Syllogism, Number& letter series, Number, letter & word Analogy, Odd man out, coding & decoding, Cubes & Dice, Logical Venn Diagrams

Statements & conclusions, statements & Arguments (Critical Reasoning), statements & Assumptions, logical connectives,Binary logic

Reference Books

1   A Modern Approach to Verbal Reasoning, R.S. Agarwal, 2022, SCHAND Publications.

2   Logical Reasoning for CAT, Arun Sharma, 2021, McGraw Hills.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 22UC0021   **Course Name:** SOCIAL IMMERSIVE LEARNING-1

L-T-P-S: 0-0-0-4   **Credits:** 1   **Prerequisite:** Nil
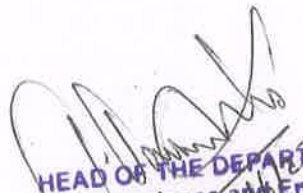
Course outcome:

CO#	CO Description	PO/PSO	BTL
CO1	Extension Activities and Social Outreach activities (ESO)	PO3,PO6,PO10	3
CO2	Technology Clubs (TEC)	PO3,PO5,PO8	3
CO3	Liberal arts, creative arts and hobby clubs (LCH)	PO9,PO12	3
CO4	Innovation, Incubation & Entrepreneurship (IIE)	PO3,PO11,PO12	3
CO5	Health & Well Being (HWB)	PO6,PO7	3

Syllabus :SOCIAL IMMERSIVE LEARNING KL's guide for Social, Experiential & Informal learning

Text Books :SOCIAL IMMERSIVE LEARNING KL's guide for Social, Experiential & Informal learning

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 22UC0022　　　　　**Course Name:** SOCIAL IMMERSIVE LEARNING-2

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

Course outcome:

CO#	CO Description	PO/PSO	BTL
CO1	Extension Activities and Social Out reach activities	PO1,PO2	3
CO2	Technology Clubs	PO3,PO4	3
CO3	Liberal arts creative arts and hobby clabs	PO5,PO6	3
CO4	Innovation,incubation&Enterprenecurship	PO7,PO8,PO9	4
CO5	Health & Well Being (HWB)	PO10,PO11,PO12	4

Syllabus :SOCIAL IMMERSIVE LEARNING KL's guide for Social, Experiential & Informal learning

Text Books :SOCIAL IMMERSIVE LEARNING KL's guide for Social, Experiential & Informal learning

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 22UC0023   **Course Name:** SOCIAL IMMERSIVE LEARNING-3

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

Course outcome:

CO#	CO Description	PO/PSO	BTL
CO1	Extension Activities and Social Out reach activities	PO1,PO2	3
CO2	Technology Clubs	PO3,PO4	3
CO3	Liberal arts creative arts and hobby clabs	PO5,PO6	3
CO4	Innovation,incubation&Enterprenecurship	PO7,PO8,PO9	4
CO5	Health & Well Being (HWB)	PO10,PO11,PO12	4

Syllabus :SOCIAL IMMERSIVE LEARNING KL's guide for Social, Experiential & Informal learning

Text Books :SOCIAL IMMERSIVE LEARNING KL's guide for Social, Experiential & Informal learning

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 22UC0024   **Course Name:** SOCIAL IMMERSIVE LEARNING-4

L-T-P-S: 0-0-0-4   **Credits: 1**   **Prerequisite:** Nil
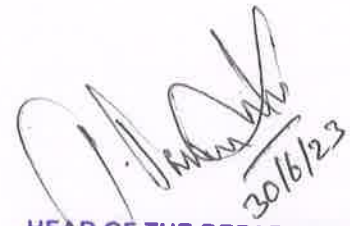
Course outcome:

CO#	CO Description	PO/PSO	BTL
CO1	Extension Activities and Social Out reach activities	PO1,PO2	3
CO2	Technology Clubs	PO3,PO4	3
CO3	Liberal arts creative arts and hobby clabs	PO5,PO6	3
CO4	Innovation,incubation&Enterprenecurship	PO7,PO8,PO9	4
CO5	Health & Well Being (HWB)	PO10,PO11,PO12	4

Syllabus : Social Immersive Learning Kl's Guide For Social, Experiential & Informal Learning

Text Books : Social Immersive Learning KI's Guide For Social, Experiential & Informal Learning

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS5101   **Course Name:** Object Oriented Programming **(COOP)**

L-T-P-S: 2-0-2-4   **Credits:** 4   **Prerequisite:** Nil
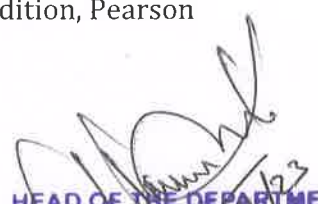
Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand basic Concepts of OOP, fundamentals of Java and apply the concepts of classes and objects through Javalanguage	2	PSO2,PO1,PO2
CO2	Apply constructors, Overloading, parameter passing in Java Programming	3	PSO2,PO1,PO2
CO3	Apply access control, Inheritance, Packages	3	PSO2,PO1,PO2
CO4	Apply Interfaces, Exception Handling	3	PO2,PSO2,PO1
CO5	Analyze object-oriented programming concepts to write programs	4	PSO2,PO1,PO2

Syllabus : Introduction: Basic concepts of Java, Fundamentals of Java, Object-Oriented Programming, OOP Principles, Encapsulation, Inheritance and Polymorphism, Java as an OOP, Internet Enabled language, The Byte code, Data types, Variables, Arrays, Operators, Control Statements, Type Conversion and Casting. Classes and Objects: Concepts of classes and objects, declaring objects, Assigning Object Reference Variables, Methods, Constructors, Access Control, Overloading methods. Inheritance: Inheritance: Inheritance Basics, member access rules, Usage of super and final keyword, forms of inheritance, Method Overriding, Access Modifiers. Abstract Classes, Packages and Interfaces: Packages, Class path, importing packages, differences between classes and Interfaces, Implementing and applying Interface. Exception Handling: Exception Handling Fundamentals. Multi-threading & Parallel Programming: Introduction to Multithreading and Parallel Programming, Thread Concepts & its States, Creating Tasks and threads, Thread Classes, Thread Pools, Thread Synchronization, Cooperation among Threads. JDBC: API, Components, Architecture (2 Tier & 3 Tier), Divers & Its Types, Packages for JDBC Connection, Steps to connect to Databases.

Text Books : Herbert Schildt, "The Complete Reference Java", 7th edition TMH. Timothy A. Budd, "An Introduction to Object-Oriented Programming", 3/e, Pearson, 2008.

Reference Books : Deitel & Deitel, "'Java – How to program", 6th edition, PHI, 2007 Cay. S.Horstmann and Gary Cornell "Core Java 2, Vol 1, Fundamentals", Seventh Edition, Pearson Education.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS51F1   **Course Name:** ENTERPRISE DEVELOPMENT PROGRAMMING

L-T-P-S: 2-0-2-0   **Credits:** 3   **Prerequisite:** Nil

Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Apply the concepts of XML, XSLT and JDBC	3	PSO1, PO2
CO2	Develop Enterprise Application using Servlet and JSP	3	PO3, PSO1
CO3	Create Enterprise Application using JSF and build Business Logic using EJB, JNDI and Session Beans	3	PSO1, PO2
CO4	Implement the concept of JPA, JAX-RS and JMS to build Web - Services. Implement the concepts of XML, XSLT, Servlets, JSP, EJB, JPA, JAX-RS and JMS to build large scale and distributable applications	4	PSO1, PO2
CO5	To experiment the concept of Enterprise Programming with real world problems	4	PSO2, PO3

Syllabus : XML Features and attributes – XML validation: DTD, XML Schema, XSD – XSLT - XSL Style Sheet to the XML Document – JDBC - JDBC CRUD Operations: Statement and PreparedStatement – Callable Statements – JDBC Transaction Management. Servlets – Generic Servlet Class – HttpServlet - Config and Context – ServletRequest and Response Introduction to JSP – Scripting Elements – JSP Implicit Objects and Directives – Action Tags – JSP Exception – MVC – Pagination in JSP - CRUD Operations in JSP. Java EE Comparing Java EE and Java SE – Packaging and Deploying - Java Server Faces (JSF): Introduction, Tag Libraries, Input Validations, Page Navigation – Java Naming and Directory Interface (JNDI) . Session Beans: EJB 3x Architecture - Session Beans: Introduction to EJB 3x Architecture - Converting a POJO to an EJB – Working with Stateless and Stateful Session Bean. Java Persistence API – Managing Entity Relationships - JAX-RS – Create and Consuming REST Service. Implement the Feature Rich Project with the Concepts - Hibernate, Spring, Spring Boot, Spring Cloud and Microservices

Text Books :

1. XML: The Complete Reference (Complete Reference Series), Heather Williamson,McGraw Hill Education India,2nd Edition
2. Java Server Programming Java EE7 Kogent Learning Solutions Inc. ,Dreamtech Press Reprint 2016
3. Advanced Java Programming, Uttam K. Roy, Oxford University Press,Reprint 2015

Reference Books :

1. J2EE: The Complete Reference, McGraw Hill Education (India) Private Limited, Jim Keogh.
2. Beginning Java EE 6 Platform with GlassFish, Apress, Second Edition, Antonio Goncalves.
3.Webtechnologies: Concepts, Methodologies Tools and Applications, Information Science Reference, 4th Edition, Arthur Tatnall.
4.Jim Rigsbee, Richard Allred, Zachary Gutterman, Nancy K.A.N, Red Hat Application Development Programming in Java EE,3rd Edition, 2022

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS52F2   **Course Name:** FULL STACK DEVELOPMENT USING JAVA

L-T-P-S: 2-0-2-0   **Credits:** 3   **Prerequisite:** Nil

Course Outcomes

CO#	CO Description	BTL	PO/PSO Mapping
CO1	Apply the java full stack concepts on Hibernate, Spring DI, Spring IoC	3	PSO1, PO3, PO5
CO2	Apply the java full stack concepts on Spring MVC, Spring JDBC and Hiberanate	3	PSO1, PO3, PO5
CO3	Apply the java full stack concepts on Spring Boot MVC, google maps, 2 step verification, sending mail and sms, captcha generation	3	PSO1, PO3, PO5
CO4	Apply the java full stack concepts on Spring Cloud and Spring Microservices.	3	PO3, PO5
CO5	Apply the Java Concepts and doing practicals on like Hibernate, Spring, Spring Boot, Spring Cloud and Microservices	3	PO3, PO5

Syllabus : Introduction to Maven, JPA, Basic concepts of ORM and its advantages - JDBC Vs Hibernate. Hibernate Architecture - Hibernate Query Language (HQL) - Hibernate Criteria Query Language (HCQL) - Generator Classes in Hibernate - Hibernate Inheritance Mapping - Spring and its advantages. Spring Architecture and modules - Dependency Injection (Setter DI, Constructor DI and Interface DI) - DI with Primitive and Non Primitive Data types - Autowiring using Dependency Injection and IoC. Spring DAO with JDBC (Jdbc Template) - Spring DAO with Hibernate - Illustrate about MVC 2-Tier Architecture - Spring MVC based Web Application using Hibernate framework - Spring MVC Pagination. Spring Boot and Spring Boot Starter ProjectSending MAIL - Dependency Injection and Inversion of Control in Spring Boot - Spring Boot Web Application MVC - Spring Boot with Rest Controller - Spring Boot with DAO to perform CRUD Operations - Spring Boot with Restful Web Services - Sending SMS - Integrating Google Maps - Gmail based 2 way Verification - Captcha Generation and Authentication. Spring Cloud, Cloud Architecture. Features, Components and Its advantages - Spring Cloud Config. Setup version control repository. Integration with repository - Client-Side Load Balancer and Spring Cloud API Gateway - Microservice based application Architecture components and Patterns. - User Interfaces integration with Micro Services. Challenges in Micro Services implementation - Microservices with Spring Cloud - Spring security with JSON Web Token (JWT). Implement the practicals - Hibernate, Spring, Spring Boot, Spring Cloud and Microservices

Text Books :
1. Web Technologies: Concepts, Methodologies, Tools, and Applications, Arthur Tatnall ,4th edition,"Information Science Reference"
2. Microservices with Spring Boot and Spring Cloud: Build resilient and scalable microservices using Spring Cloud, Istio and Kubernetes,2nd Edition,Packet Publishing LTD
3. Spring and Hibernate,Santosh Kumar k,2009,Tata McGraw-Hill Education

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Reference Books :

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

2 Microservices with Spring Boot and Spring Cloud: Build resilient and scalable microservices using Spring Cloud Istio and Kubernetes Packet Publishing LTD 2nd Edition

3 Spring and Hibernate Santosh Kumar k Tata McGraw-Hill Education 2009

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

5 Java EE 8 Application Development David R. Heffelfinger. 1st edition

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 21CS3120R **Course Name:** MULTIMODAL INFORMATION PROCESSING (MMIP)

L-T-P-S: 2-0-2-0   **Credits:** 3   **Prerequisite:** Nil

Course Outcomes:

CO#	CO Description	BTL	PO/PSO Mapping
CO1	Utilize the various types of signals, systems and their frequency domain transformation.	3	PO1/PSO1
CO2	Apply the design methodology of different filters and their realizations.	3	PO1, PO3/PSO1
CO3	Examine signal processing approaches for extraction of information present in the natural signals.	4	PO1, PO2/PSO1
CO4	Discover machine learning approaches for processing of signals.	4	PO1, PO3 /PSO1
CO5	Examine the signal processing approaches related to transformation, filtering, feature extraction, machine learning for signal processing.	4	PO1, PO2, PO3/PSO1

Syllabus : Signals and Systems: Types of Signals: Analog, deterministic, non-deterministic, random signals, periodic, aperiodic signals, discrete time signals, digital signals. Elementary signals: impulse, unit step, ramp, sinusoidal signal, complex exponential. Systems: impulse response, Convolution, Difference Equations for representation of systems, properties of systems, linearity, superposition principle, shift invariance, causality, stability. Fourier series for periodic signals, Fourier transforms, properties of Fourier Transform, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transforms (DFT), Fast Fourier Transforms (FFT), Phase and group delays, Sampling and Quantization. Transforms and Filter Design: Z-Transforms, Region of convergence (ROC), Properties of Z-Transforms, Causality and stability of filters, Finite Impulse Response (FIR), Infinite Impulse Response (IIR), Pole-Zero representation, Digital filter design: FIR filter design by Fourier Transform, Linear Phase Characteristics, low pass, high pass, band pass and band reject filters, IIR filter design by coefficient calculation, Frequency response of filters, All pass filters, Hilbert Transform, Filter realizations. 1-Dimensional and 2-Dimensional Signal Processing: Windowing techniques: Rectangular, Bartlett, Hamming, Hanning, Blackwell, Kaisar. Shorttime analysis: Short Time Fourier Transform (STFT) of Speech signals, Enhancement (denoising) techniques such as Mean, Median, and Moving average filter for images. Feature extraction techniques: MelFrequency Cepstral Coefficients (MFCC), Linear Prediction Coefficients (LPC) for speech, Audio Reconstruction using Analysis by Synthesis approach. Wavelet based image decomposition, Image Reconstruction using Analysis by Synthesis approach. Machine Learning approaches for building Signal Processing based Intelligent Systems: Pre-processing, feature extraction and classification using Convolutional Neural Networks (CNN) and Deep Neural Networks (DNN). Data augmentation using Generative Adversarial Networks (GAN), synthesis of signals using Recurrent Neural Network (RNN). (Laboratory Experiments Component) Apply above approaches in laboratory experiments related to transformation, filtering, feature extraction, machine learning for information processing.

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Text Books :

1 Discrete Time Signal Processing, Alan V. Oppenheim and R. W. Schafer, 2nd, Prentice Hall, MIT Press, 1999

2 Signals and Systems, Simon Haykin and Barry Van Veen, 2nd, Wiley, 2007

3 Digital Signal Processing: Fundamentals and Applications, LiTan, 1st, Academic Press, 2008

4 Deep Learning, Ian Goodfellow, Yoshua Bengio, and Aaron Courville 1st, MIT Press, 2021

Reference Books :

1 Digital Signal Processing: Principles, Algorithms, and Applications, J. G. Proakis and M G , Monolakis, 4th, Prentice Hall, 2007

2 Discrete-Time Speech Signal Processing: Principles and Practice, Thomas F. Quatieri, 1st, Pearson Prentice Hall, 2001

3 A Practical Guide to Wavelet Analysis, Christopher Torrence and Gilbert P. Compo, 1st, Bulletin of the American Meteorological Society, 1998

4 Digital Image Processing, R. Gonzalez and R. Woods, 4th, Pearson, 2018

5 Digital Signal Processing Using MATLAB, Vinay K. Ingle and John G. Proakis, 3rd, Cengage Learning, 2010

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23UC0019   **Course Name:** ESSENCE OF INDIAN KNOWLEDGE TRADITION

L-T-P-S: 2-0-0-0   **Credits:** 2   **Prerequisite:** Nil
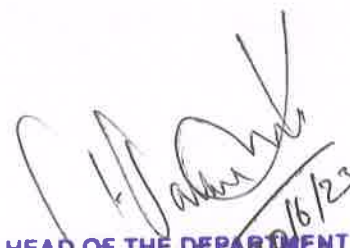
COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	To understand the concepts of Indian traditional knowledge	PO1,PSO1	2
CO2	To develop the outstanding knowledge on Indian administration	PO1,PSO2	2
CO3	To understand the importance of traditional culture and knowledge	PO1,PSO2	2
CO4	To know the impact of western culture on Indian society	PO1	2

Syllabus : Module 1 Indian Knowledge System – An Introduction Number System and Units of Measurements Mathematics, Astronomy Concept of Culture- Culture and Civilization- General Characteristics of Indian culture Importance of Culture-Unity in Diversity Module 2 Evolution of Indian Administration Arthashastra and Kautilya Sapthanga theory Traditions and Culture through the Ages Module 3 Fundamental Unity of Harappa and Vedic Culture Jainism and Buddhism Mauryan Period Gupta Period-Pallavas and Cholas, Vijayanagar Period-Art Architecture and Literature Module 4 Rise of the West and its impact on India- Social and Religious reformers in the 18th and 19th centuries- Press and growth of modern Indian literature- Rise of Indian Cinema-Indian Independence

Reference Books :

1 Indian heritage, culture,Art and Culture Madhukumar Bhagat GKP Publishers 2019
2 Traditional Knowledge System in India, Amit Jha, Springer 2009.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23UC0026   **Course Name:** HUMAN VALUES GENDER EQUITY AND PROFESSIONAL ETHICS

L-T-P-S: 2-0-0-0   **Credits:** 2   **Prerequisite:** Nil

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	The student will understand about value, human values and develop right understanding of human values in personal and professional life.	PO1,PO10	2
CO2	The student will understand about self, others and human-human relationship in individual, family, society and nature.	PO2,PO10,PO12	2
CO3	Student will apply the acquired knowledge in the dimensions of the biological, sociological, psychological and legal aspects of gender equality at all four orders of living.	PO9,PO12	3
CO4	Student will be able to analyze how the human values and gender equality will be helping individual in maintaining professional ethics for harmony at all orders of living	PO8,PO10,PO12	4

Syllabus :

Unit 1: Introduction to Human Values: Understanding Value,Self-exploration as the Process for identifying Value, Continuous Happiness and Prosperity - The Basic Human Aspirations, Right Understanding, Relationship and Physical Facilities, Happiness and Prosperity –Current Scenario, Method to fulfil the Basic Human Aspirations; Harmony in the Human Being: Understanding the Human Being as Co-existence ofSelf ('I') and Body, Discriminating between the Needs of the Self and the Body, The Body as an Instrument of 'I', Understand Harmony in the Self('I'), Harmony of the Self ('I') with the Body.

Unit 2 : Understanding Harmony in the Family and Society: The Basic Unit of Human Interaction, Values in Human-to-Human Relationships, Vision for the Universal Human Order; Harmony in the Nature (Existence):Understand Harmony in the Nature, Inter-connectedness, Self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing 'Existence is Co-existence' at All Levels, The Holistic Perception of Harmony in Existence.

Unit 3: What is Gender, and Why Should We Study It?: Gender Equality Milestones, The Context Today; Socialisation: Making Women, Making Men: Preparing for Womanhood, Preparing for Manhood, Different Masculinities, Unrecognized and Unaccounted For, Wage Differentials between Women and Men, Women in the Working Environment;

Unit 4: Being Boy: A Village Boyhood, School Days, College Styles, Ek Ladki Ko Dekha Toh; Sexual Harassment: SAY NO!: Sexual Harassment, Not 'Eve-Teasing', Consent and Relationships, Coping with Everyday Harassment; Becoming Man: A Dangerous Model of Masculinity, Changing Masculinities, Imprints of Masculinity, Mothers, Fathers and Family.

Unit 5: Implications of the Values and Gender Equality – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models - Typical Case Studies, Strategies for Transition towards Value-based Life, Women in the Working Environment and Profession

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Text Books :

1 A Foundation Course in Human Values and Professional Ethics. First Edition, Gaur, R. R., Sangal,   R., &Bagaria, G. P. Excel Books 2010

2   "Towards A World of Equals ABilingual Textbook on Gender", Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu Telugu Akademi, Hyderabad, 2015

Reference Books :

1. Small is beautiful: A study of Economics as if People Mattered, E F Schumacher Blond & Briggs, Britain 1973

2. How the Other Half Dies, Sussan George, Penguin press, reprinted 1986, 1991.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23UC0018   **Course Name:** FUNDAMENTALS OF MATHEMATICS

L-T-P-S: 3-0-0-0   **Credits:** 3   **Prerequisite:** Nil

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Apply matrix theory to solve system of linear equations.	PO1	3
CO2	Apply trigonometric identities to solve trigonometric equations and also predict the data by using concepts combinatorics.	PO1	3
CO3	Apply calculus concept to determine areas and volumes and also solve differential equations.	PO1	3
CO4	Apply statistical methods to find central tendency of the given data and also find directional ratios by vector algebra concepts.	PO1	3

Syllabus : Matrix Algebra: Concepts, Notation, Equality, Types of Matrices- zero and identity matrix, transpose of a Matrix, symmetric and skew symmetric Matrices. Operations of Matrices- Addition, Subtraction, Multiplication. Determinant, adjoint and inverse of a square matrix. Solving system of linear equations in two or three variables -Matrix Method and Cramer's Rule. Trigonometry: Generation of angles, quadrants, measurement of angles, radians, Trigonometric ratios and functions. Inverse trigonometric functions. Complex Numbers: Complex Numbers and its properties Permutations and Combinations: Fundamental Principle of counting. Applications on Permutations and Combinations. Differential and Integral Calculus: Derivatives of polynomials and exponential functions, product and quotient rules. derivatives of trigonometric functions and chain rule, Derivatives of logarithmic functions. Basic problems on Integrations. Differential Equations: Definition, Formation of first order differential equation, equations reduced by separation of variables and linear form, Integrating factor. Vector Algebra: Introduction, Magnitude, Direction Ratios, Types of vectors, operations of vectors and its properties with applications. Statistics: Measures of Central Tendency, mean, mode, median, Standard deviation, variance

Text Books :

1. Higher Engineering Mathematics, By Dr. B.S. Grewal. Khanna Publisher. New Delhi, 2021.
2. Higher Engineering Mathematics, By John Bird. Routledge. London, 8th Edition ,2017
3. Mathematical Statistics, J. N. Kapur & H. C. Saxena, S. Chand, 1986, Edition 12.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CSB3101R   **Course Name:** CRYPT ANALYSIS & CYBER DEFENSE (R)

L-T-P-S: 3-0-2-4   **Credits:** 5   **Prerequisite:** Nil

COURSE OUTCOMES (COs):
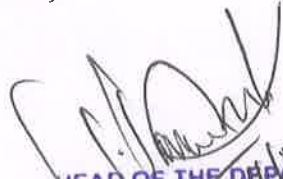
CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Apply Classical Encryption Techniques and Symmetric Encryption algorithms to convert a given Plaintext to Cipher text.	PO1, PO2, PSO2	3
CO2	Apply RC4 Algorithm, Block Cipher Modes of Operation and Multiple Encryption for given plaintext.	PO1, PO2, PSO2	3
CO3	Apply Public key Crypto Systems to ensure Secure communication of data.	PO1, PO2, PSO2	3
CO4	Apply statistical methods to find central tendency of the given data and also find directional ratios by vector algebra concepts.	PO1, PO2, PSO2	3
CO5	Implement security goals like Confidentiality, Integrity, Authentication algorithms.	PO1, PO3, PSO2	3
CO6	Analyze social engineering, Ethical Hacking & Incident Responses using various tools..	PO1, PO3, PSO2	3

Syllabus

Introduction to Security: Security Concepts, Security Attacks, A Security Model, Security , Services and Mechanisms, Antivirus bypassing, Password Attacks and Web browser exploitation. Block Ciphers: DES, DES Example, Strength of DES, Differential and Linear Cryptanalysis., AES: Finite Field Arithmetic, AES Structure, AES Transformation Functions, AES Example. Multiple Encryption and Triple DES. Modes of Operation. Pseudorandom Number Generation: Principles and Pseudorandom Number, Generators, Pseudorandom Number Generation using a Block Cipher, Stream Ciphers. Stream Ciphers: RC4. Public-key Cryptography: RSA algorithm, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic, Elliptic Curve Cryptography. Cryptographic. Hash Functions: Applications of Cryptographic Hash functions, Two Simple Hash Functions, Requirements and Security, SHA 512, MD5..

Reference Books

1 Cryptography and Network Security Principles and Practice, William stallings, 5th Edition, 2010, Pearson.
2 Applied Cryptography: Protocols, Algorthms, and Source Code in C, Bruce Schneier, Second Edition, 2015, John Wiley & Sons.
3 Cyber Security Incident Management Guide, Gerard Johansen, Third Edition, 2017, Packt Publishing Ltd.
4 Applied Cryptography for Cyber Security and Defense: Information Encryption and Cyphering, Hamid R. Nemati and Li Yang, Second Edition, 2011, IGI Global.
5 Cryptography and Network Security, Forouzon B, Indian Edition, 2010, TMH (2010)..

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CEC3101R   **Course Name:** CLOUD INFRASTRUCTURE AND SERVICES (R)

L-T-P-S: 3-0-2-4   **Credits:** 5   **Prerequisite:** OS

COURSE OUTCOMES (COs):
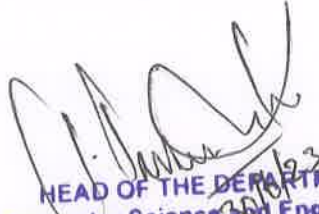
CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Apply the foundation for cloud infrastructure	PO3	3
CO2	Analyze Virtualization, its levels, and real time examples	PO2, PO3, PO4, PO8, PSO1	4
CO3	Apply Public key Crypto Systems to ensure Secure communication of data.	PO2, PO3, PO4, PO8, PSO1	4
CO4	Analyze load balancing, container services and Kubernetes	PO2, PO3, PO4, PO8, PSO1, PSO2	4
CO5	Analyze hands-On exposure of Cloud infrastructure, virtualization, Load balancing and authentication, and security	PO3, PO4, PSO1	4
CO6	Analyze the Infrastructure related concepts as best practices	PO3, PO4, PSO1	4

Syllabus

Introduction to Cloud Technologies: Introduction to the Cloud Computing, History of cloud computing, Cloud Deployment models, Cloud service options: IaaS, PaaS, and SaaS. Data as a Service, NoSQL as a Service, Comparison of service providers, cloud Architectures: NIST cloud reference Architecture and ITU-T, cloud reference Architecture. Virtualization, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Hardware and OS level virtualization techniques, Pros and cons of virtualization, Virtualization technology examples: Xen- para virtualization, VMware: full virtualization, Microsoft Hyper-V Load Balancing, Types of Load Balancing, Risk Factors in Load Balancing, Auto scaling -Docker, Containers and Kubernetes - Building own container based on micro services - Docker containers -Manage multiple Kubernetes Cluster - Multi Cloud deployments Cloud Security Introduction, Infrastructure Security, Network level security, Host level security, Application level security, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud

Reference Books:

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

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

3 Handbook of Cloud Computing , Borko Furht, Armando Escalante , 2010, Springer .

4 Cloud Infrastructure Service A Complete Guide - 2019 Edition , Gerardus Blokdyk, 2019, Paperback.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 22EC2106   **Course Name:** PROCESSORS & CONTROLLERS

L-T-P-S: 3-0-2-2   **Credits:** 4.5   **Prerequisite:** NIL

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Apply the architectural features of CISC type of General-purpose processor Intel 8086.	PO2,PO7,PSO1	3
CO2	Apply the architectural features of CISC type of microcontroller Intel 8051 Microcontroller.	PSO1,PO2,PO7	3
CO3	Analyze the Interfacing of Peripherals to the 8051 Microcontroller through programming using MCU8051 IDE.	PSO1,PO5,PO7	4
CO4	Apply the basic architecture concepts of ARM - CORTEX STM-32 Microcontroller	PSO1,PO7,PO2	3
CO5	Analyze the programming & interfacing of 8051 and 8086 using the hardware/software tool.	PSO1,PO2,PO5	4
CO6	Analyze the programming & interfacing of 8051 using the proteus and keil tool.	PSO1,PO2,PO5	4

Syllabus :8086-Microprocessor: Basics of processor, Introduction, and History of Processors, pinout, Architecture, addressing modes, Instruction set, Timing Diagram for Minimum and Maximum mode, ALU programming, and examples. 8051-Microcontroller: Architecture, Pin Diagram, addressing modes, Instruction sets, Programs involving Arithmetic and Logical Instructions, Timers/Counters, Interrupts & Serial port Assembly level programming. 8051-Microcontroller Applications: Peripherals and Input Output with 8051 Microcontroller - Timers and Interfacing Seven Segment, LCD, ADC, DAC & Motor Control, Keypad). Case studies: Traffic signal, Home automation & Industrial applications. PIC & ARM Microcontroller: Architecture & features of PIC, Architecture of ARM Microcontroller, ARM series of microcontrollers, Evolution of ARM microcontrollers, ARM features, Basic concepts of pipeline processing, ARM processor modes and registers, Special registers and exception handling, ARM and Thumb modes of execution.

Text Books :A K Ray and K M Bhurchandi "Advanced Microprocessors and Peripherals " The McGraw Companies,2nd Edition,2006 Mazidi & McKinley "The 8051 Micro controller and Embedded systems: using assembles and C, 2nd edition, 2007. Embedded Systems - Raj –Kamal, Second Edition TMH, 2009

Reference Books : The 8051 Microcontroller. ARCHITECTURE, PROGRAMMING, and APPLICATIONS. Kenneth J. Ayala. Western CarolinaUniversity.WEST PUBLISHING COMPANY. Practical Microcontroller Engineering with ARM Technology by Ying Bai " "Microprocessor and Interfacing", Company,2006. ", D.V.Hall, 2nd Edition, Tata McGraw Hill Publishing

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS2249F **Course Name:** WEB 3 DEVELOPMENT FOR BOTH PRIVATE AND PUBLIC BLOCKCHAIN (F)

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

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Apply the architectural features of CISC type of General-purpose processor Intel 8086.	PO2,PO7,PSO1	3
CO2	Apply the architectural features of CISC type of microcontroller Intel 8051 Microcontroller.	PSO1,PO2,PO7	3
CO3	Analyze the Interfacing of Peripherals to the 8051 Microcontroller through programming using MCU8051 IDE.	PSO1,PO5,PO7	4
CO4	Apply the basic architecture concepts of ARM - CORTEX STM-32 Microcontroller	PSO1,PO7,PO2	3
CO5	Analyze the programming & interfacing of 8051 and 8086 using the hardware/software tool.	PSO1,PO2,PO5	4
CO6	Analyze the programming & interfacing of 8051 using the proteus and keil tool.	PSO1,PO2,PO5	4

Syllabus

Introduction to Web 3 Development : Understanding Web 3.0 and its implications, Comparison between centralized, decentralized, and distributed systems Overview of blockchain technology and its core components. Smart Contract Development : Introduction to smart contracts, Solidity programming language for Ethereum smart contracts, Writing, testing, and deploying smart contracts. Ethereum Development : Setting up a development environment for Ethereum, Building decentralized applications (DApps) on Ethereum Interacting with Ethereum nodes using web3.js or ethers.js, Integration with Ethereum wallets and MetaMask. Hyperledger Fabric : Introduction to Hyperledger Fabric blockchain framework, setting up a Hyperledger Fabric network, Chain code (smart contract) development in Go Lang. Deploying smart contracts on Hyperledger Fabric, Designing and implementing private blockchain networks, Use cases and applications of private blockchains, Privacy, scalability, and permissioning in private blockchains. Decentralized Storage and Identity Management : Introduction to decentralized storage solutions (IPFS, Swarm), Storing and retrieving data securely on decentralized networks Identity management and authentication in Web 3 applications, Implementing decentralized identity solutions (e.g., uPort, Sovrin).Interoperability and Cross-Chain Development : Understanding the need for interoperability between blockchains, Cross-chain communication protocols (e.g., Polkadot, Cosmos),Building cross-chain decentralized applications (dApps), Challenges and opportunities in blockchain interoperability.

Reference Books

1 Mastering Ethereum: Building Smart Contracts and DApps, Andreas M. Antonopoulos and Gavin Wood, 2019, O'Reilly.

2 Introducing Ethereum and Solidity: Foundations of Cryptocurrency and Blockchain Programming for Beginners, Chris Dannen, 2017, Apress.

3 Beginning Ethereum Smart Contracts Programming: With Examples in Python, Solidity, and JavaScript, Wei-Meng Lee, 2019, Apress.

4 Blockchain QuickStart Guide: Explore Cryptography, Cryptocurrency, Distributed Ledger, Hyperledger Fabric, Ethereum, Smart Contracts, and dApps, Dr. Kalpesh Parikh; Amit Johri, 2022, BPB Publications.

5 Hands-On Smart Contract Development with Hyperledger Fabric V2: Building Enterprise Blockchain Applications, Matt Zand, Xun (Brian) Wu, Mark Anthony Morris, 2021, O'Reilly Media.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS2248F   **Course Name:** ANYPOINT PLATFORM DEVELOPMENT: FUNDAMENTALS (F)

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

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Design an application network using API-led connectivity for web service	PO1, PO2, PSO1	2
CO2	Apply Anypoint Platform to discover, design, build, deploy, manage, and govern APIs	PO1, PO2, PSO1	3
CO3	Apply databases, files, SaaS applications, JMS queues for web service	PO3, PO4, PSO1	3
CO4	Apply handle errors techniques, and transform data using DataWeave	PO4, PO5, PSO1	3
CO5	Analye batch data processing using JSON , XML	PO4, PO5, PSO1	3

Syllabus

Fundamental Concept of Anypoint, Introducing application networks and API-led connectivity, Anypoint Studio , Connecting to data , Transforming data , Creating RESTful interfaces manually for Mule applications ,Generating RESTful interfaces automatically using APIkit . Designing APIs Introducing RAML Using API Designer to define APIs with RAML, Anypoint Studio , Connecting to data , Transforming data , Anypoint Studio , Connecting to data , Transforming data , Creating RESTful interfaces manually for Mule applications , Generating RESTful interfaces automatically using APIkit . Building APIs Creating Mule applications with Anypoint Studio, Connecting to data , Transforming data , Anypoint Studio , Connecting to data , Transforming data , Creating RESTful interfaces manually for Mule applications ,Generating RESTful interfaces automatically using APIkit . Deploying and managing APIs Creating Mule applications with Anypoint Studio , Connecting to data , Transforming data , Creating RESTful interfaces manually for Mule applications ,Generating RESTful interfaces automatically using APIkit.

Reference Books:

1 Mulesoft developer, Nanda Nachimuthu 3, kindler2023, Amazon.

2 API recipes with Anypoint platform, Brinda Palmer, Kindle Edition 2023, Amazon.

3 MuleSoft Developer A Complete Guide, Gerardus Blokdyk, 2023, kindle publisher.

4 API Recipes with MuleSoft? Anypoint Platform, WHISHWORKS Editorial Board, kindler2023, Amazon.

5 MuleSoft for Salesforce Developers: A practitioner's guide to deploying MuleSoft APIs and integrations for Salesforce enterprise solutions, Arul Christhuraj Alphonse (Author), Alexandra Martinez (Author), Akshata Sawant (Author) , Kindle Edition2023, Amazon.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS4106   **Course Name:** DISTRIBUTED COMPUTING (R)

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

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Understanding of Distributed Systems Principles	PO1, PO2, PO3	2
CO2	Proficiency in Distributed Computing Technologies	PO1, PO2, PO3	3
CO3	Ability to Design and Implement Distributed Algorithms	PO1, PO2, PO3	3
CO4	Practical Experience with Distributed Systems Development	PO1, PO2, PO3	4

Syllabus

fundamental principles underlying distributed systems, including concepts such as scalability, fault tolerance, consistency, and concurrency distributed computing technologies and frameworks such as Hadoop, Spark, Kubernetes, and MapReduce design and implement distributed algorithms for solving common problems encountered in distributed computing, such as distributed consensus, distributed coordination, and distributed data storage. design, implement, test, and debug distributed systems, gaining insight into real-world challenges

Reference Books:

1 Distributed Systems: Principles and Paradigms, Andrew S. Tanenbaum and Maarten Van Steen, 3rd Edition, Pearson.

2 Distributed Computing: Principles, Algorithms, and Systems, Ajay D. Kshemkalyani and Mukesh Singhal, 1st Edition, Cambridge University Press.

3 Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems, Martin Kleppmann, 1st Edition, O'Reilly Media.

4 Distributed Systems: Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, and Gordon Blair, 5th Edition, Pearson.

5 Scalable Internet Architectures, Theo Schlossnagle, 1st Edition, Sams Publishing

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23MT1002 **Course Name:** DISCRETE STRUCTURES (R)

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

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Apply the knolodge of sets and function to the real world problems and computer problems to analize and draw ven diagrams	PO1	3
CO2	Apply basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional &predicate logic	PO1	3
CO3	Apply the knowledge of counting techniques, Recurrence Relations, Generating functions to solve the real world problems	PO1	3
CO4	Apply graph theory to solving real world structures and their related applications	PO1	3

Syllabus

Basic Discrete Structures: Sets: Sets and Subsets, Power Set, Cartesian Product, Set Operations, Venn Diagram, Inclusion-Exclusion Principle, Computer Representation of Sets. Functions: Basic Concept, Injective and Bijective Functions, Inverse and Composite Functions, Graph of Functions, Functions for Computer Science (Ceiling Function, Floor Function, Boolean Function, Exponential Function) Logic and Proof Methods. Logic: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Negation of Quantified Statements, Proof of quantified statements, Nested Quantifiers, Rules of Inferences, proof methods: Basic Terminologies, Proof Methods (Direct Proof, Indirect Proof, Proof by Contradiction, Proof By Contraposition. Counting The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving Linear recurrence relations with constant coefficients, Divide-and-Conquer algorithm and Recurrence Relation, Particular solution, total solution, Generating functions, Inclusion and Exclusion, Application of Inclusion and exclusion function. Relations: Relations and their Properties, n-array relations and their applications, representing relations, Closure of relations, equivalence of relations, partial orderings. Counting The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving Linear recurrence relations with constant coefficients, Divide-and-Conquer algorithm and Recurrence Relation, Particular solution, total solution, Generating functions, Inclusion and Exclusion, Application of Inclusion and exclusion function. Relations: Relations and their Properties, n-array relations and their applications, representing relations, Closure of relations, equivalence of relations, partial orderings.

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Reference Books

1 Discrete mathematics and its applications, Kenneth H. Rosen, 3, McGraw Hill Publication, 2022..

2 Discrete Mathematical Structures, Bernard Kolman, Robert Busby, Sharon C. Ross, , 6, Pearson Publications, 2015 .

3 Discrete Mathematics for Computer Scientists and Mathematicians, Joe L Mott, Abraham Kandel, Theodore P Baker, 2, Printice Hall of India .

4 Discrete Mathematical Structures with Applications to Computer Science, Tremblay J P and Manohar R, 1, Tata McGraw Hill publishers, .

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 22EC2210R   **Course Name:** NETWORK PROTOCOLS AND SECURITY

L-T-P-S: 3-0-2-0   **Credits: 4**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the knowledge of communication to understand the concepts of physical layerand datalink layer.	3	PO1, PO2, PO3, PSO2
CO2	Analyze various MAC protocols and apply IP addressing concepts to subnet a network.	4	PO2, PO3, PSO2
CO3	Analyze static and dynamic routing algorithms and transport layer protocols.	4	PO2, PO3, PSO2
CO4	Analyze application layer protocols and various cryptographic algorithms.	4	PO2, PO3, PSO2
CO5	Analyze the functionality of the network using different protocols and working of various cryptographic algorithms.	4	PO2, PO5, PSO2

Syllabus

Introduction to Computer networks and Data Link Layer: Use of Computer Networks, Network Hardware, Network software, Reference models: OSI and TCP/IP, Physical Layer: The theoretical basis for Data Communication, Guided and Unguided Transmission Media, Switching. Data Link Layer: DLL design issues. Error Detection and Correction, Elementary data link protocols, sliding window protocols.

Medium Access Control Sub layer: Channel allocation problem, multiple access protocols, Design issues of Networklayer, Inter-networking Devices: Distinguishing of Networking Devices and Inter-networking Devices, VLANS, Addressing: IP addressing (IPV4 & IPV6), subnetting; IP Tunneling, NAT,PAT

ARP, DHCP Types of Routing: static, default and dynamic. Networking Protocols: RIP, OSPF, BGP; Access Control list for IPV4, IPV6, Other Protocols: Transport Layer: Process to Process Delivery; UDP; TCP; Stream Control Transmission Protocol (SCTP); Congestion Control: Open Loop, Closed Loop Choke Packets; Quality of Service: Techniques to Improve QoS: Leaky bucket algorithm, Token bucket algorithm.

Application Layer: DNS, SMTP, SNMP Introduction to Security, Security goals, Security Attacks, Security Services and Mechanisms, A Security Model, Asymmetric & Symmetric key Ciphers, Substitution Techniques, Transposition Techniques, DES, RSA algorithm, Secure Socket Layer.

Reference Books

1   Data Communication and Networking, Behrouz A. Forouzan, 5th Edition, (2012), TMH.

2   Cryptography and Network Security , William Stallings , 6th Edition, 2015   , Pearson Education.

3   Computer Networks -- A Systems Approach , Peterson, LL and Davie BS , 5th edition-(2012) , Morgan Kaufmann, Elsevier.

4   Computer Networks   , A.S.Tanenbaum, David J. Weteral   , 5 th edition. 2013   , Pearson Education.

5   Computer Networking: A Top-Down Approach   , Kurose, J and Ross, K   , 6th edition-(2012)   , Addison-Wesley.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 22AD2001   **Course Name:** DATA DRIVEN ARTIFICIAL INTELLIGENT SYSTEMS

L-T-P-S: 3-0-2-0   **Credits:** 4   **Prerequisite:** LACE

Course Outcomes

CO#	CO Description	BTL	PO/PSO Mapping
CO1	Understand and apply the concepts of intelligent agents and various search algorithms, to solve real-world problems.	3	PO1, PO2, PSO2
CO2	Analyse satisfaction problems, discover knowledge using logic, and analyse reasoning techniques to make informed decisions in uncertain environments.	4	PO2,PO3, PSO1
CO3	Apply and analyse various Machine Learning algorithms, Examine CNN and Deep Learning techniques	4	PO1, PO3, PSO2
CO4	Apply various Data Visualization Techniques, Analyse Data analytics techniques, Discover the insights from complex datasets.	4	PO3, PO5, PSO2
CO5	Examine AI for Data science lab in the python environment.	4	PO2,PO3, PSO1

Syllabus

Foundations of Artificial Intelligence, Intelligent agents, their environments, heuristic search techniques, including A* search and other best-first search algorithms, Constraint Satisfaction and Reasoning, solve constraint satisfaction problems using backtracking, forward checking, and other methods, knowledge representation techniques, such as propositional and first order logic
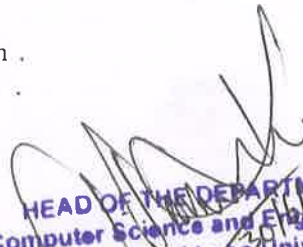
Probabilistic reasoning for AI, including Bayesian networks and inference algorithms, Machine Learning and Neural Networks: machine learning algorithms, such as supervised and unsupervised learning techniques, and how to pre-process and analyse data, Find S, Concept learning search and Candidate Elimination Algorithm (CEA), evaluating a hypothesis, probably learning approximately correct hypothesis, and function approximation.

Artificial Neural Networks (ANN), including the structure and functionality of feedforward and recurrent networks. Architecture, learning and inference. Performance measures. Convolutional Neural Networks (CNN) and Deep Learning techniques for tasks like image recognition, natural language processing, and reinforcement learning.

Data Science and Analytics: This module focuses on the essentials of data science, including data classification, analytics, visualization, and processing techniques. various data science algorithms, such as decision trees, k-means clustering, and principal component analysis, Linear Regression, Logistic Regression, Decision Trees different types of data analytics, including descriptive, diagnostic, predictive, and prescriptive analytics, and understand how they can be applied to real-world problems..

Reference Books

1. Artificial Intelligence , Russel and Norvig , 2015, Pearson Education, PHI .
2. Machine Learning , Tom M.Mitchell , 2017, Tata McGraw-Hill Edition .
3. Artificial Intelligence , Elaine Rich & Kevin Knight , 2017, Tata McGraw-Hill Edition .
4. Machine Learning an Algorithmic Perspective, Stephen Marsland , 2014, CRC Press .

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CI2001   **Course Name:** ADAPTIVE SOFTWARE ENGINEERING

L-T-P-S: 2-1-0-0   **Credits: 3**   **Prerequisite:** NIL

Course Outcomes

CO#	CO Description	BTL	PO/PSO Mapping
CO1	Understand the fundamental concept of software and software engineering, as well as the nature of the process, including numerous software models with reverse engineering.	3	PSO2,PO1,PO2,PO3
CO2	Apply the demands of users and which methodology will be best suited to meet those needs. They can employ extreme software models to elicit and validate the user's needs. They can also use agile methodologies to design and develop project-based softwares	3	PSO2,PO2,PO3,PO4
CO3	Apply various software methodologies of Scrum, Kanban and SAFe Methodology for developing user-friendly software and also they can able to analyse various software projects by using project Monitoring Tools such as JIRA, Design Patterns - Architectural Patterns - Model Driven Architecture.	4	PSO2,PO2,PO3,PO5
CO4	Analyze numerous testing methodologies for testing diverse software, as well as risk management, project planning, and estimating in order to design and analyse any software project.	4	PSO2,PO1,PO2,PO3

Syllabus

Software and Software Engineering: Nature of software, software application domains, unique nature of web applications, software engineering, software process, product and 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.

REQUIREMENTS: Requirements Development Methodology - Specifying Requirements - Eliciting Accurate Requirements -Documenting Business Requirements - Defining User Requirements - Validating Requirements – Achieving Requirements Traceability - Managing Changing Requirements - Reviews, Walkthroughs, and Inspections, SRS Vs User Stories. Agile Modelling, Extreme Programming.

Scrum, Kanban, SAFe Methodology, Project Monitoring Tool using JIRA, Design Patterns - Architectural Patterns - Model Driven Architectures.

A strategic approach to software testing, strategic issues, test strategies for conventional software, Black-Box and White-Box testing, validation testing, system testing. RISK MANAGEMENT IN SOFTWARE ENGINEERING PROJECTS - Project Planning and Estimation.

Reference Books:
1   Software Engineering – A Practitioner's Approach   Roger Pressman Mc Graw Hill,   2014
2   Software Engineering   Ian Sommerville Pearson Education,   2015
3   Agile Software Development Ecosystems   Jim Highsmith   Addison Wesley 2002
4   Fundamentals of Software Engineering   Rajib Mall   PHI Learning pvt ltd, Delhi   2014
5   "Software Engineering: Principles and Practices"   Deepak Jain   Oxford 2008

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 21CS3120R

Course Name: MULTIMODAL INFORMATION PROCESSING

L-T-P-S: 2-0-2-0   **Credits:** 3   **Prerequisite:** Nil

Course Outcomes:

CO#	CO Description	BTL	PO/PSO Mapping
CO1	Utilize the various types of signals, systems and their frequency domain transformation.	3	PO1/PSO1
CO2	Apply the design methodology of different filters and their realizations.	3	PO1, PO3/PSO1
CO3	Examine signal processing approaches for extraction of information present in the natural signals.	4	PO1, PO2/PSO1
CO4	Discover machine learning approaches for processing of signals.	4	PO1, PO3 /PSO1
CO5	Examine the signal processing approaches related to transformation, filtering, feature extraction, machine learning for signal processing.	4	PO1, PO2, PO3/PSO1

Syllabus:

Module 1	Signals and Systems: Types of Signals: Analog, deterministic, non-deterministic, random signals, periodic, aperiodic signals, discrete time signals, digital signals. Elementary signals: impulse, unit step, ramp, sinusoidal signal, complex exponential. Systems: impulse response, Convolution, Difference Equations for representation of systems, properties of systems, linearity, superposition principle, shift invariance, causality, stability. Fourier series for periodic signals, Fourier transforms, properties of Fourier Transform, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transforms (DFT), Fast Fourier Transforms (FFT), Phase and group delays, Sampling and Quantization.
Module 2	Transforms and Filter Design: Z-Transforms, Region of convergence (ROC), Properties of Z-Transforms, Causality and stability of filters, Finite Impulse Response (FIR), Infinite Impulse Response (IIR), Pole-Zero representation, Digital filter design: FIR filter design by Fourier Transform, Linear Phase Characteristics, low pass, high pass, band pass and band reject filters, IIR filter design by coefficient calculation, Frequency response of filters, All pass filters, Hilbert Transform, Filter realizations

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Module 3	1-Dimensional and 2-Dimensional Information Processing: Windowing techniques: Rectangular, Bartlett, Hamming, Hanning, Blackwell, Kaisar. Shorttime analysis: Short Time Fourier Transform (STFT) of Speech signals, Enhancement (denoising) techniques such as Mean, Median, and Moving average filter for images. Feature extraction techniques: MelFrequency Cepstral Coefficients (MFCC), Linear Prediction Coefficients (LPC) for speech, Audio Reconstruction using Analysis by Synthesis approach. Wavelet based image decomposition, Image Reconstruction using Analysis by Synthesis approach.
Module 4	Machine Learning approaches for building Multimodal Information Processing based Intelligent Systems: Pre-processing, feature extraction and classification using Convolutional Neural Networks (CNN) and Deep Neural Networks (DNN). Data augmentation using Generative Adversarial Networks (GAN), synthesis of signals using Recurrent Neural Network (RNN).

Reference Books:

Book Sl No	Title	Author(s)	Edition	Publisher
Book 1: (T1)	Discrete Time Signal Processing	Alan V. Oppenheim and R. W. Schafer	2nd	Prentice Hall, MIT Press, 1999
Book 2: (T2)	Signals and Systems	Simon Haykin and Barry Van Veen,	2nd	Wiley, 2007
Book 3 (T3)	Digital Signal Processing: Fundamentals and Applications	LiTan	1st	Academic Press, 2008
Book 4 (T4)	Deep Learning	Ian Goodfellow, Yoshua Bengio, and Aaron Courville	1st	MIT Press, 2021
Reference Book (R1)	Digital Signal Processing: Principles, Algorithms, and Applications	J. G. Proakis and M G , Monolakis,	4th	Prentice Hall, 2007
Reference Book (R2)	Discrete-Time Speech Signal Processing:	Thomas F. Quatieri	1st	Pearson Prentice Hall, 2001

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Book Sl No	Title	Author(s)	Edition	Publisher
	Principles and Practice			
Reference Book (R3)	A Practical Guide to Wavelet Analysis	Christopher Torrence and Gilbert P. Compo,	1st	Bulletin of the American Meteorological Society
Reference Book (R4)	Digital Image Processing	R. Gonzalez and R. Woods	4th	Pearson, 2018
Reference Book (R5)	Digital Signal Processing Using MATLAB	Vinay K. Ingle and John G. Proakis	3rd	Cengage Learning, 2010
Reference Book (R6)	Handbook of Image and Video Processing	Alan C Bovik	1st	Academic Press Series in Communications, Networking, and Multimedia, 2000
Reference Book (R7)	Generative Deep Learning	David Foster	1st	O'REILLY, 2019

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Annexure-3(a)

B.Tech - Computer Science and Engineering 2022-23 and 2023-24 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
23CEC3101R	CLOUD INFRASTRUCTURE&SERVICES	PE	Introduction to Cloud Computing and Characteristics,Challenges,Virtualization, Taxonomy of Virtualization, Hardware and OS level virtualization techniques, Types of Virtualizations, Pros & Cons of Virtualization, Technology Examples, Other virtualization techniques, Cloud Reference Models, Principles of parallel and distributed computing, Cloud computing Architecture, Managing the cloud, Cloud security, Fundamental security , basics, Threat agents, Cloud security threats, Industrial platforms & new Development, Inter process Communication among threads, Specialized cloud	Introduction to Cloud Technologies: Introduction to the Cloud Computing, History of cloud computing, Cloud Deployment models, Cloud service options: IaaS, PaaS, and SaaS. Data as a Service, NoSQL as a Service, Comparison of service providers, cloud Architectures: NIST cloud reference Architecture and ITU-T, cloud reference Architecture. Virtualization, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Hardware and OS level virtualization techniques, Pros and cons of virtualization, Virtualization technology examples: Xen-para virtualization, VMware: full virtualization, Microsoft Hyper-V. Load Balancing, Types of Load Balancing,	Load Balancing, Types of Load Balancing, Risk Factors in Load Balancing, Auto scaling -Docker, Containers and Kubernetes - Building own container based on micro services - Docker containers - Manage multiple Kubernetes Cluster - Multi Cloud deployments	CO2	To include more hands-on experience with leading cloud platforms and emphasizing advanced concepts like containerization and serverless computing.	10%

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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
			mechanisms, Cloud Management Mechanism, Cloud Security Mechanism, Fundamental Cloud Architecture, Advanced Cloud Architecture, Cloud clusters and Cost Usage Metrics Understanding Service Oriented Architecture, Moving applications to Cloud, Working with Cloud based storage, Working with Productivity software, Communicating with Cloud, Using Webmail services, Using Media and Streaming, Using the Mobile cloud, Working with Mobile Devices, Working with Mobile web services, The Role of Grid Computing Technologies in Cloud Computing, Cloud computing Technologies and Applications, Data-Intensive Technologies for Cloud Computing.	Risk Factors in Load Balancing, Auto scaling - Docker, Containers and Kubernetes - Building own container based on micro services - Docker containers - Manage multiple Kubernetes Cluster - Multi Cloud deployments. Cloud Security Introduction, Infrastructure Security, Network level security, Host level security, Application-level security, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud. Moving applications to Cloud, Using Webmail services, Cloud computing Technologies and Applications, Data-Intensive Technologies for Cloud Computing.				

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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
23CSB3101R	CRYPTANALYSIS & CYBER DEFENSE	PE	Introduction to Security: Security Concepts, Security Attacks, Antivirus bypassing, Pasword Attacks and Web browser exploitation, Security Services and Mechanisms, A Security Model, Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques. Block Ciphers and DES: Traditional Block Cipher Structure, DES, DES Example, Strength of DES, Basic concepts in Number Theory and Finite Fields, Division Algorithms, Euclidean Algorithm, Modular Algorithm, Groups, Rings and Fields, Polynomial Arithmetic, Finite Fields of the form GF(2n), Differential and Linear Cryptanalysis, Block Cipher Design Principles. AES: Finite Field Arithmetic, AES Structure, AES Transformation Functions, AES Example, AES implementation. Block Cipher Operation: Multiple	Introduction to Security: Security Concepts, Security Attacks, A Security Model, Security , Services and Mechanisms, Antivirus bypassing, Password Attacks and Web browser exploitation. Block Ciphers: DES, DES Example, Strength of DES, Differential and Linear Cryptanalysis., AES: Finite Field Arithmetic, AES Structure, AES Transformation Functions, AES Example. Multiple Encryption and Triple DES. Modes of Operation. Pseudorandom Number Generation: Principles and Pseudorandom Number, Generators, Pseudorandom Number Generation using a Block Cipher, Stream Ciphers. Stream Ciphers: RC4.. Public-key Cryptography: RSA algorithm, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic,	Removed: Basic concepts in Number Theory and Finite Fields, Division Algorithms, Euclidean Algorithm, Modular Algorithm, Groups, Rings and Fields, Polynomial Arithmetic, Finite Fields of the form GF(2n), Fermats and Euler's Theorem, Testing for Primality, Chinese Remainder Theorem, Discrete Logarithm. Added: Incident Response Process, Cyber Incident Response Team,	CO4	To better prepare students for contemporary cybersecurity challenges.	10%

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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
			Encryption and Triple DES, Modes of Operation,XTS mode for Block Oriented Storage Device, Pseudorandom Number Generation and Stream Ciphers: Principles and Pseudorandom Number Generation, Pseudorandom Number, Generators, Pseudorandom Number Generation using a Block Cipher, Stream, Ciphers, RC4, Fermats and Euler's Theorem, Testing for Primality, Chinese Remainder Theorem, Discrete Logarithm, Public-key Cryptography and RSA: Principles of Public-Key cryptosystems, the RSA algorithm. Other Public-key Cryptosystems: Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic Elliptic Curve Cryptography, Pseudorandom Number Generation based on an Asymmetric Cipher. Cryptographic Hash Functions: Applications of Cryptographic Hash functions, Two Simple	Elliptic Curve Cryptography.. Cryptographic. Hash Functions: Applications of Cryptographic Hash functions, Two Simple Hash Functions, Requirements and Security, SHA 512, MD5. Performing Incident Response: Introduction to Incident Response Process, Cyber Incident Response Team, Communication Plan and Stakeholder Management, Incident Response Plan, Cyber Kill Chain Attack Framework, Incident Response, Disaster Recovery, and Retention Policy	Communication Plan and Stakeholder Management, Incident Response Plan, Cyber Kill Chain Attack Framework, Incident Response, Disaster Recovery, and Retention Policy			

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			Hash Functions, Requirements and Security, Hash Functions based on Cipher Block Chaining, SHA					
23AIP3305R	DEEP LEARNING	PE	Introduction to Deep learning, 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, Stochastic GD, Adam. How Learning Differs from Pure Optimization, Surrogate Loss Functions and Early Stopping, Challenges in Neural Network Optimization, AdaGrad, RMSProp Bias Variance Tradeoff, L2 regularization, Early stopping, . Batch Normalization, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Dropout, Greedy	Introduction to Deep learning, 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, Stochastic GD, Adam.Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Dropout, Greedy Layer wise Pre-training, Better activation functions, better weight initialization methods, Learning Vectorial	Removed: CO2: ZF-Net, ResNet , YOLO Object Detection Removed CO4 : VAE,GAN.(moved GI) Added: CO4: Deep belief neural networks	CO2, CO4	To improve clarity and alignment with industry demands	10%

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			Layer wise Pre-training, Better activation functions, better weight initialization methods, 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, Recurrent Neural Networks, Backpropagation Through Time (BPTT),Vanishing and Exploding Gradients, Loss Functions in RNNs, Sequence Prediction, Gated Recurrent Units (GRUs), Long Short TermMemory (LSTM) Cells, Solving the vanishing gradient problem with LSTMs , Encoder Decoder Models:Regularization in autoencoders, Denoising autoencoders, Sparse autoencoders, Contractive autoencoders. Attention	Representations Of Words Convolutional Neural Networks, LeNet, AlexNet, VGGNet, ResNet Object Detection. Visualizing 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 , Deep Dream, Deep Art. Encoder Decoder Models, Regularization in autoencoders, Denoising autoencoders, Sparse autoencoders ,Markov Networks. Using joint distributions for classification and sampling, Latent Variables, Unsupervised Learning, Markov Chains, Restricted Boltzmann Machines, Deep Belief neural networks.				

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			Mechanism, Attention over images, Deep Belief networks, Markov Networks. 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) Cycle GAN ,Super resolution and Conditional GAN models.					

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-3(b)

Report- Analysis of Feedback on curriculum – received from the stake holders prior to the commencement of the 2023-24 ODD Semester

Feedback from different stake holders has been collected in respect of the curriculum offered for the academic year 2023-24

S. No.	Type of Stake holder	Number of feedbacks
1	Students	984
2	Parents	41
3	Alumni	25
4	Faculty	201
5	Academic Peers	21
6	Industry Persons	15
	Total	**1,287**

Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Industry Person	Mr Sameer, HR, Tech Mahindra, Industry Person, to cover a range of competencies that prepare individuals to effectively lead teams, manage resources, and drive organizational success.	It is resolved to introduce a course "Leadership and Management Skills" for 2023-24 admitted batch students.
Industry Person	Damarla Pawan Rahul,TCS, Industry Person, suggested the inclusion of a course on "Processors and Controllers" in the curriculum as it provides students with a solid understanding of the fundamental components that drive modern computing systems. It is	It is resolved to introduce courses "Processors and Controllers" for 2022-23 admitted batch students.
Industry Person	Ms. Naga Phani, AT & T, Industry Person, recommended incorporating a course on Computational Geometry into the curriculum, as it will equip students with essential skills to solve complex geometric problems efficiently using computational methods.	It is resolved to introduce a course "Computational Geometry" for 2023-24 admitted batch students.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Industry Person	MR JAGAN MOHAN (NGA HR Pvt LIMITED, HYDERABAD), Recommended to design the course which covers security aspects instead of old networks concepts alone.	It is resolved to introduce courses "Network Protocols and Security" for 2022-23 & 2023-24 admitted students
Industry Person	Mr SOHAL (EPAM), Recommended object oriented concepts in curriculum of M.Tech.	It is resolved to introduce a course "Object Oriented Programming" course to 2023-24 M.Tech admitted batch.
Industry Person	Mr. Sudeep, Cognizant, Industry Person, recommended to introduce the course "Data Science & Statistics" to "Statistical Methods in Data Science" to better reflect its emphasis on statistical techniques within the context of data science.	It is resolved to introduce a course "Data Science & Statistics" for 2023-24 admitted batch students.
Academic Peer	Dr.Nagam Anil (Vardhamaan Eng College,Professor,anil230@gmail.com recommended the inclusion of a course on "Cross-Platform User Experience Design" in the curriculum.	It is resolved to introduce course "Cross-Platform User Interface Design" for 2022-2023 & 2023-24 students
Academic Peer	Dr. Benson Raj, Assistant Professor, Academic Peer, recommended introducing a course titled "Physical Chemistry & Thermodynamics" to the curriculum, offering students a comprehensive understanding of the fundamental principles governing chemical processes and thermodynamic phenomena.	It is resolved to introduce a course "Physical Chemistry & Thermodynamics" for 2023-24 admitted batch students.
Academic Peer	Mrs. G Prashanti, Assist. Professor, recommended introducing a course on Numerical Analysis to the curriculum, providing students with comprehensive knowledge of modern computational techniques and algorithms.	It is resolved to introduce a course "Numerical Analysis" for 2023-24 admitted batch students.
Academic Peer	Dr Srinivas Reddy, Assistant Professor, Academic Peer, recommended the integration of a course on "Computational Chemistry" into the curriculum. Such a course equips students with essential skills in utilizing computational methods to study and analyze	It is resolved to introduce a course "Computational Chemistry" for 2023-24 admitted batch.

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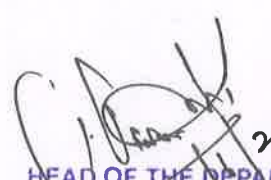Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified
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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
	chemical systems, a critical capability highly sought after in various industries including pharmaceuticals, materials science, and chemical engineering.	
Academic Peer	Dr. R. Manjula Devi, Professor, Academic Peer, suggested to introduce "Electromagnetism" course to provide students with foundational knowledge and practical skills in understanding electromagnetic principles and their applications.	It is resolved to introduce a course "Electromagnetism" for 2023-24 admitted batch
Academic Peer	Dr.Vivek S Deshpande, Professor, MIT, Pune, recommended the inclusion of the Indian Knowledge Tradition in the curriculum, as it provides a rich and diverse perspective that complements global education.	It is resolved to introduce a course "Essence of Indian Knowledge Tradition" for 2022-23 and 2023-24 admitted batch students.
Academic Peer	Dr. V. Ramalingam Scientist CSIR-Indian Institute of Chemical Technology, Hyderabad, recommended the inclusion of the Indian Knowledge System in the curriculum, as it provides a rich and diverse perspective that complements global education.	IIt is resolved to introduce courses "Indian Knowledge Systems : Vedic Mathematics", "Indian Knowledge Systems : Engineering Elective" for 2022-23 & 2023-24 admitted batch students.
Academic Peer	Dr V. Ramya Associate Professor, Academic Peer, recommended incorporating a course on "Biochemistry" into the curriculum, providing students with a deep understanding of the chemical process and molecules fundamentals to life.	It is resolved to introduce a course "Biochemistry" for 2023-24 admitted batch.
Academic Peer	Dr. Siba Kumar Udgata, Professor, Academic Peer, recommended incorporating a course titled "Computational Mechanics for Robotics" into the curriculum, focusing on providing students with the computational skills necessary for designing, analyzing, and optimizing robotic systems effectively.	It is resolved to introduce a course "Computational Mechanics for Robotics" for 2023-24 admitted batch.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Academic Peer	Dr. Kamalesh Narain Singh, Academic Peer, recommended to introduce Distributed Computing through networks concepts course to equip students with essential skills for designing and managing interconnected systems, addressing the growing demand in modern industries.	It is resolved to introduce a course "Distributed Computing" for 2023-24 admitted Batch.
Academic Peer	Ms. Lova Kumari, Assistant Professor, JNTU, Academic Peer, recommended the inclusion of Enterprise Programming in the curriculum.	It is resolved to introduce a course "Enterprise Development Programming" course to 2023-24 M.Tech admitted batch.
Academic Peer	Dr. S.Domnic, Professor, Academic Peer, recommended to combine the courses "Universal Human Values" and "Gender Sensitization" to deepen its focus oncontemporary societal issues, including diversity, inclusion, and ethical considerations in professional setting.	It is resolved to introduce course "Gender & Social Equality" to 2022-23 and "Human Values, Gender Equality & Professional Ethics" to 2023-24 admitted batches.
Academic Peer	Dr. S.Domnic Professor, Computer Applications, National Institute of Technology, Tiruchirappalli, India, Academic Peer, recommended the inclusion of course in computer science and mathematics, covering key concepts that are essential for understanding computer algorithms, programming, data structures, and complex systems. It focuses on mathematical structures that are discrete rather than continuous, making it highly applicable to areas like cryptography, networking, logic design, and more.	It is resolved to introduce courses "Discrete Structures" for 2023-24 admitted batch students
Academic Peer	Dr. Monica C, Assistant Professor, VIT university, Chennai, Academic Peer, recommended an advanced curriculum that includes in-depth coverage of Java programming principles, advanced front-end and back-end development techniques, database management, and software engineering practices.	It is resolved to introduce a course "Full Stack Development using Java" course to 2023-24 admitted M.Tech batch.

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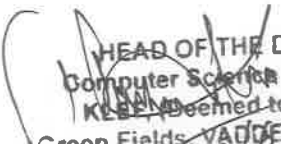Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified
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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Academic Peer	Dr. C Siva Sankar Associate Professor, Savitha University, Academic Peer, recommended the inclusion of a Python programming course in the curriculum in M. Tech curriculum.	It is resolved to introduce a course "Problem-Solving Using Python Programming" course to 2023-24 M.Tech admitted batch.
Alumni	Mr. Chalamalasetti Vamsi Krishna, Alumni, recommended introducing a course titled "Full Stack Application Development" to the curriculum.	It is resolved to introduce a course "Full Stack Application Development" for 2023-24 admitted batch.
Alumni	Ms Girija, We kindly request the inclusion of the course "Fundamentals of IoT and Sensors" in the curriculum.	It is resolved to introduce courses "Fundamentals of IoT and Sensors" for 2022-23 & 2023-24
Alumni	Mr. Pavan Sai Sunkara, Alumni, proposed to introduce a course titled "CI/CD & Cloud DevOps" to the curriculum.	It is resolved to introduce a course "CI/CD Cloud DevOps" for 2023-24 admitted batch.
Alumni	Mr. Sai Deep Muvva, Alumni, recommended introducing a course on Computational Physics to the curriculum, focusing on applying numerical methods and computational techniques to solve complex problems in physics.	It is resolved to introduce a course "Computational Physics" for 2023-24 admitted Batch.
Alumni	Mr. Guru Sai Ram, Developing corporate readiness skills equips students with the necessary tools for success in the professional world. Also participation of conferences, seminars and social activities are useful to improve their confidence levels.	It is resolved to introduce courses "Social Immersive Learning" for 2022-23 & 2023-24 admitted batch.
Alumni	Mr. Sai Deep Muvva, Full Stack Dev at Development Bank of Singapore, Alumni, recommended the inclusion of the career development courses which helps professionals to assess and enhance their skills, knowledge, and strategies for career progression.	It is resolved to introduce a course "Audit Career" for 2023-24 admitted batch.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Alumni	Ms. N Sri Lakshmi, Alumni, recommended to introduce the course which covers the gap between theoretical knowledge and practical applications. This course equips students with the skills to analyze the data, develop intelligent algorithms, make informed decisions, and prepare them for the demands of a data-driven future. The Artificial Intelligence for Data Science course is revised and recommended to introduce with the title as " Data Driven Artificial Intelligent Systems" to ensure both foundational concepts and advanced techniques. This revision should integrate practical applications and case studies, providing students with hands-on experience and a deeper understanding of real-world AI and ML implementations.	It is resolved to introduce a course "Data Driven Artificial Intelligent Systems" for 2022-23 admitted batch students and "Artificial Intelligence and Machine Learning" course for 2023-24 admitted batch students.
Alumni	Mr. Sudhakar Reddy, Alumni, strongly recommended to implement "Web 3 Development for Both Private and Public Blockchain" course, providing students with comprehensive skills to navigate and innovate within the evolving landscape of blockchain technology.	It is resolved to introduce a course "Web 3 Development for Both Private and Public Blockchain" for 2023-24 admitted batch students.
Alumni	Mr. Aditya Potluri, Alumni, highly recommended to introduce "AnyPoint Platform Development: Fundamentals" course.	It is resolved to introduce a course "AnyPoint Platform Development: Fundamentals" for 2023-24 admitted batch students.
Alumni	Mr. Venkata Sai Akhil Guntupalli, Alumni, recommended introducing "Generative Deep Learning" as a new course to empower students with advanced techniques for creative AI model development, fostering innovation in areas such as image synthesis and text generation, preparing them for leading roles in AI research and application.	It is resolved to introduce a course "Generative Deep Learning" for 2023-24 admitted batch.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Alumni	Mr. Shaik Muhammed, Alumni, recommended to revise the course Deep Learning, as per the new course introduced with Title AI & ML in their second year, enabling students to gain essential expertise and readiness to tackle real-world challenges in the rapidly evolving field of artificial intelligence.	It is resolved to approve the revision of syllabus in "Deep Learning" course to 2022-23 and 2023-24 admitted batches.
Alumni	Mr. Vishnu Sai Teja Kondamudi, Alumni, recommended introducing a course titled "Linux Administration & Automation" to the curriculum. This course will provide students with comprehensive knowledge and practical skills in managing Linux-based systems and automating administrative tasks.	It is resolved to introduce a course "Linux Administration & Automation" for 2023-24 admitted batch students.
Faculty	Dr. Yamuna Devi, Assoc. Professor, recommended introducing a course "Nature-Inspired Soft Computing" to "Computational Intelligence: Nature-Inspired Algorithms" to better encapsulate its focus on leveraging nature-inspired algorithms for computational problem-solving.	It is resolved to introduce a course "Nature Inspired Soft Computing" for 2023-24 admitted batch students.
Faculty	T Srilatha, Assistant Professor, Faculty, recommended incorporating a course on Digital Design and Computer Architecture as imperative to equip students with a fundamental understanding of hardware components and their organization, vital for comprehending modern computing systems and advancing technological innovations.	It is resolved to introduce a course "Digital Design and Computer Architecture" for 2022-2023 & 2023-24 admitted batch students.
Faculty	Dr. V Murali Mohan, Associate Professor, Faculty, recommended revising the syllabus of Cloud Infrastructure & Services to include more hands-on experience with leading cloud platforms and emphasizing advanced concepts like containerization and serverless computing.	It is resolved to approve the revision of syllabus in "Cloud Infrastructure & Services" course to 2022-23 and 2023-24 admitted batches.

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Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS
Faculty	Mrs Lalitha, Assistant Professor, Faculty, suggested updating the syllabus to cover emerging cryptographic techniques, practical cyber defense strategies, and real-world case studies to better prepare students for contemporary cybersecurity challenges.	It is resolved to approve the revision of syllabus in "Crypt Analysis & Cyber Defense" course to 2022-23 and 2023-24 admitted batches.
Faculty	Mr. B Elangovan, Faculty, recommended to propose the Theory of Computation course in the curriculum to incorporate contemporary topics like quantum computing and computational complexity theory, ensuring students are equipped with up-to-date knowledge and skills relevant to the evolving field of computer science.	It is resolved to introduce a course "Theory of Computation" for 2023-24 admitted batch students.
Faculty	Dr.V. Suryakanth, suggested to include Multimodal information Processing in the curriculum to cover speech processing, text processing. Which helps the students in research domain.	It is resolved to introduce courses "Multi Modal Information Processing" for 2021-22 and 2022-23 admitted batch students
Student	Sumanth, We respectfully request the inclusion of a "Fundamentals of Mathematics" course in the curriculum.	It is resolved to introduce a course "Fundamentals of Mathematics" for 2023-24
Student	Dinesh Reddy V, recommended for the inclusion of "Adaptive Software Engineering" in the curriculum as this addition aims to equip students with the necessary skills and knowledge to excel in the rapidly evolving field of software engineering.	It is resolved to introduce courses "Adaptive Software Engineering" for 2022-2023 & 2023-24 students
Student	S SHYAM and other focus group students, We are very happy in terms of coding. Because we have number of programming related courses, and we are practicing coding in variety of platforms as part of courses. Recommending relooking into engineering science courses which gives strong foundation in terms of hardware.	It is resolved to introduce courses "Basic Electrical and Electronic Circuits" for 2022-23 & 2023-24 admitted batch students.

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Annexure-4

Course Code: 23CS61F5

Course Name: PROBLEM-SOLVING USING PYTHON PROGRAMMING

L-T-P-S: 3-0-0-0   **Credits:** 3   **Prerequisite:** Nil

Course Outcomes
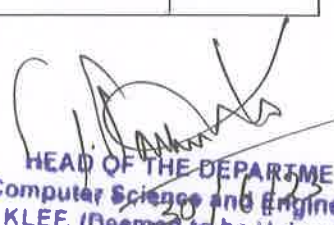
CO#	CO Description	BTL	PO Mapping
CO1	Understanding the fundamental concepts like Flow control and conditions, File handling, OOPs, and Python modules.	2	PO2,PO5
CO2	Apply various conditional, loop, logical and bitwise operations on different Applications	3	PO2,PO5
CO3	Analyse different techniques related to Modules and packages for creating applications for real world Problems	4	PO2,PO5
CO4	Analyse Object-Oriented Approach, Exceptions and files to handle real world Applications	4	PO2,PO5

Syllabus

Introduction to Python, Data Types, Variables, Basic Input-Output Operations, Basic Operators, Boolean Values. Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations, Functions, Tuples, Dictionaries, and Data Processing. Modules, Packages, String and List Methods, and Exceptions. The Object-Oriented Approach: Classes, Methods, Objects, and the Standard Objective Features; Exception Handling, and Working with Files.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Powerful Object-Oriented Programming	Mark Lutz	O'Reilly	
2	Head First Python: A Brain-Friendly Guide	Paul Barry	O'Reilly	2nd Edition

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS51F1

Course Name: ENTERPRISE DEVELOPMENT PROGRAMMING

L-T-P-S: 2-0-2-0   **Credits:** 3   **Prerequisite:** Nil

Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Apply the concepts of XML, XSLT and JDBC	3	PO2
CO2	Develop Enterprise Application using Servlet and JSP	3	PO3
CO3	Create Enterprise Application using JSF and build Business Logic using EJB, JNDI and Session Beans	3	PO2
CO4	Implement the concept of JPA, JAX-RS and JMS to build Web -Services. Implement the concepts of XML, XSLT, Servlets, JSP, EJB, JPA, JAX-RS and JMS to build large scale and distributable applications	4	PO2
CO5	To experiment the concept of Enterprise Programming with real world problems	4	PO3

Syllabus

XML Features and attributes – XML validation: DTD, XML Schema, XSD – XSLT - XSL Style Sheet to the XML Document – JDBC - JDBC CRUD Operations: Statement and PreparedStatement – Callable Statements – JDBC Transaction Management. Servlets – Generic Servlet Class – HttpServlet - Config and Context – ServletRequest and Response Introduction to JSP – Scripting Elements – JSP Implicit Objects and Directives – Action Tags – JSP Exception – MVC – Pagination in JSP - CRUD Operations in JSP. Java EE Comparing Java EE and Java SE – Packaging and Deploying - Java Server Faces (JSF): Introduction, Tag Libraries, Input Validations, Page Navigation – Java Naming and Directory Interface (JNDI) . Session Beans: EJB 3x Architecture - Session Beans: Introduction to EJB 3x Architecture - Converting a POJO to an EJB – Working with Stateless and Stateful Session Bean. Java Persistence API – Managing Entity Relationships - JAX-RS – Create and Consuming REST Service. Implement the Feature Rich Project with the Concepts - Hibernate, Spring, Spring Boot, Spring Cloud and Microservices

Reference Books:

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Sl No	Title	Author(s)	Publisher	Year
1	XML: The Complete Reference (Complete Reference Series)	Heather Williamson	McGraw Hill Education India	2nd Edition
2	Java Server Programming Java EE7	Kogent Learning Solutions Inc.	Dreamtech Press	Reprint 2016
3	Advanced Java Programming	Uttam K. Roy	Oxford University Press	Reprint 2015

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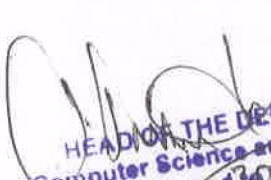Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Code: 23CS52F2

Course Name: FULL STACK DEVELOPMENT USING JAVA

L-T-P-S: 2-0-2-0   **Credits:** 3   **Prerequisite:** COOP

Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Apply the java full stack concepts on Hibernate, Spring DI, Spring IoC	3	PO3,PO5
CO2	Apply the java full stack concepts on Spring MVC, Spring JDBC and Hibernate	3	PO3,PO5
CO3	Apply the java full stack concepts on Spring Boot MVC, google maps, 2 step verification, sending mail and sms, captcha generation	3	PO3,PO5
CO4	Apply the java full stack concepts on Spring Cloud and Spring Microservices.	3	PO3,PO5
CO5	Apply the Java Concepts and doing practical on like Hibernate, Spring, Spring Boot, Spring Cloud and Microservices	3	PO3,PO5

Syllabus

Introduction to Maven, JPA, Basic concepts of ORM and its advantages - JDBC Vs Hibernate. Hibernate Architecture - Hibernate Query Language (HQL) - Hibernate Criteria Query Language (HCQL) - Generator Classes in Hibernate - Hibernate Inheritance Mapping - Spring and its advantages. Spring Architecture and modules - Dependency Injection (Setter DI, Constructor DI and Interface DI) - DI with Primitive and Non Primitive Data types - Autowiring using Dependency Injection and IoC. Spring DAO with JDBC (Jdbc Template) - Spring DAO with Hibernate - Illustrate about MVC 2-Tier Architecture - Spring MVC based Web Application using Hibernate framework - Spring MVC Pagination. Spring Boot and Spring Boot Starter ProjectSending MAIL - Dependency Injection and Inversion of Control in Spring Boot - Spring Boot Web Application MVC - Spring Boot with Rest Controller - Spring Boot with DAO to perform CRUD Operations - Spring Boot with Restful Web Services - Sending SMS - Integrating Google Maps - Gmail based 2 way Verification - Captcha Generation and Authentication. Spring Cloud, Cloud Architecture. Features, Components and Its advantages - Spring Cloud Config. Setup version control repository. Integration with repository - Client-Side Load Balancer and Spring Cloud API Gateway - Microservice based application Architecture components and Patterns. - User Interfaces integration with Micro Services. Challenges in Micro Services

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implementation - Microservices with Spring Cloud - Spring security with JSON Web Token (JWT). Implement the practicals - Hibernate, Spring, Spring Boot, Spring Cloud and Microservices

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Web Technologies: Concepts, Methodologies, Tools, and Applications	Arthur Tatnall	Information Science Reference	4th edition
2	Microservices with Spring Boot and Spring Cloud: Build resilient and scalable microservices using Spring Cloud	Istio and Kubernetes	Packet Publishing LTD	2nd Edition
3	Spring and Hibernate	Santosh Kumar k	Tata McGraw-Hill Education	2009
4	Beginning Spring Boot 2 Applications and Microservices with the Spring Framework	K. Siva Prasad Reddy	Apress	1st edition
5	Java EE 8 Application Development	David R.	Heffelfinger.	1st edition

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Course Code: 23CS5101

Course Name: OBJECT ORIENTED PROGRAMMING

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

Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand and apply basic concepts of Java, and fundamentals of Java.	3	PO1, PO2
CO2	Apply the concepts of classes, objects, Inheritance, method overriding, and overloading	3	PO2, PO5
CO3	Analyze the concepts of abstract class, packages, interfaces, and exception handling	4	PO2, PO5
CO4	Analyze the concepts of Multi-threading, Parallel Programming, and JDBC.	4	PO2, PO5
CO5	Apply the various OOPs concepts to solve any real-world problems.	4	PO2, PO5
CO6	Skilling on Advanced OOPs concepts	6	PO2, PO5

Syllabus:

Introduction: Basic concepts of Java, Fundamentals of Java, Object-Oriented Programming, OOP Principles, Encapsulation, Inheritance and Polymorphism, Java as an OOP, Internet Enabled language, The Byte code, Data types, Variables, Arrays, Operators, Control Statements, Type Conversion and Casting. Classes and Objects: Concepts of classes and objects, declaring objects, Assigning Object Reference Variables, Methods, Constructors, Access Control, Overloading methods. Inheritance: Inheritance: Inheritance Basics, member access rules, Usage of super and final keyword, forms of inheritance, Method Overriding, Access Modifiers. Abstract Classes, Packages and Interfaces: Packages, Classpath, importing packages, differences between classes and Interfaces, Implementing and applying Interface. Exception Handling: Exception Handling Fundamentals. Multi-threading & Parallel Programming: Introduction to Multithreading and Parallel Programming, Thread Concepts & its States, Creating Tasks

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and threads, Thread Classes, Thread Pools, Thread Synchronization, Cooperation among Threads. JDBC: API, Components, Architecture (2 Tier & 3 Tier), Divers & Its Types, Packages for JDBC Connection, Steps to connect to Databases.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	The Complete Reference Java	Herbert Schildt	Pearson	2008
2	An Introduction to Object-Oriented Programming	Timothy A. Budd	Pearson	2008
3	Java – How to program	Deitel&Deitel	Pearson	2007

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Annexure-5(a)

2023-24 B. Tech – CSE Admitted Batch Category Wise Course Structure

SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	New /Revised/ Retained	Stake Holder	Justification for Considering the Feedback	EES
1	AUC	22UC0019	ESSENCE OF INDIAN KNOWLEDGE TRADITION	EIKT	2	0	0	0	0	2	NIL	New	Academic Peer	To provide a rich and diverse perspective that complements global education.	SKILL DEVELOPMENT
2	AUC	22UC0020	INDIAN KNOWLEDGE SYSTEMS: ENGINEERING ELECTIVE	IKS	2	0	0	0	0	2	NIL	New	Academic Peer	To provide a rich and diverse perspective that complements global education.	SKILL DEVELOPMENT
3	AUC	23UC0008	INDIAN CONSTITUTION	IC	2	0	0	0	0	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
4	AUC	23UC0018	FUNDAMENTALS OF MATHEMATICS	FOM	3	0	0	0	0	3	NIL	New	Student	To help non engineering background students	SKILL DEVELOPMENT
5	AUC	23UC0017	INDIAN KNOWLEDGE SYSTEMS: VEDIC MATHEMATICS	IKSVM	0	0	0	2	0	2	NIL	New	Academic Peer	To provide a rich and diverse perspective that complements global education.	SKILL DEVELOPMENT
6	AUC	23UC0009	ECOLOGY AND ENVIRONMENT	E&E	2	0	0	0	0	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
7	AUC	23UCXXXX	AUC - CAREER	AUCC	2	0	0	0	0	2	NIL	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
		No. of Courses and Credits			7				0						
8	HAS	23UC0026	HUMAN VALUES, GENDER EQUALITY & PROFESSIONAL ETHICS	HGP	2	0	0	0	2	2	NIL	New	Academic Peer	To focus on contemporary societal issues and professional ethical values.	SKILL DEVELOPMENT
9	HAS	23UC1203	DESIGN THINKING AND INNOVATION	DTI	0	0	4	0	2	4	NIL	Retained	No changes	-	ENTERPRENEUR SHIP

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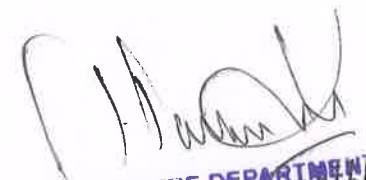
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10	HAS	23UC1101	INTEGRATED PROFESSIONAL ENGLISH	IPE	0	0	4	0	2	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
11	HAS	23UC1202	ENGLISH PROFICIENCY	EP	0	0	4	0	2	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
12	HAS	23UC0027	LEADERSHIP AND MANAGEMENT SKILLS	LAMS	0	0	4	0	2	4	NIL	New	Industry Person	To effectively lead teams, manage resources, and drive organizational success.	EMPLOYABILITY
13	HAS	23FLXXXX	FOREIGN LANGUAGE ELECTIVE	FL	3	0	0	0	3	3	NIL	Retained	No changes	-	SKILL DEVELOPMENT
14	HAS	23MBXXXX	MANAGEMENT ELECTIVE	ME	4	0	0	0	4	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
			No. of Courses and Credits		**7**				**17**						
15	SIL	22UC0021	SOCIAL IMMERSIVE LEARNING	SIL-1	0	0	0	4	1	4	NIL	New	Alumni	To equip students with the necessary tools for success in the professional world	SKILL DEVELOPMENT
16	SIL	22UC0022	SOCIAL IMMERSIVE LEARNING	SIL-2	0	0	0	4	1	4	NIL	New	Alumni	To equip students with the necessary tools for success in the professional world	SKILL DEVELOPMENT
17	SIL	22UC0023	SOCIAL IMMERSIVE LEARNING	SIL-3	0	0	0	4	1	4	NIL	New	Alumni	To equip students with the necessary tools for success in the professional world	SKILL DEVELOPMENT
			No. of Courses and Credits		**3**				**3**						
18	BSC	23MT1001	LINEAR ALGEBRA AND CALCULUS FOR ENGINEERS	LACE	2	2	0	0	4	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
19	BSC	23MT1002	DISCRETE STRUCTURES	DIS	2	2	0	0	4	4	NIL	New	Academic Peer	To focus on mathematical structures that are discrete rather than continuous	ENTERPRENEUR SHIP

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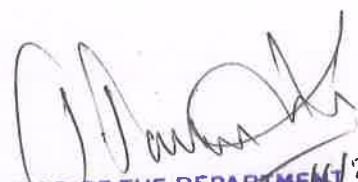Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2013 Certified
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20	BSC	23MTXXXX	MATHEMATICS ELECTIVE-1	ME-1	2	2	0	0	4	4	-	Retained	No changes	-	SKILL DEVELOPMENT
21	BSC	23MTXXXX	MATHEMATICS ELECTIVE-2	ME-2	2	2	0	0	4	4	-	Retained	No changes	-	SKILL DEVELOPMENT
22	BSC	23MTXXXX	MATHEMATICS ELECTIVE-3	ME-3	2	2	0	0	4	4	-	Retained	No changes	-	EMPLOYABILITY
23	BSC	23XXXXXX	SCIENCE ELECTIVE-1	SCE-1	2	2	0	0	4	4	DIS	Retained	No changes	-	SKILL DEVELOPMENT
24	BSC	23XXXXXX	SCIENCE ELECTIVE-2	SCE-2	3	0	2	0	4	5	LACE	Retained	No changes	-	SKILL DEVELOPMENT
25	BSC	23XXXXXX	SCIENCE ELECTIVE-3	SCE-3	3	0	2	0	4	5	NIL	Retained	No changes	-	SKILL DEVELOPMENT
No. of Courses and Credits					8				32						
26	ESC	23AD2001O	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	AIML	3	0	2	0	4	5	CTSD	New	Alumni	To equip with the skills to analyze the data, develop intelligent algorithms.	EMPLOYABILITY
27	ESC	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	CTSD	3	0	2	4	5	9	NIL	Retained	No changes	-	SKILL DEVELOPMENT
28	ESC	23SC1202	DATA STRUCTURES	DS	2	0	2	4	4	8	CTSD	Retained	No changes	-	EMPLOYABILITY
29	ESC	23SC1203	COMPUTATIONAL THINKING FOR OBJECT-ORIENTED DESIGN	CTOD	2	0	2	4	4	8	CTSD	Retained	No changes	-	SKILL DEVELOPMENT
30	ESC	23EC1101	FUNDAMENTALS OF IOT AND SENSORS	FITS	3	0	4	0	5	7	NIL	New	Alumni	To enable real-time data collection, communication, and automation across various industries.	EMPLOYABILITY
31	ESC	23ME1103	DESIGN TOOL WORKSHOP	DTW	0	0	4	0	2	4	NIL	Retained	No changes	-	EMPLOYABILITY
32	ESC	23EC1202	DIGITAL DESIGN & COMPUTER ARCHITECTURE	DDCA	3	0	2	0	4	5	Nil	New	Faculty	To equip with a fundamental understanding of hardware components and their organization	EMPLOYABILITY

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33	ESC	23EC1203	BASIC ELECTRICAL AND ELECTRONIC CIRCUITS	BEEC	2	0	0	0	2	2	Nil	New	Student	To give strong foundation in terms of hardware	SKILL DEVELOPMENT
			No. of Courses and Credits		8				30						
34	PCC	23CS2104R	OPERATING SYSTEMS	OS	3	0	2	0	4	5	DDCA	Retained	No changes	-	EMPLOYABILITY
35	PCC	23CS4106	DISTRIBUTED COMPUTING	DC	2	0	0	0	2	2	OS	New	Academic Peer	To equip with essential skills for designing and managing interconnected systems	EMPLOYABILITY
36	PCC	23CS2103R	ADVANCED OBJECT ORIENTED PROGRAMMING	AOOP	3	0	2	4	5	9	CTOD	Retained	No changes	-	EMPLOYABILITY
37	PCC	23CS2205R	DESIGN AND ANALYSIS OF ALGORITHMS	DAA	3	0	2	4	5	9	DS	Retained	No changes	-	EMPLOYABILITY
38	PCC	23EC2210R	NETWORK PROTOCOLS AND SECURITY	NPS	3	0	2	0	4	5	DDCA	New	Industry Person	To cover security aspects	EMPLOYABILITY
39	PCC	23AD2102R	DATABASE MANAGEMENT SYSTEMS	DBMS	3	0	2	0	4	5	DS	Retained	No changes	-	EMPLOYABILITY
40	PCC	23CI2001	ADAPTIVE SOFTWARE ENGINEERING	ASE	3	1	0	0	4	4	NIL	New	Student	To excel in the rapidly evolving field of software engineering.	EMPLOYABILITY
			No. of Courses and Credits		7				28						
41	PEC		FLEXI CORE	FCC	2	0	2	0	3	4	-	-	-	-	-
42	PEC		PROFESSIONAL ELECTIVE - 1	PE-1	3	0	2	4	5	9	-	-	-	-	-
43	PEC		PROFESSIONAL ELECTIVE - 2	PE-2	3	0	0	0	3	3	-	-	-	-	-
44	PEC		PROFESSIONAL ELECTIVE - 3	PE-3	3	0	2	4	5	9	-	-	-	-	-
45	PEC		PROFESSIONAL ELECTIVE - 4	PE-4	3	0	0	0	3	3	-	-	-	-	-

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			No. of Courses and Credits		5				19						
46	SDC	23SDCS11R	LINUX ADMINISTRATION & AUTOMATION	LAA	0	0	2	4	2	6	NIL	New	Alumni	To provide students with comprehensive knowledge and practical skills in managing Linux-based systems and automating administrative tasks	SKILL DEVELOPMENT
47	SDC	23SDCS12R	FULL STACK APPLICATION DEVELOPMENT	FSD	0	0	2	4	2	6	NIL	New	Alumni	To provide knowledge on experience on web applications development	SKILL DEVELOPMENT
48	SDC	23SDCS13R	CI/CD & CLOUD DEVOPS	CDP	0	0	2	4	2	6	NIL	New	Alumni	To provide knowledge on experience on web applications development	SKILL DEVELOPMENT
			No. of Courses and Credits		3				6						
49	PRI	231E2040	SOCIAL INTERNSHIP	SIP	0	0	0	4	0	4	-	Retained	No changes	-	SKILL DEVELOPMENT
50	PRI	231E3041	TECHNICAL INTERNSHIP	TEI	0	0	0	4	0	4	-	Retained	No changes	-	SKILL DEVELOPMENT
51	PRI	231E4053	CAPSTONE PROJECT - 1	CP-1	0	0	8	16	8	24	-	Retained	No changes	-	SKILL DEVELOPMENT
52	PRI	231E4054R	CAPSTONE PROJECT - 2	CP-2	0	0	8	16	8	24	-	Retained	No changes	-	SKILL DEVELOPMENT
			No. of Courses and Credits		4				16						
53	OEC		OPEN ELECTIVE - 1	OE-1	4	0	0	0	4	4	-	-	-	-	-
54	OEC		OPEN ELECTIVE - 2	OE-2	4	0	0	0	4	4	-	-	-	-	-
55	OEC		OPEN ELECTIVE - 3	OE-3	4	0	0	0	4	4	-	-	-	-	-
			No. of Courses and Credits		3				12						

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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56	VAC		VALUE ADDED CERTIFICATION-1	VAC-CERT	0	0	0	8	0	0	-	Retained	No changes	-	SKILL DEVELOPMENT
57	VAC		VALUE ADDED CERTIFICATION-2	VAC-CERT	0	0	0	8	0	0	-	Retained	No changes	-	SKILL DEVELOPMENT
58	VAC		VALUE ADDED CERTIFICATION-3	VAC-CERT	0	0	0	8	0	0	-	Retained	No changes	-	SKILL DEVELOPMENT
59	VAC		VALUE ADDED SPORTS	VAC-SPORTS	2	0	0	0	0	0	-	Retained	No changes	-	SKILL DEVELOPMENT
		No. of Courses and Credits			4				0						
		TOTAL COURSES			59		TOTAL CREDITS		163						

PROFESSIONAL ELECTIVE COURSES (PEC)

ARTIFICIAL INTELLIGENCE & INTELLIGENT PROCESS AUTOMATION (AI&IPA)

	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	New /Revised/ Retained	Stake Holder	Justification for Considering the Feedback	EES
1	PE-1	23AIP3101R	DEEP LEARNING	DL	3	0	2	4	5	9	AI&ML	10%-Revised	Alumni	To design models as per industry demands	SKILL DEVELOPMENT
2	PE-2	23AIP3202R	SOFT COMPUTING	SC	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	EMPLOYABILITY
3	PE-2	23AIP3203R	MULTI MODAL INFORMATION PROCESSING	MMIP	2	0	2	0	3	4	AI&ML	New	Faculty	To cover speech processing, text processing as it helps the students in research domain.	EMPLOYABILITY
4	PE-2	23AIP3204R	ARTIFICIAL NEURAL NETWORKS	ANN	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	EMPLOYABILITY
5	PE-3	23AIP3305R	GENERATIVE DEEP LEARNING	GDL	3	0	2	4	5	9	AI&ML	New	Alumni	To empower students with advanced techniques for creative AI model development	SKILL DEVELOPMENT
6	PE-4	23AIP3406M	COGNITIVE COMPUTING	CC	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	EMPLOYABILITY

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7	PE-4	23AIP3407M	PERCEPTION AND COMPUTER VISION	PCV	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	EMPLOYABILITY
8	PE-4	23AIP3408M	MACHINE LEARNING ON CLOUD	MLC	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	SKILL DEVELOPMENT
9	PE-5	23AIP3509	COMPUTATIONAL EPIDEMIOLOGY	CE	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	EMPLOYABILITY
10	PE-5	23AIP3510	NATURAL LANGUAGE PROCESSING	NLP	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	EMPLOYABILITY
11	PE-5	23AIP3511	SPEECH PROCESSING	SP	2	0	2	0	3	4	AI&ML	Retained	No Changes	-	EMPLOYABILITY
12	PE-5	23AIP3512	DESIGN & MANAGEMENT OF DISTRIBUTED APPLICATIONS FOR AI ON CLOUD	DMDAAC	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	SKILL DEVELOPMENT
13	PE-5	23AIP3513	ARCHITECTING DEEP LEARNING WORKLOADS ON CLOUD	ADLWC	3	0	0	0	3	3	AI&ML	Retained	No Changes	-	EMPLOYABILITY
CLOUD & EDGE COMPUTING (CEC)															
1	PE-1	23CEC3101R	CLOUD INFRASTRUCTURE AND SERVICES	CIS	3	0	2	4	5	9	OS	10% - Revised	Faculty	To emphasize advanced concepts like containerization and serverless computing.	SKILL DEVELOPMENT
2	PE-2	23CEC3202R	ADVANCED OPERATING SYSTEMS	AOS	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
3	PE-2	23CEC3203R	FUNCTIONAL & CONCURRENT PROGRAMMING	FCP	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
4	PE-2	23CEC3204R	CLOUD DEVOPS	CD	3	0	0	0	3	3	OS	Retained	No Changes	-	SKILL DEVELOPMENT
5	PE-3	23CEC3305R	CLOUD & SERVERLESS COMPUTING	CSC	3	0	2	4	5	9	OS	Retained	No Changes	-	SKILL DEVELOPMENT
6	PE-4	23CEC3406M	ADVANCED COMPUTER ARCHITECTURE	ACA	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
7	PE-4	23CEC3407M	PARALLEL ALGORITHMS	PA	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY

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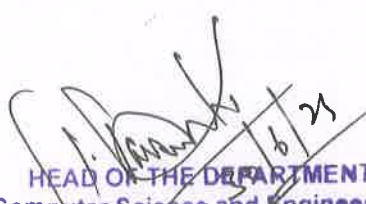Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
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8	PE-4	23CEC3408M	CLOUD SECURITY	CS	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
9	PE-4	23CEC3409M	ARCHITECTING CLOUD SOLUTIONS*	ACS	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
10	PE-5	23CEC3510	EDGE COMPUTING	EC	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
11	PE-5	23CEC3511	HIGH PERFORMANCE COMPUTING	HPC	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
12	PE-5	23CEC3512	DESIGN OF DISTRIBUTED APPLICATIONS ON CLOUD (DDA)	DDAC	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
13	PE-5	23CEC3513	CLOUD NETWORKING	CN	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
CYBER PHYSICAL SYSTEMS & IOT (CPS&IOT)															
1	PE-1	23CPS3101R	IOT SENSING AND ACTUATING DEVICES	ISAD	3	0	2	4	5	9	FITS	Retained	No Changes	-	EMPLOYABILITY
2	PE-2	23CPS3202R	INTERNET OF THINGS ARCHITECTURES AND PROTOCOLS	IOTAP	3	0	0	0	3	3	FITS	Retained	No Changes	-	SKILL DEVELOPMENT
3	PE-3	23CPS3303R	CYBER PHYSICAL SYSTEMS	CPS	3	0	2	4	5	9	FITS	Retained	No Changes	-	EMPLOYABILITY
4	PE-4	23CPS3404M	FOUNDATIONS OF HYBRID AND EMBEDED SYSTEMS	DVP	3	0	0	0	3	3	FITS	Retained	No Changes	-	SKILL DEVELOPMENT
5	PE-5	23CPS3505	CLOUD COMPUTING FOR IOT ENGINEERS	CCIOTE	3	0	0	0	3	3	FITS	Retained	No Changes	-	EMPLOYABILITY
6	PE-5	23CPS3506	WIRELESS SENSOR NETWORKS	WSN	3	0	0	0	3	3	FITS	Retained	No Changes	-	EMPLOYABILITY
CYBER SECURITY & BLOCKCHAIN TECHNOLOGY (CYS & BCT)															
1	PE-1	23CSB3101R	CRYPT ANALYSIS & CYBER DEFENSE	CACD	3	0	2	4	5	9	NPS	12% - Revised	Faculty	To better prepare students for contemporary cybersecurity challenges.	SKILL DEVELOPMENT
2	PE-2	23CSB3202R	NETWORK AND INFRASTRUCTURE SECURITY	NIS	3	0	0	0	3	3	NPS	Retained	No Changes	-	SKILL DEVELOPMENT

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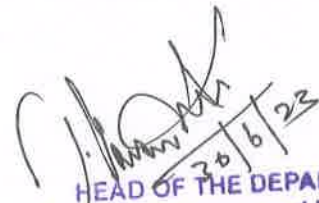Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

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3	PE-2	23CSB3203R	INTRODUCTION TO BLOCKCHAIN AND CRYPTO CURRENCIES	IBCC	2	0	2	0	3	4	NPS	Retained	No Changes	-	SKILL DEVELOPMENT
4	PE-3	23CSB3304R	DIGITAL FORENSICS	DF	3	0	2	4	5	9	NPS	Retained	No Changes	-	EMPLOYABILITY
5	PE-4	23CSB3405M	DATABASE SYSTEM AND SECURITY	DSS	3	0	0	0	3	3	NPS	Retained	No Changes	-	EMPLOYABILITY
6	PE-4	23CSB3406M	PROGRAMMING FOR SMART CONTRACTS	PSC	3	0	0	0	3	3	NPS	Retained	No Changes	-	EMPLOYABILITY
7	PE-4	23CSB3407M	CLOUD SECURITY	CS	3	0	0	0	3	3	NPS	Retained	No Changes	-	EMPLOYABILITY
8	PE-5	23CSB3508	SECURE SOFTWARE ENGINEERING	SSE	3	0	0	0	3	3	NPS	Retained	No Changes	-	EMPLOYABILITY
9	PE-5	23CSB3509	WEB SECURITY	WS	3	0	0	0	3	3	NPS	Retained	No Changes	-	EMPLOYABILITY
10	PE-5	23CSB3510	SECURITY GOVERNANCE & MANAGEMENT	SGM	3	0	0	0	3	3	NPS	Retained	No Changes	-	EMPLOYABILITY
DATA SCIENCE & BIG DATA ANALYTICS (DS&BDA)															
1	PE-1	23DSB3101R	DATA ANALYTICS AND VISUALIZATION	DAV	3	0	2	4	5	9	DBMS	Retained	No Changes	-	EMPLOYABILITY
2	PE-2	23DSB3202R	DATA WAREHOUSING AND MINING	DMDW	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY
3	PE-3	23DSB3303R	BIG DATA ANALYTICS	BDA	3	0	2	4	5	9	DBMS	Retained	No Changes	-	EMPLOYABILITY
4	PE-4	23DSB3404M	BIG DATA OPTIMIZATION	BDO	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY
5	PE-4	23DSB3407M	DATA ANALYTICS ON CLOUD	DAC	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY
6	PE-4	23DSB3408M	DIGITAL MEDIA ANALYTICS	DMA	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY
7	PE-4	23DSB3406M	DIGITAL VIDEO PROCESSING	DVP	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY
8	PE-5	23DSB3509	ADVANCED DATABASES	AD	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY

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9	PE-5	23DSB3510	BUSINESS ANALYTICS	BA	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY
10	PE-5	23DSB3511	GRAPH & WEB ANALYTICS	GWA	3	0	0	0	3	3	DBMS	Retained	No Changes	-	SKILL DEVELOPMENT
11	PE-5	23DSB3512	DATA GOVERNANCE ON CLOUD	DGC	3	0	0	0	3	3	DBMS	Retained	No Changes	-	EMPLOYABILITY
GAME DEVELOPMENT & UX DESIGN (GDU)																

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1	PE-1	23GDU3101R	PROGRAMMING FOR GAME DEVELOPMENT	PGD	3	0	2	4	5	9	OS	Retained	No Changes	-	EMPLOYABILITY
2	PE-2	23GDU3202R	UX DESIGN	UD	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
3	PE-3	23GDU3303R	AR & VR APPLICATION DEVELOPMENT	AR&VR	3	0	2	4	5	9	OS	Retained	No Changes	-	EMPLOYABILITY
4	PE-4	23GDU3404M	COMPUTER GRAPHICS	CG	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
5	PE-4	23GDU3405M	3D MODELLING & ANIMATION	ANIM	3	0	0	0	3	3	OS	Retained	No Changes	-	SKILL DEVELOPMENT
6	PE-5	23GDU3506	PRINCIPLES OF GAME DESIGN	PRGD	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
7	PE-5	23GDU3507	BUSINESS OF GAMES & ENTREPRENEURSHIP	BGE	3	0	0	0	3	3	OS	Retained	No Changes	-	EMPLOYABILITY
SOFTWARE MODELLING & DEVOPS (SMD)																

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1	PE-1	23SMD3101R	SOFTWARE VERIFICATION & VALIDATION	CACD	3	0	2	4	5	9	ASE	Retained	No Changes	-	EMPLOYABILITY
2	PE-2	23SMD3202R	DESIGN PATTERNS & CLEAN CODING TECHNIQUES	NIS	3	0	0	0	3	3	ASE	Retained	No Changes	-	EMPLOYABILITY
3	PE-3	23SMD3303R	CONTINUOUS DELIVERY & DEVOPS	NIS	3	0	2	4	5	9	ASE	Retained	No Changes	-	EMPLOYABILITY
4	PE-4	23SMD3404M	SOFTWARE PROJECT MANAGEMENT	NIS	3	0	0	0	3	3	ASE	Retained	No Changes	-	EMPLOYABILITY
5	PE-4	23SMD3405M	SOFTWARE ARCHITECTURE & DESIGN	IBCC	3	0	0	0	3	3	ASE	Retained	No Changes	-	EMPLOYABILITY

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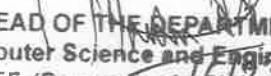Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified

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6	PE-5	23SMD3506	SOFTWARE RELIABILITY	IBCC	3	0	0	0	3	3	ASE	Retained	No Changes	-	EMPLOYABILITY
7	PE-5	23SMD3507	CROSS-PLATFORM USER INTERFACE DESIGN	IBCC	3	0	0	0	3	3	ASE	New	Academic Peer	To create cohesive, user-friendly interfaces across multiple platforms and devices.	SKILL DEVELOPMENT
			FLEXICORE COURSES												
1	FC	23CEC3101F	CLOUD INFRASTRUCTURE AND SERVICES	CIS	2	0	2	0	3	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
2	FC	23CS2236F	FUNCTIONAL & CONCURRENT PROGRAMMING	FCP	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
3	FC	23CS2230F	SOLUTIONS ARCHITECTING ON CLOUD	SAC	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
4	FC	23CS2243F	CLOUD DEVOPS (EPAM)	CD-EPAM	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
5	FC	23CS2235F	COMPILER DESIGN	CD	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
6	FC	23CS2240F	.NET PROGRAMMING (EPAM)	.NET-EPAM	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
7	FC	23CS2247F	CRYPTOGRAPHY AND SECURITY	CS	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
8	FC	23CSB3101F	CRYPT ANALYSIS & CYBER DEFENSE	CACD	2	0	2	0	3	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
9	FC	23CSB3202F	NETWORK AND INFRASTRUCTURE SECURITY	NIS	2	0	2	0	3	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
10	FC	23CSB3203F	INTRODUCTION TO BLOCKCHAIN AND CRYPTO CURRENCIES	IBCC	2	0	2	0	3	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
11	FC	23DSB3101F	DATA ANALYTICS AND VISUALIZATION	DAV	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
12	FC	23DSB3509F	ADVANCED DATABASES	AD	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
13	FC	23CS2225F	EMBEDDED SYSTEMS	EBS	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY

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14	FC	23CS2229F	APPLICATION DEVELOPMENT ON CLOUD	ADC	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
15	FC	23CS2231F	VISUAL PROGRAMMING	VSP	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
16	FC	23CS2241F	FRONT END WEB DEVELOPMENT (EPAM)	FEWD-EPAM	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
17	FC	23CS2248F	ANYPOINT PLATFORM DEVELOPMENT: FUNDAMENTALS	APDF	2	0	2	0	3	4	Nil	New	Alumni	To equip students with foundational skills in leveraging the AnyPoint platform for seamless integration and development of robust applications	SKILL DEVELOPMENT
18	FC	23CS2249F	WEB 3 DEVELOPMENT FOR BOTH PRIVATE AND PUBLIC BLOCKCHAIN	WDPPB	2	0	2	0	3	4	Nil	New	Alumni	To provide students readiness for cutting-edge opportunities in decentralized applications development.	SKILL DEVELOPMENT
19	FC	23GDU3202F	UX DESIGN	UD	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
20	FC	23CS2242F	SOFTWARE TESTING (EPAM)	ST-EPAM	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
21	FC	23SMD3101F	SOFTWARE VERIFICATION & VALIDATION	SVV	2	0	2	0	3	4	Nil	Retained	No Changes	-	EMPLOYABILITY
22	FC	23SMD3507F	CROSS-PLATFORM USER INTERFACE DESIGN	CPUIF	2	0	2	0	3	4	Nil	New	Academic Peer	To create cohesive, user-friendly interfaces across multiple platforms and devices.	SKILL DEVELOPMENT
FOREIGN LANGUAGE AND MANEGEMENT ELECTIVE COURSES															
1	HAS-FLE	23FL3054	FRENCH LANGUAGE	FLG	3	0	0	0	3	3	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
2	HAS-FLE	23FL3055	GERMAN LANGUAGE	GLG	3	0	0	0	3	3	Nil	Retained	No Changes	-	SKILL DEVELOPMENT

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	New /Revised/ Retained	Stake Holder	Justification for Considering the Feedback	EES
3	HAS-FLE	23FL3058	JAPANESE LANGUAGE	JLG	3	0	0	0	3	3	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
4	HAS-MGE	23MB4068	INNOVATION MANAGEMENT	IMG	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
5	HAS-MGE	23MB4062	CONSTRUCTION PROJECT MANAGEMENT	CPM	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
6	HAS-MGE	23MB4063	RESOURCES SAFETY AND QUALITY MANAGEMENT	RSQM	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
7	HAS-MGE	23MB4067	INDUSTRIAL MANAGEMENT & PRODUCTION PLANNING	IMPP	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
8	HAS-MGE	23MB0003	FINANCIAL MANAGEMENT FOR ENGINEERS	FMFE	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
9	HAS-MGE	23MB0005	MANAGING PERSONAL FINANCE	MPF	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
10	HAS-MGE	23MB4066	DECENTRALISED FINANCE AND DIGITAL FINANCIAL SYSTEMS	DFDFS	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
11	HAS-MGE	23MB4065	DIGITAL ECONOMICS AND TOKENOMICS	DET	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
12	HAS-MGE	23MB0001	BASICS OF MARKETING FOR ENGINEERS	BME	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
13	HAS-MGE	23MB4064	SEO AND DIGITAL MARKETING	SDM	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
14	HAS-MGE	23MB0002	PARADIGMS IN MANAGEMENT THOUGHT	PIMT	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
15	HAS-MGE	23MB0004	ORGANIZATION MANAGEMENT	OMG	4	0	0	0	4	4	Nil	Retained	No Changes	-	SKILL DEVELOPMENT
MATHEMATICS ELECTIVE COURSES															
1	BSC-ME-1	23MT2005	PROBABILITY, STATISTICS & QUEUEING THEORY	PSQT	2	2	0	0	4	4	Nil	Retained	No changes	-	EMPLOYABILITY
2	BSC-ME-1	23MT2013	RELATIONAL ALGEBRA AND INFORMATION THEORY	RAI	2	2	0	0	4	4	Nil	Retained	No changes	-	EMPLOYABILITY
3	BSC-ME-2	23MT2014	THEORY OF COMPUTATION	TOC	2	2	0	0	4	4	Nil	New	Faculty	To ensure students with up-to-date knowledge	EMPLOYABILITY

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														and skills relevant to the evolving field of computer science.	
4	BSC-ME-3	23MT2015	NUMERICAL ANALYSIS	NMA	2	2	0	0	4	4	Nil	New	Faculty	To provide students with comprehensive knowledge of modern computational techniques and algorithms	EMPLOYABILITY
5	BSC-ME-3	23MT2016	COMPUTATIONAL GEOMETRY	CPG	2	2	0	0	4	4	Nil	New	Industry Person	To equip students with essential skills to solve complex geometric problems efficiently using computational methods	EMPLOYABILITY
6	BSC-ME-3	23MT2004	MATHEMATICAL PROGRAMMING	MP	2	2	0	0	4	4	Nil	Retained	No changes	-	EMPLOYABILITY
1	BSC-SE-1	23CS3202	NATURE INSPIRED SOFT COMPUTING	NSC	2	2	0	0	4	4	DIS	New	Faculty	To better understand nature inspired algorithms for computational problem-solving	EMPLOYABILITY
2	BSC-SE-1	23CS3203	QUANTUM COMPUTING	QCP	2	2	0	0	4	4	DIS	Retained	No changes	-	EMPLOYABILITY
3	BSC-SE-1	23SC3201	DATA SCIENCE AND STATISTICS	DSS	2	2	0	0	4	4	DIS	New	Industry Person	To better reflect the statistical techniques in the context of data science	EMPLOYABILITY
4	BSC-SE-2	23PH1011	COMPUTATIONAL MECHANICS FOR ROBOTICS	CMR	3	0	2	0	4	5	LACE	New	Academic Peer	To provide students with the computational skills necessary for designing, analyzing, and optimizing robotic systems effectively	EMPLOYABILITY
5	BSC-SE-2	23PH1009	COMPUTATIONAL PHYSICS	CMP	3	0	2	0	4	5	LACE	New	Alumni	To focus on applying numerical methods and	EMPLOYABILITY

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														computational techniques to solve complex problems in physics	
6	BSC-SE-2	23PH1010	ELECTROMAGNETISM	EMT	3	0	2	0	4	5	LACE	New	Academic Peer	To provide students with foundational knowledge and practical skills in understanding electromagnetic principles and their applications	EMPLOYABILITY
7	BSC-SE-3	23CY1002	PHYSICAL CHEMISTRY AND THERMODYNAMICS	PCT	3	0	2	0	4	5	Nil	New	Academic Peer	To offer students a comprehensive understanding of the fundamental principles governing chemical processes and thermodynamic phenomena	EMPLOYABILITY
8	BSC-SE-3	23BT2103	BIOCHEMISTRY	BCM	3	0	2	0	4	5	Nil	New	Academic Peer	To provide students with a deep understanding of the chemical processes and molecules fundamental to life	EMPLOYABILITY
9	BSC-SE-3	23CY1003	COMPUTATIONAL CHEMISTRY	CPC	3	0	2	0	4	5	Nil	New	Academic Peer	To equip students with essential skills in utilizing computational methods to study and analyze chemical systems	EMPLOYABILITY
			OPEN ELECTIVE COUSES												
1	OE-1	23OEGN01	NATIONAL CADET CORPS - 1	NCC1	3	0	2	0	4	5	Nil	Retained	No changes	-	SKILL DEVELOPMENT
2	OE-1	23OEGN04	NATIONAL SERVICE SCHEME-1	NSS1	3	0	2	0	4	5	Nil	Retained	No changes	-	SKILL DEVELOPMENT

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3	OE-1	230EDT01	INNOVATIVE PRODUCT DEVELOPMENT FOR ENTREPRENEURS	IPDFE	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
4	OE-1	230EBT01	IPR AND PATENT LAWS	IPR	4	0	0	0	4	4	Nil	Retained	No changes	-	ENTREPRENEUR SHIP
5	OE-1	230ECE07M	CONSTRUCTION MANAGEMENT	CMT	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
6	OE-1	230EBT04	BIOLOGY FOR ENGINEERS	BFE	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
7	OE-1	230EME01M	ROBOTICS	RBT	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
8	OE-1	230EME01R	ROBOTICS	RBT	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
9	OE-1	230ECE06M	EXPLORING OUR RESPONSES TO CLIMATE CHANGE	EORCC	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
10	OE-2	230EGN02	NATIONAL CADET CORPS - 2	NCC2	3	0	2	0	4	5	Nil	Retained	No changes	-	SKILL DEVELOPMENT
11	OE-2	230EGN05	NATIONAL SERVICE SCHEME-2	NSS2	3	0	2	0	4	5	Nil	Retained	No changes	-	SKILL DEVELOPMENT
12	OE-2	230EDT02	STRATEGIC FINANCIAL AND MARKETING PLANNING FOR ENTREPRENEURS	SFMPE	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
13	OE-2	230EEC11	IMAGE PROCESSING	IMP	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
14	OE-2	230EBT02	BIOMATERIALS	BIM	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
15	OE-2	230EEE05M	SELF-DRIVING CARS	SDC	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
16	OE-2	230ECE02	ENVIRONMENTAL POLLUTION CONTROL METHODS	EPCM	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
17	OE-2	230ECE03	SOLID AND HAZARDOUS WASTE MANAGEMENT	SHWM	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
18	OE-2	230ECE08 M	GEOGRAPHIC INFORMATION SYSTEMS	GIS	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT

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19	OE-3	23OEGN03	NATIONAL CADET CORPS - 3	NCC3	3	0	2	0	4	5	Nil	Retained	No changes	-	SKILL DEVELOPMENT
20	OE-3	23OEGN06	NATIONAL SERVICE SCHEME-3	NSS3	3	0	2	0	4	5	Nil	Retained	No changes	-	SKILL DEVELOPMENT
21	OE-3	23OEDT03	LEADERSHIP IN ENTREPRENEURIAL VENTURES	LEV	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
22	OE-3	23OEBT03	ENVIRONMENTAL BIOTECHNOLOGY	EBT	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
23	OE-3	23OEEE06M	ENERGY PRODUCTION, DISTRIBUTION & SAFETY	EPD&S	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
24	OE-3	23OECE05	DISASTER MANAGEMENT	RSGIS	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
25	OE-3	23OEEC12	NANO ELECTRONICS	NEN	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
26	OE-3	23OECE04	REMOTE SENSING & GIS	RSGIS	4	0	0	0	4	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
PROJECT COURSES															
1	PRI	23IE2040	SOCIAL INTERNSHIP	SIP	0	0	0	4	0	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
2	PRI	23IE3041	TECHNICAL INTERNSHIP	TIP	0	0	0	4	0	4	Nil	Retained	No changes	-	SKILL DEVELOPMENT
3	PRI	23IE4042	INDUSTRIAL INTERNSHIP	IIP	0	0	8	16	8	24	Nil	Retained	No changes	-	SKILL DEVELOPMENT
4	PRI	23IE4048	ENGINEERING PROJECT	EPJ	0	0	8	16	8	24	Nil	Retained	No changes	-	SKILL DEVELOPMENT
5	PRI	23IE4051	INDUSTRIAL INTERNSHIP - PHASE 1	IIP-1	0	0	8	16	8	24	Nil	Retained	No changes	-	SKILL DEVELOPMENT
6	PRI	23IE4052	INDUSTRIAL INTERNSHIP - PHASE 2	IIP-2	0	0	8	16	8	24	Nil	Retained	No changes	-	SKILL DEVELOPMENT
7	PRI	23IE4053	CAPSTONE PROJECT - 1	CP-1	0	0	8	16	8	24	Nil	Retained	No changes	-	SKILL DEVELOPMENT
8	PRI	23IE4054	CAPSTONE PROJECT - 2	CP-2	0	0	8	16	8	24	Nil	Retained	No changes	-	SKILL DEVELOPMENT

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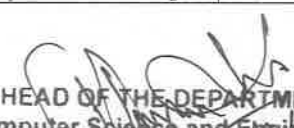Accredited by **NAAC** as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified

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9	PRI	23IE4055	INNOVATION PROJECT - 1	ICP-1	0	0	10	20	10	30	Nil	Retained	No changes	-	SKILL DEVELOPMENT
10	PRI	23IE4056	INNOVATION PROJECT - 2	ICP-2	0	0	10	20	10	30	Nil	Retained	No changes	-	SKILL DEVELOPMENT
11	PRI	23IE4057	RESEARCH PROJECT - 1	RCP-1	0	0	10	20	10	30	Nil	Retained	No changes	-	SKILL DEVELOPMENT
12	PRI	23IE4058	RESEARCH PROJECT - 2	RCP-2	0	0	10	20	10	30	Nil	Retained	No changes	-	SKILL DEVELOPMENT
AUDIT CAREER COURSES															
1	AUC-CAREER	CADCORL1V1	CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN	CAD: TICD	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
2	AUC-CAREER	CADCORL2V2	CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN	CAD: TICD	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
3	AUC-CAREER	CADGATL1V1	CAREER ADVANCEMENT: GATE TRAINING	CAD: GATE	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
4	AUC-CAREER	CADENTL1V1	CAREER ADVANCEMENT:ENTREPRENEURIAL CAREER PATHWAY TRAINING	CAD: ECPT	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
5	AUC-CAREER	CADUPSL1V1	CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAM TRAINING	CAD: UPSC	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
6	AUC-CAREER	CADUPSL2V2	CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAM TRAINING	CAD: UPSC	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT

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7	AUC-CAREER	CRTVQRL2V2	CAMPUS RECRUITMENT: QUANTITATIVE APTITUDE TRAINING	CRT: QAT	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
8	AUC-CAREER	CRTVQRL3V3	CAMPUS RECRUITMENT: REASONING APTITUDE TRAINING	CRT: RAT	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
9	AUC-CAREER	CRTVQRL1V1	CAMPUS RECRUITMENT: VERBAL APTITUDE TRAINING	CRT: VAT	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
10	AUC-CAREER	CADCATL1V1	CAREER ADVANCEMENT: CAT, GMAT TRAINING	CAD: CAT-GMAT	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
11	AUC-CAREER	CADGREL1V1	CAREER ADVANCEMENT: GRE, TOEFL & IELTS TRAINING	CAD: GRE-TOEFL-IELTS	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
12	AUC-CAREER	CRTCODL1V1	CAMPUS RECRUITMENT: LOGIC BUILDING SKILLS TRAINING	CRT: LBST	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
13	AUC-CAREER	CRTCODL2V2	CAMPUS RECRUITMENT: CODING SKILLS TRAINING - DATA STRUCTURES	CRT: CST-DS	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
14	AUC-CAREER	CRTCODL3V3	CAMPUS RECRUITMENT: CODING SKILLS TRAINING - ALGORITHMS	CRT: CST-ALG	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
15	AUC-CAREER	CRTCSSL1V1	CAMPUS RECRUITMENT: COMMUNICATION SKILLS TRAINING	CRT: CST	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT

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16	AUC-CAREER	CRTCSSL2V2	CAMPUS RECRUITMENT: SOFT SKILLS TRAINING	CRT: SST	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
17	AUC-CAREER	CRTINDL1V1	CAMPUS RECRUITMENT: INDUSTRY-SPECIFIC TRAINING	CRT: IST	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
18	AUC-CAREER	CRTINDL2V2	CAMPUS RECRUITMENT: INDUSTRY-SPECIFIC TRAINING	CRT: IST	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
19	AUC-CAREER	CRTTOLL1V1	CAMPUS RECRUITMENT: TOOL BASED TRAINING	CRT: TBT	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT
20	AUC-CAREER	CRTTOLL2V2	CAMPUS RECRUITMENT: TOOL BASED TRAINING	CRT: TBT	0	0	0	8	0	8	Nil	New	Alumni	To assess and enhance skills, knowledge, and strategies for career progression.	SKILL DEVELOPMENT

Total number of courses = 151

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

$$= ((3+38))*100/151 = 27.15\%$$

Percentage of Courses focusing on Employability= 97*100/151=64.23%

Percentage of Courses focusing on Entrepreneurship = 2*100/151=1%

Percentage of Courses focusing on Skill Development = 52*100/151=34.36%

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.Tech 2022-23 Admitted Batch Category wise Course Structure

S. No	Course Code	Course Title	Category	Mode	L	T	P	S	Cr	CH	Pre-requisite	New/ Revised/ Retained	Stake Holder	Justification	EES
1	22UC1101	INTEGRATED PROFESSIONAL ENGLISH	HSS	R	0	0	4	0	2	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
2	22UC2103	ESSENTIAL SKILLS FOR EMPLOYABILITY	HSS	R	0	0	4	0	2	4	NIL	Retained	No changes	-	EMPLOYABILITY
3	22UC0010	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS	HSS	R	2	0	0	0	2	2	NIL	Retained	No changes	-	EMPLOYABILITY
4	22UC1202	ENGLISH PROFICIENCY	HSS	R	0	0	4	0	2	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
5	22UC2204	CORPORATE READINESS SKILLS	HSS	R	0	0	4	0	2	4	NIL	Retained	No changes	-	EMPLOYABILITY
6	22UC1203	DESIGN THINKING FOR INNOVATION	HSS	R	0	0	4	0	2	4	NIL	Retained	No changes		ENTREPRENEURSHIP
7	22UC0012	INNOVATION MANAGEMENT	HSS	R	0	0	4	0	2	4	NIL	Retained	No changes		ENTREPRENEURSHIP
8	22UC0021	SOCIAL IMMERSIVE LEARNING	HSS	R	0	0	0	4	1	4	NIL	New	Alumni	To equip students with the necessary tools for success in the professional world	SKILL DEVELOPMENT
9	22UC0022	SOCIAL IMMERSIVE LEARNING	HSS	R	0	0	0	4	1	4	NIL	New	Alumni	To equip students with the necessary tools for	SKILL DEVELOPMENT

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Sl. No	Category	Course Code	Course Name	Short Name	L	T	P	S	Cr	Ch	Pre Requisite	New /Revised/ Retained	Stake Holder	Justification for Considering the Feedback	EES
			No. of Courses and Credits		1				3						
19	VAC		VALUE ADDED COURSE	VAC-1	2	0	0	0	0	0	NIL	Retained	No changes	-	-
20	VAC		VALUE ADDED COURSE	VAC-2	0	0	0	8	0	0	NIL	Retained	No changes	-	-
			No. of Courses and Credits		2				0						
			TOTAL COURSES		20		**TOTAL CREDITS**		80						
PROFESSIONAL ELECTIVE COURSES (PEC)															
1	PE-1	23CS51A1	ARTIFICIAL NEURAL NETWORKS	ANN	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
2	PE-1	23CS51S1	CYBER DEFENCE AND CRYPT ANALYSIS	CDCA	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
3	PE-1	23CS51C1	WIRELESS AND MOBILE SECURITY	WMS	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
4	PE-1	23CS51F1	ENTERPRISE DEVELOPMENT PROGRAMMING	EDP	2	0	2	0	3	4	NIL	New	Academic Peer	To create scalable, secure, and efficient applications tailored for large organizations and complex business needs.	EMPLOYABILITY
5	PE2	23CS52A2	BIG DATA OPTIMIZATION TECHNIQUES	BDOT	2	0	2	0	3	4	EDBS	Retained	No changes	-	EMPLOYABILITY
6	PE2	23CS52S2	NETWORK AND INFRASTRUCTURE SECURITY	NIS	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY

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														success in the professional world	
10	22UC0023	SOCIAL IMMERSIVE LEARNING	HSS	R	0	0	0	4	1	4	NIL	New	Alumni	To equip students with the necessary tools for success in the professional world	SKILL DEVELOPMENT
11	22UC0024	SOCIAL IMMERSIVE LEARNING	HSS	R	0	0	0	4	1	4	NIL	New	Alumni	To equip students with the necessary tools for success in the professional world	SKILL DEVELOPMENT
12	FL	FOREIGN LANGUAGE ELECTIVE	HSS	R	2	0	0	0	2	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
13	ME	MANAGEMENT ELECTIVE	HSS	R	2	0	0	0	2	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
							Total Credits		22						
14	22MT1101	MATHEMATICAL FOR COMPUTING	BSC	R	2	2	0	2	4.5	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
15	22MT2103	PROBABILITY, STATISTICS & QUEUEING THEORY	BSC	R	2	2	0	0	4	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT

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16	SE-1	PHYSICS ELECTIVE	BSC	R	3	0	2	0	4	5	NIL	Retained	No changes	-	SKILL DEVELOPMENT
17	SE-2	CHEMISTRY ELECTIVE	BSC	R	3	0	2	0	4	5	NIL	Retained	No changes	-	SKILL DEVELOPMENT
18	22MT2102	MATHEMATICS FOR ENGINEERS	BSC	R	2	1	0	0	3	3	NIL	Retained	No changes	-	SKILL DEVELOPMENT
19	22CS2204	MATHEMATICAL PROGRAMMING	BSC	R	2	2	0	0	4	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
								Total Credits	**23.5**						
20	22SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	ESC	R	3	0	2	6	5.5	11	NIL	Retained	No changes	-	EMPLOYABILITY
21	22EC1101	DIGITAL LOGIC & PROCESSORS	ESC	R	3	0	2	0	4	5	NIL	Retained	No changes	-	EMPLOYABILITY
22	22ME1103	DIGITAL TOOLS WORKSHOP	ESC	R	0	0	4	0	2	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
23	22SC1202	DATA STRUCTURES	ESC	R	3	0	2	4	5	9	22SC1101	Retained	No changes	-	EMPLOYABILITY
24	22EC1202	COMPUTER ORGANIZATION & ARCHITECTURE	ESC	R	2	0	0	0	2	2	22EC1101	Retained	No changes	-	EMPLOYABILITY
25	22SC1209	IOT WORKSHOP	ESC	R	0	0	4	0	2	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
26	22SC1203	COMPUTATIONAL THINKING FOR OBJECT-ORIENTED DESIGN	ESC	R	3	0	2	4	5	9	22SC1101	Retained	No changes	-	SKILL DEVELOPMENT

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27	22UC3108	PROBLEM SOLVING & REASONING SKILLS-1	ESC	R	0	0	0	4	1	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
28	22UC3209	PROBLEM SOLVING & REASONING SKILLS-2	ESC	R	0	0	0	4	1	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
						Total Credits			27.5						
29	22CS2108	ENTERPRISE PROGRAMMING	PCC	R	2	0	2	4	4	8	22SC1203	Retained	No changes	-	EMPLOYABILITY
30	22CS2109	OPERATING SYSTEMS	PCC	R	2	0	2	0	3	4	22EC1202	Retained	No changes	-	EMPLOYABILITY
31	22CS2215	AUTOMATA THEORY & FORMAL LANGUAGES	PCC	R	2	1	0	0	3	3	22MT1202	Retained	No changes	-	EMPLOYABILITY
32	22CS2116	ADVANCED OBJECT ORIENTED PROGRAMMING	PCC	R	2	0	2	4	4	8	22SC1203	Retained	No changes	-	EMPLOYABILITY
33	22CS2110	DATABASE MANAGEMENT SYSTEMS	PCC	R	2	0	2	0	3	4	22SC1202	Retained	No changes	-	EMPLOYABILITY
34	22CI2001	ADAPTIVE SOFTWARE ENGINEERING	PCC	R	2	1	0	0	3	3	NIL	New	Student	To excel in the rapidly evolving field of software engineering.	EMPLOYABILITY
35	22EC2210	NETWORK PROTOCOLS & SECURITY	PCC	R	3	0	2	0	4	5	22EC1202	New	Industry Person	To cover security aspects	EMPLOYABILITY
36	22AD2001	DATA DRIVEN ARTIFICIAL INTELLIGENT SYSTEMS	PCC	R	2	0	2	0	3	4	22SC1101	Retained	No changes	-	EMPLOYABILITY

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37	22CS2214	DESIGN & ANALYSIS OF ALGORITHMS	PCC	R	2	0	2	4	4	8	22SC1202	Retained	No changes	-	EMPLOYABILITY
38	22CS4115	PARALLEL & DISTRIBUTED COMPUTING	PCC	R	2	0	2	0	3	3	22CS2109	Retained	No changes	-	EMPLOYABILITY
							Total Credits		34						
39	FC-1	FLEXI CORE COURSE - 1	FCC	R	2	0	2	0	3	4	-	-	-	-	-
40	FC-2	FLEXI CORE COURSE - 2	FCC	R	2	0	2	0	3	4	-	-	-	-	-
41	FC-3	FLEXI CORE COURSE - 3	FCC	R	2	0	2	0	3	4	-	-	-	-	-
							Total Credits		9						
42	PE-1	PROFESSIONAL ELECTIVE - 1	PEC	R	2	0	2	4	4	8	-	-	-	-	-
43	PE-2	PROFESSIONAL ELECTIVE - 2	PEC	R	2	0	2	0	3	4	-	-	-	-	-
44	PE-3	PROFESSIONAL ELECTIVE - 3	PEC	R	2	0	2	4	4	8	-	-	-	-	-
45	PE-4	PROFESSIONAL ELECTIVE - 4	PEC	M	4	0	0	0	4	4	-	-	-	-	-
46	PE-5	PROFESSIONAL ELECTIVE - 5	PEC	R	3	0	0	0	3	3	-	-	-	-	-
							Total Credits		18						
47	OE-1	OPEN ELECTIVE - 1	OEC	R	3	0	0	0	3	3	-	-	-	-	-

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48	OE-2	OPEN ELECTIVE - 2	OEC	R	3	0	0	0	3	3	-	-	-	-	-
49	OE-3	OPEN ELECTIVE - 3	OEC	R	3	0	0	0	3	3	-	-	-	-	-
					Total Credits				9						
50	22IE2040	SOCIAL INTERNSHIP	PJC	R	0	0	0	4	0	4		Retained	No changes	-	SKILL DEVELOPMENT
51	22IE3041	TECHNICAL INTERNSHIP	PJC	R	0	0	0	8	0	8		Retained	No changes	-	SKILL DEVELOPMENT
52	22IE4043	RESEARCH INTERNSHIP	PJC	R	0	0	0	8	0	8		Retained	No changes	-	SKILL DEVELOPMENT
53	22IE3043	TERM PAPER	PJC	R	0	0	4	0	2	4		Retained	No changes	-	SKILL DEVELOPMENT
54	22IE4053R	ENGINEERING CAPSTONE PROJECT - PHASE 1	PJC	R	0	0	6	12	6	18		Retained	No changes	-	SKILL DEVELOPMENT
55	22IE4054R	ENGINEERING CAPSTONE PROJECT - PHASE 2	PJC	R	0	0	6	12	6	18		Retained	No changes	-	SKILL DEVELOPMENT
56	22IE4048	ENGINEERING PROJECT	PJC		0	0	6	12	6	18		Retained	No changes	-	SKILL DEVELOPMENT
57	22IE4051	INDUSTRIAL INTERNSHIP - PHASE 1	PJC		0	0	0	24	6	24		Retained	No changes	-	SKILL DEVELOPMENT
58	22IE4052	INDUSTRIAL INTERNSHIP - PHASE 2	PJC		0	0	0	24	6	24		Retained	No changes	-	SKILL DEVELOPMENT
59	22IE4042	INDUSTRIAL INTERNSHIP	PJC		0	0	0	24	6	24		Retained	No changes	-	SKILL DEVELOPMENT

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S. No	Course Code	Course Title	Category	Mode	L	T	P	S	Cr	CH	Pre-requisite	New/ Revised/ Retained	Stake Holder	Justification	EES
							Total Credits		14						
60		TOOL BASED LEARNING - 1	SDC	R	0	0	0	4	0	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
61		TOOL BASED LEARNING - 2	SDC	R	0	0	0	4	0	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
62		SKILL DEVELOPMENT PROJECT - 1	SDC	R	0	0	2	4	2	6	NIL	Retained	No changes	-	SKILL DEVELOPMENT
63		SKILL DEVELOPMENT PROJECT - 2	SDC	R	0	0	2	4	2	6	22CS2108	Retained	No changes	-	SKILL DEVELOPMENT
64		SKILL DEVELOPMENT PROJECT - 3	SDC	R	0	0	2	4	2	6	22CS2108	Retained	No changes	-	SKILL DEVELOPMENT
65		SKILL DEVELOPMENT PROJECT – 4 (Specialization)	SDC	R	0	0	2	4	2	6	22TS2006	Retained	No changes	-	SKILL DEVELOPMENT
							Total Credits		8	32					
66	22UC0010	ENTREPRENEURSHIP	AUC	R	2	0	0	0	0	2	NIL	Retained	No changes	-	ENTREPRENEURSHIP
67	22UC0008	INDIAN HERITAGE & CULTURE	AUC	R	2	0	0	0	0	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
68	22UC0016	GENDER & SOCIAL EQUALITY	AUC	R	2	0	0	0	0	2	NIL	New	Academic Peer	To focus on contemporary societal issues and professional ethical values.	SKILL DEVELOPMENT

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69	22UC0019	ESSENCE OF INDIAN KNOWLEDGE TRADITION	AUC	R	2	0	0	0	0	2	NIL	New	Academic Peer	To provide a rich and diverse perspective that complements global education.	SKILL DEVELOPMENT
70	22UC0008	INDIAN CONSTITUTION	AUC	R	2	0	0	0	0	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
71	22UC0009	ECOLOGY & ENVIRONMENT	AUC	R	2	0	0	0	0	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
72	22UC0020	INDIAN KNOWLEDGE SYSTEMS - ENGINEERING ELECTIVE	AUC	R	2	0	0	0	0	2	NIL	New	Academic Peer	To provide a rich and diverse perspective that complements global education.	SKILL DEVELOPMENT
						Total Credits			0						
73	VAC-1	VALUE ADDED COURSE - 1	VAC	R	0	0	0	8	0	0	NIL	Retained	No changes	-	SKILL DEVELOPMENT
74	VAC-2	VALUE ADDED COURSE - 2	VAC	R	0	0	0	8	0	0	NIL	Retained	No changes	-	SKILL DEVELOPMENT
75	VAC-3	VALUE ADDED COURSE - 3	VAC	R	0	0	0	8	0	0	NIL	Retained	No changes	-	SKILL DEVELOPMENT

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76	VAC-4	VALUE ADDED COURSE - 4	VAC	R	0	0	0	8	0	0	NIL	Retained	No changes	-	SKILL DEVELOPMENT
77	VAC-5	VALUE ADDED COURSE - 4	VAC	R	0	0	0	8	0	0	NIL	Retained	No changes	-	SKILL DEVELOPMENT
78	SP	SPORTS CERTIFICATE	Sports	R	0	0	0	2	0	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
									0						
				Total Credits					165						

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Annexure-5(b)

2023-24 M. Tech – CSE Admitted Batch Category Wise Course Structure

Sl. No	Category	Course Code	Course Name	Short Name	L	T	P	S	Cr	Ch	Pre Requisite	New /Revised/ Retained	Stake Holder	Justification for Considering the Feedback	EES
1	AUC	23CS5207/ 23CS5206	AWS CERTIFIED CLOUD PRACTITIONER / JUNIPER NETWORKS CERTIFIED ASSOCIATE, JUNOS (JNCIA-JUNOS)	AWSCP/ JUNOS	0	0	4	0	0	4	NIL	Retained	No changes	-	EMPLOYABILITY
2	AUC	23UC5201	PROFESSIONAL COMMUNICATION SKILLS	PCS	0	0	4	0	0	4	NIL	Retained	No changes	-	EMPLOYABILITY
			No. of Courses and Credits		**2**				**0**						
3	ESC	23MT5101	DISCRETE STRUCTURES AND MATRIX COMPUTATION	DSMC	2	2	0	0	4	4	NIL	Retained	No changes	-	SKILL DEVELOPMENT
			No. of Courses and Credits		**1**				**4**						
4	PCC	23CS5101	OBJECT ORIENTED PROGRAMMING	OOP	2	0	2	4	4	8	NIL	New	Industry Person	To develop the skills to structure code using objects and classes, enabling modular, reusable, and maintainable software design.	EMPLOYABILITY
5	PCC	23CS5102	ECLECTIC DATABASE SYSTEMS	EDBS	3	0	2	0	4	5	NIL	Retained	No changes	-	EMPLOYABILITY
6	PCC	23CS5103	ADVANCED OPERATING SYSTEMS	AOS	3	0	2	0	4	5	NIL	Retained	No changes	-	EMPLOYABILITY

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7	PCC	23CS5204	DATA STRUCTURES AND ALGORITHMS	DSA	3	0	2	0	4	5	DSMC	Retained	No changes	-	SKILL DEVELOPMENT
8	PCC	23CS5205	AGILE BASED SOFTWARE ENGINEERING	ASE	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
			No. of Courses and Credits		5				19						
9	PEC		PROFESSIONAL ELECTIVE - 1	PE-1	2	0	2	0	3	4		Retained	No changes	-	-
10	PEC		PROFESSIONAL ELECTIVE - 2	PE-2	2	0	2	0	3	4		Retained	No changes	-	-
11	PEC		PROFESSIONAL ELECTIVE - 3	PE-3	3	0	2	0	4	5		Retained	No changes	-	-
12	PEC		PROFESSIONAL ELECTIVE - 4	PE-4	3	0	0	0	3	3		Retained	No changes	-	-
13	PEC		PROFESSIONAL ELECTIVE - 5	PE-5	3	0	0	0	3	3		Retained	No changes	-	-
			No. of Courses and Credits		5				16						
14	PRI	23IE5201	ESSENTIALS OF RESEARCH DESIGN	ERD	1	1	0	0	2	2	NIL	Retained	No changes	-	SKILL DEVELOPMENT
15	PRI	23IE5149	TERM PAPER	TP	0	0	8	0	4	8	NIL	Retained	No changes	-	SKILL DEVELOPMENT
16	PRI	23IE6150/ 23IE6151	DISSERTATION-1/ INTERNSHIP-1	DIS	0	0	32	0	16	24/0	TP	Retained	No changes	-	EMPLOYABILITY
17	PRI	23IE6250/ 23IE6251	DISSERTATION-2/ INTERNSHIP-2	DIS	0	0	32	0	16	24/0	TP	Retained	No changes	-	EMPLOYABILITY
			No. of Courses and Credits		4				38						
18	OE	OE	IPR AND PATENT LAWS	IPL	3	0	0	0	3	0	NIL	Retained	No changes	-	EMPLOYABILITY

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Sl. No	Category	Course Code	Course Name	Short Name	L	T	P	S	Cr	Ch	Pre Requisite	New /Revised/ Retained	Stake Holder	Justification for Considering the Feedback	EES
			No. of Courses and Credits		1				3						
19	VAC		VALUE ADDED COURSE	VAC-1	2	0	0	0	0	0	NIL	Retained	No changes	-	-
20	VAC		VALUE ADDED COURSE	VAC-2	2	0	0	0	0	0	NIL	Retained	No changes	-	-
			No. of Courses and Credits		2				0						
			TOTAL COURSES		20		TOTAL CREDITS		80						
PROFESSIONAL ELECTIVE COURSES (PEC)															
1	PE-1	23CS51A1	ARTIFICIAL NEURAL NETWORKS	ANN	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
2	PE-1	23CS51S1	CYBER DEFENCE AND CRYPT ANALYSIS	CDCA	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
3	PE-1	23CS51C1	WIRELESS AND MOBILE SECURITY	WMS	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
4	PE-1	23CS51F1	ENTERPRISE DEVELOPMENT PROGRAMMING	EDP	2	0	2	0	3	4	NIL	New	Academic Peer	To create scalable, secure, and efficient applications tailored for large organizations and complex business needs.	EMPLOYABILITY
5	PE2	23CS52A2	BIG DATA OPTIMIZATION TECHNIQUES	BDOT	2	0	2	0	3	4	EDBS	Retained	No changes	-	EMPLOYABILITY
6	PE2	23CS52S2	NETWORK AND INFRASTRUCTURE SECURITY	NIS	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY

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7	PE2	23CS52C2	CLOUD INFRASTRUCTURE AND SERVICES	CIS	2	0	2	0	3	4	NIL	Retained	No changes	-	EMPLOYABILITY
8	PE2	23CS52F2	FULL STACK DEVELOPMENT USING JAVA	JFSD	2	0	2	0	3	4	COOP	New	Academic Peer	To build complete, dynamic web applications using Java, covering both client-side and server-side development.	EMPLOYABILITY
9	PE3	23CS52A3	COGNITIVE COMPUTING AND ANALYTICS	CCA	3	0	2	0	4	5	NIL	Retained	No changes	-	EMPLOYABILITY
10	PE3	23CS52S3	SECURITY GOVERNANCE AND MANAGEMENT	SGM	3	0	2	0	4	5	NIL	Retained	No changes	-	EMPLOYABILITY
11	PE3	23CS52F3	CONTINUOUS DELIVERY AND DEVOPS	CDD	3	0	2	0	4	5	NIL	Retained	No changes	-	EMPLOYABILITY
12	PE4	23CS52A4	DEEP LEARNING	DL	3	0	0	0	3	3	ANN	Retained	No changes	-	EMPLOYABILITY
13	PE4	23CS52S4	SECURITY FOR CLOUD SYSTEMS SERVICES	SCSS	3	0	0	0	3	3	NIL	Retained	No changes	-	EMPLOYABILITY
14	PE4	23CS52C4	IMAGE PROCESSING	IP	3	0	0	0	3	3	NIL	Retained	No changes	-	EMPLOYABILITY
15	PE4	23CS52F4	DATA VISUALIZATION TECHNIQUES	DVT	3	0	0	0	3	3	NIL	Retained	No changes	-	EMPLOYABILITY
16	PE5	23CS61A5	DATA VISUALIZATION TECHNIQUES	DVT	3	0	0	0	3	3/0	NIL	Retained	No changes	-	EMPLOYABILITY
17	PE5	23CS61S5	INTRODUCTION TO BLOCKCHAIN AND CRYPTO CURRENCIES	IBCC	3	0	0	0	3	3/0	NIL	Retained	No changes	-	EMPLOYABILITY
18	PE5	23CS61C5	AR AND VR APPLICATION DEVELOPMENT	AR & VR	3	0	0	0	3	3/0	NIL	Retained	No changes	-	EMPLOYABILITY

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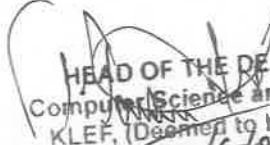
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Sl. No	Category	Course Code	Course Name	Short Name	L	T	P	S	Cr	Ch	Pre Requisite	New /Revised/ Retained	Stake Holder	Justification for Considering the Feedback	EES
19	PE5	23CS61F5	PROBLEM-SOLVING USING PYTHON PROGRAMMING	PSPP	3	0	0	0	3	3/0	NIL	New	Academic Peer	To efficiently solve complex problems by writing clear, logical, and effective Python code.	EMPLOYABILITY
							VALUE ADDED COURSES								
1	VAC	23CC3099	CLUSTERING & CLASSIFICATION WITH MACHINE LEARNING IN PYTHON	CCMLP	2	0	0	0	0	0	NIL	Retained	No changes	-	EMPLOYABILITY
2	VAC	23CC3100	CRYPTOCURRENCY INVESTMENT	CCI	2	0	0	0	0	0	NIL	Retained	No changes	-	EMPLOYABILITY
3	VAC	23CC3101	ADVANCED CSS AND SASS: FLEXBOX, GRID, ANIMATIONS	ACSFGA	2	0	0	0	0	0	NIL	Retained	No changes	-	EMPLOYABILITY

Total number of courses = 34

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

= ((0+4))*100/34 = 11.76%

Percentage of Courses focusing on Employability= 30*100/34=88.24%

Percentage of Courses focusing on Skill Development = 4*100/34=11.76%

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-5(c)

Certificate Course in Computational Thinking & Engineering Science 2023-24 Admitted Batch Category Wise Course Structure

SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
1	AUC	23UC0018	FUNDAMENTALS OF MATHEMATICS	FOM	3	0	0	0	0	3	NIL	SKILL DEVELOPMENT
2	AUC	23UC0017	INDIAN KNOWLEDGE SYSTEMS: VEDIC MATHEMATICS	IKSVM	0	0	0	2	0	2	NIL	SKILL DEVELOPMENT
3	HAS	23UC0026	HUMAN VALUES, GENDER EQUALITY & PROFESSIONAL ETHICS	HGP	2	0	0	0	2	2	NIL	SKILL DEVELOPMENT
4	HAS	23UC1203	DESIGN THINKING AND INNOVATION	DTI	0	0	4	0	2	4	NIL	ENTERPRENEURSHIP
5	HAS	23UC1101	INTEGRATED PROFESSIONAL ENGLISH	IPE	0	0	4	0	2	4	NIL	SKILL DEVELOPMENT
6	HAS	23UC1202	ENGLISH PROFICIENCY	EP	0	0	4	0	2	4	NIL	SKILL DEVELOPMENT
7	SIL	22UC0021	SOCIAL IMMERSIVE LEARNING	SIL-1	0	0	0	4	1	4	NIL	SKILL DEVELOPMENT
8	BSC	23MT1001	LINEAR ALGEBRA AND CALCULUS FOR ENGINEERS	LACE	2	2	0	0	4	4	NIL	SKILL DEVELOPMENT
9	BSC	23MT1002	DISCRETE STRUCTURES	DIS	2	2	0	0	4	4	NIL	SKILL DEVELOPMENT
10	ESC	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	CTSD	3	0	2	4	5	9	NIL	SKILL DEVELOPMENT
11	ESC	23SC1202	DATA STRUCTURES	DS	2	0	2	4	4	8	CTSD	EMPLOYABILITY

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SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
12	ESC	23SC1203	COMPUTATIONAL THINKING FOR OBJECT-ORIENTED DESIGN	CTOD	2	0	2	4	4	8	CTSD	SKILL DEVELOPMENT
13	ESC	23EC1101	FUNDAMENTALS OF IOT AND SENSORS	FITS	3	0	4	0	5	7	NIL	EMPLOYABILITY
14	ESC	23ME1103	DESIGN TOOL WORKSHOP	DTW	0	0	4	0	2	4	NIL	EMPLOYABILITY
15	ESC	23EC1202	DIGITAL DESIGN & COMPUTER ARCHITECTURE	DDCA	3	0	2	0	4	5	Nil	EMPLOYABILITY
16	ESC	23EC1203	BASIC ELECTRICAL AND ELECTRONIC CIRCUITS	BEEC	2	0	0	0	2	2	Nil	SKILL DEVELOPMENT
17	SDC		SKILL INTERNSHIP	SI	0	0	0	16	4	16	Nil	SKILL DEVELOPMENT
							TOTAL CREDITS		44			

Total number of courses = 17

Percentage of Courses focusing on Employability= 4*100/17=23%

Percentage of Courses focusing on Entrepreneurship = 1*100/17=6%

Percentage of Courses focusing on Skill Development = 12*100/17=71%

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-5(d)

Diploma in Computer Science 2023-24 Admitted Batch Category Wise Course Structure

SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
1	AUC	22UC0019	ESSENCE OF INDIAN KNOWLEDGE TRADITION	EIKT	2	0	0	0	0	2	NIL	SKILL DEVELOPMENT
2	AUC	22UC0020	INDIAN KNOWLEDGE SYSTEMS: ENGINEERING ELECTIVE	IKS	2	0	0	0	0	2	NIL	SKILL DEVELOPMENT
3	AUC	23UC0018	FUNDAMENTALS OF MATHEMATICS	FOM	3	0	0	0	0	3	NIL	SKILL DEVELOPMENT
4	AUC	23UC0017	INDIAN KNOWLEDGE SYSTEMS: VEDIC MATHEMATICS	IKSVM	0	0	0	2	0	2	NIL	SKILL DEVELOPMENT
5	HAS	23UC0026	HUMAN VALUES, GENDER EQUALITY & PROFESSIONAL ETHICS	HGP	2	0	0	0	2	2	NIL	SKILL DEVELOPMENT
6	HAS	23UC1203	DESIGN THINKING AND INNOVATION	DTI	0	0	4	0	2	4	NIL	ENTERPRENEURSHIP
7	HAS	23UC1101	INTEGRATED PROFESSIONAL ENGLISH	IPE	0	0	4	0	2	4	NIL	SKILL DEVELOPMENT
8	HAS	23UC1202	ENGLISH PROFICIENCY	EP	0	0	4	0	2	4	NIL	SKILL DEVELOPMENT
9	HAS	23FLXXXX	FOREIGN LANGUAGE ELECTIVE	FL	3	0	0	0	3	3	NIL	SKILL DEVELOPMENT
10	HAS	23MBXXXX	MANAGEMENT ELECTIVE	ME	4	0	0	0	4	4	NIL	SKILL DEVELOPMENT
11	SIL	22UC0021	SOCIAL IMMERSIVE LEARNING	SIL-1	0	0	0	4	1	4	NIL	SKILL DEVELOPMENT
12	SIL	22UC0022	SOCIAL IMMERSIVE LEARNING	SIL-2	0	0	0	4	1	4	NIL	SKILL DEVELOPMENT
13	SIL	22UC0023	SOCIAL IMMERSIVE LEARNING	SIL-3	0	0	0	4	1	4	NIL	SKILL DEVELOPMENT

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SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
14	BSC	23MT1001	LINEAR ALGEBRA AND CALCULUS FOR ENGINEERS	LACE	2	2	0	0	4	4	NIL	SKILL DEVELOPMENT
15	BSC	23MT1002	DISCRETE STRUCTURES	DIS	2	2	0	0	4	4	NIL	SKILL DEVELOPMENT
16	BSC	23MTXXXX	MATHEMATICS ELECTIVE-1	ME-1	2	2	0	0	4	4	-	SKILL DEVELOPMENT
17	BSC	23MTXXXX	MATHEMATICS ELECTIVE-2	ME-2	2	2	0	0	4	4	-	SKILL DEVELOPMENT
18	ESC	23AD2001O	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	AIML	3	0	2	0	4	5	CTSD	EMPLOYABILITY
19	ESC	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	CTSD	3	0	2	4	5	9	NIL	SKILL DEVELOPMENT
20	ESC	23SC1202	DATA STRUCTURES	DS	2	0	2	4	4	8	CTSD	EMPLOYABILITY
21	ESC	23SC1203	COMPUTATIONAL THINKING FOR OBJECT-ORIENTED DESIGN	CTOD	2	0	2	4	4	8	CTSD	SKILL DEVELOPMENT
22	ESC	23EC1101	FUNDAMENTALS OF IOT AND SENSORS	FITS	3	0	4	0	5	7	NIL	EMPLOYABILITY
23	ESC	23ME1103	DESIGN TOOL WORKSHOP	DTW	0	0	4	0	2	4	NIL	EMPLOYABILITY
24	ESC	23EC1202	DIGITAL DESIGN & COMPUTER ARCHITECTURE	DDCA	3	0	2	0	4	5	Nil	EMPLOYABILITY
25	ESC	23EC1203	BASIC ELECTRICAL AND ELECTRONIC CIRCUITS	BEEC	2	0	0	0	2	2	Nil	SKILL DEVELOPMENT
26	PCC	23CS2104R	OPERATING SYSTEMS	OS	3	0	2	0	4	5	DDCA	EMPLOYABILITY
27	PCC	23CS2103R	ADVANCED OBJECT ORIENTED PROGRAMMING	AOOP	3	0	2	4	5	9	CTOD	EMPLOYABILITY
28	PCC	23CS2205R	DESIGN AND ANALYSIS OF ALGORITHMS	DAA	3	0	2	4	5	9	DS	EMPLOYABILITY

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29	PCC	23EC2210R	NETWORK PROTOCOLS AND SECURITY	NPS	3	0	2	0	4	5	DDCA	EMPLOYABILITY
30	PCC	23AD2102R	DATABASE MANAGEMENT SYSTEMS	DBMS	3	0	2	0	4	5	DS	EMPLOYABILITY
31	SDC	23SDCS11R	LINUX ADMINISTRATION & AUTOMATION	LAA	0	0	2	4	2	6	NIL	SKILL DEVELOPMENT
32	SDC	23SDCS12R	FULL STACK APPLICATION DEVELOPMENT	FSD	0	0	2	4	2	6	NIL	SKILL DEVELOPMENT
33	PRI	23IE2040	SOCIAL INTERNSHIP	SIP	0	0	0	4	0	4	-	SKILL DEVELOPMENT
34	VAC		VALUE ADDED CERTIFICATION-1	VAC-CERT	0	0	0	8	0	8	-	SKILL DEVELOPMENT
35	SDC		SKILL INTERNSHIP	SI	0	0	0	16	4	16	-	SKILL DEVELOPMENT
								TOTAL CREDITS	84			

Total number of courses = 35

Percentage of Courses focusing on Employability= 10*100/35=28.57%

Percentage of Courses focusing on Entrepreneurship = 1*100/35=2.85%

Percentage of Courses focusing on Skill Development = 24*100/35=68.57%

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-5(e)

Bachelor of Science - Computer Engineering 2023-24 Admitted Batch Category Wise Course Structure

SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
1	AUC	22UC0019	ESSENCE OF INDIAN KNOWLEDGE TRADITION	EIKT	2	0	0	0	0	2	NIL	SKILL DEVELOPMENT
2	AUC	22UC0020	INDIAN KNOWLEDGE SYSTEMS: ENGINEERING ELECTIVE	IKS	2	0	0	0	0	2	NIL	SKILL DEVELOPMENT
3	AUC	23UC0008	INDIAN CONSTITUTION	IC	2	0	0	0	0	2	NIL	SKILL DEVELOPMENT
4	AUC	23UC0018	FUNDAMENTALS OF MATHEMATICS	FOM	3	0	0	0	0	3	NIL	SKILL DEVELOPMENT
5	AUC	23UC0017	INDIAN KNOWLEDGE SYSTEMS: VEDIC MATHEMATICS	IKSVM	0	0	0	2	0	2	NIL	SKILL DEVELOPMENT
6	AUC	23UC0009	ECOLOGY AND ENVIRONMENT	E&E	2	0	0	0	0	2	NIL	SKILL DEVELOPMENT
7	HAS	23UC0026	HUMAN VALUES, GENDER EQUALITY & PROFESSIONAL ETHICS	HGP	2	0	0	0	2	2	NIL	SKILL DEVELOPMENT
8	HAS	23UC1203	DESIGN THINKING AND INNOVATION	DTI	0	0	4	0	2	4	NIL	ENTERPRENEURSHIP
9	HAS	23UC1101	INTEGRATED PROFESSIONAL ENGLISH	IPE	0	0	4	0	2	4	NIL	SKILL DEVELOPMENT
10	HAS	23UC1202	ENGLISH PROFICIENCY	EP	0	0	4	0	2	4	NIL	SKILL DEVELOPMENT
11	HAS	23UC0027	LEADERSHIP AND MANAGEMENT SKILLS	LAMS	0	0	4	0	2	4	NIL	EMPLOYABILITY

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SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
12	HAS	23FLXXXX	FOREIGN LANGUAGE ELECTIVE	FL	3	0	0	0	3	3	NIL	SKILL DEVELOPMENT
13	HAS	23MBXXXX	MANAGEMENT ELECTIVE	ME	4	0	0	0	4	4	NIL	SKILL DEVELOPMENT
14	SIL	22UC0021	SOCIAL IMMERSIVE LEARNING	SIL-1	0	0	0	4	1	4	NIL	SKILL DEVELOPMENT
15	SIL	22UC0022	SOCIAL IMMERSIVE LEARNING	SIL-2	0	0	0	4	1	4	NIL	SKILL DEVELOPMENT
16	SIL	22UC0023	SOCIAL IMMERSIVE LEARNING	SIL-3	0	0	0	4	1	4	NIL	SKILL DEVELOPMENT
17	BSC	23MT1001	LINEAR ALGEBRA AND CALCULUS FOR ENGINEERS	LACE	2	2	0	0	4	4	NIL	SKILL DEVELOPMENT
18	BSC	23MT1002	DISCRETE STRUCTURES	DIS	2	2	0	0	4	4	NIL	SKILL DEVELOPMENT
19	BSC	23MTXXXX	MATHEMATICS ELECTIVE-1	ME-1	2	2	0	0	4	4	-	SKILL DEVELOPMENT
20	BSC	23MTXXXX	MATHEMATICS ELECTIVE-2	ME-2	2	2	0	0	4	4	-	SKILL DEVELOPMENT
21	BSC	23MTXXXX	MATHEMATICS ELECTIVE-3	ME-3	2	2	0	0	4	4	-	EMPLOYABILITY
22	BSC	23XXXXXX	SCIENCE ELECTIVE-1	SCE-1	2	2	0	0	4	4	DIS	SKILL DEVELOPMENT
23	ESC	23AD2001O	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	AIML	3	0	2	0	4	5	CTSD	EMPLOYABILITY
24	ESC	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	CTSD	3	0	2	4	5	9	NIL	SKILL DEVELOPMENT
25	ESC	23SC1202	DATA STRUCTURES	DS	2	0	2	4	4	8	CTSD	EMPLOYABILITY
26	ESC	23SC1203	COMPUTATIONAL THINKING FOR OBJECT-ORIENTED DESIGN	CTOD	2	0	2	4	4	8	CTSD	SKILL DEVELOPMENT

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SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
27	ESC	23EC1101	FUNDAMENTALS OF IOT AND SENSORS	FITS	3	0	4	0	5	7	NIL	EMPLOYABILITY
28	ESC	23ME1103	DESIGN TOOL WORKSHOP	DTW	0	0	4	0	2	4	NIL	EMPLOYABILITY
29	ESC	23EC1202	DIGITAL DESIGN & COMPUTER ARCHITECTURE	DDCA	3	0	2	0	4	5	Nil	EMPLOYABILITY
30	ESC	23EC1203	BASIC ELECTRICAL AND ELECTRONIC CIRCUITS	BEEC	2	0	0	0	2	2	Nil	SKILL DEVELOPMENT
31	PCC	23CS2104R	OPERATING SYSTEMS	OS	3	0	2	0	4	5	DDCA	EMPLOYABILITY
32	PCC	23CS2103R	ADVANCED OBJECT ORIENTED PROGRAMMING	AOOP	3	0	2	4	5	9	CTOD	EMPLOYABILITY
33	PCC	23CS2205R	DESIGN AND ANALYSIS OF ALGORITHMS	DAA	3	0	2	4	5	9	DS	EMPLOYABILITY
34	PCC	23EC2210R	NETWORK PROTOCOLS AND SECURITY	NPS	3	0	2	0	4	5	DDCA	EMPLOYABILITY
35	PCC	23AD2102R	DATABASE MANAGEMENT SYSTEMS	DBMS	3	0	2	0	4	5	DS	EMPLOYABILITY
36	PCC	23CI2001	ADAPTIVE SOFTWARE ENGINEERING	ASE	3	1	0	0	4	4	NIL	EMPLOYABILITY
37	PEC		FLEXI CORE	FCC	2	0	2	0	3	4	-	EMPLOYABILITY
38	PEC		PROFESSIONAL ELECTIVE - 1	PE-1	3	0	2	4	5	9	-	EMPLOYABILITY
39	PEC		PROFESSIONAL ELECTIVE - 2	PE-2	3	0	0	0	3	3	-	EMPLOYABILITY
40	PEC		PROFESSIONAL ELECTIVE - 3	PE-3	3	0	2	4	5	9	-	EMPLOYABILITY
41	SDC	23SDCS11R	LINUX ADMINISTRATION & AUTOMATION	LAA	0	0	2	4	2	6	NIL	SKILL DEVELOPMENT

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SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	L	T	P	S	Cr	CH	PRE-REQUISITE	EES
42	SDC	23SDCS12R	FULL STACK APPLICATION DEVELOPMENT	FSD	0	0	2	4	2	6	NIL	SKILL DEVELOPMENT
43	SDC	23SDCS13R	CI/CD & CLOUD DEVOPS	CDP	0	0	2	4	2	6	NIL	SKILL DEVELOPMENT
44	PRI	23IE2040	SOCIAL INTERNSHIP	SIP	0	0	0	4	0	4	-	SKILL DEVELOPMENT
45	PRI	23IE3041	TECHNICAL INTERNSHIP	TEI	0	0	0	4	0	4	-	SKILL DEVELOPMENT
46	OEC		OPEN ELECTIVE - 1	OE-1	4	0	0	0	4	4	-	EMPLOYABILITY
47	VAC		VALUE ADDED CERTIFICATION-1	VAC-CERT	0	0	0	8	0	8	-	SKILL DEVELOPMENT
48	VAC		VALUE ADDED CERTIFICATION-2	VAC-CERT	0	0	0	8	0	8	-	SKILL DEVELOPMENT
49	SDC		SKILL INTERNSHIP	SI	0	0	0	16	4	16	-	SKILL DEVELOPMENT
								TOTAL CREDITS	124			

Total number of courses = 49

Percentage of Courses focusing on Employability= 18*100/49=36.74%

Percentage of Courses focusing on Entrepreneurship = 1*100/49=2.04%

Percentage of Courses focusing on Skill Development = 30*100/49=61.22%

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-5(f)

Courses offered under Honors Advanced Flexi Core, HTE Flexi Core - Experiential Learning, HTR Flexi Core – Research

SL NO	CATEGORY	COURSE CODE	COURSE TITLE	SHORT NAME	MODE	L	T	P	S	Cr	CH	Pre Requisite
1	HFC	23CS04HF	HIGH PERFORMANCE COMPUTING	HPC	R	3	0	2	0	4	5	NIL
2	HFC	23CS03HF	ADVANCED ALGORITHMS & DATA STRUCTURES	AADS	R	3	0	2	0	4	5	NIL
3	HFC	23CS02HF	EMBEDDED SYSTEMS DESIGN	ESD	R	3	0	2	0	4	5	NIL
4	HFC	23EC2106R	PROCESSORS AND CONTROLLERS	PRC	R	3	0	2	0	4	5	NIL
5	HRC	23IE01RF	INDEPENDENT STUDY & RESEARCH	ISR	R	2	0	2	0	3	4	NIL
6	HRC	23IE02RF	RESEARCH METHODOLOGY, ETHICS & SCIENTIFIC WRITING	RMES	R	2	0	2	0	3	4	NIL
7	HRC	23IE03RF	RESEARCH SEMINAR	RS	R	0	0	4	4	3	8	NIL
8	HRC	23IE04RF	TERM PAPER	TP	R	0	0	4	4	3	8	NIL
9	HIC	23DT01IF	ENTREPRENEURIAL TECHNOLOGY DEVELOPMENT AND PROTOTYPING	ETDP	E	0	0	6	4	4	10	NIL
10	HIC	23DT02IF	CUSTOMER DISCOVERY FOR STARTUPS	CDFS	E	0	0	6	4	4	10	NIL
11	HIC	23DT03IF	CUSTOMER VALIDATION FOR STARTUPS	CVFS	E	0	0	6	4	4	10	NIL
12	HIC	23DT04IF	CUSTOMER CREATION AND MARKETING FOR ENTREPRENEURS	CCME	E	0	0	6	4	4	10	NIL
13	HEC	23CS02EF	SCALABLE SYSTEM ENGINEERING	SSE	E	0	0	6	4	4	10	NIL
14	HEC	23CS01EF	FRONTEND DEVELOPMENT FRAMEWORKS	FEDF	E	0	0	6	4	4	10	NIL
15	HEC	23CS03EF	OPEN SOURCE ENGINEERING	OSE	E	0	0	6	4	4	10	NIL
16	HEC	23CS04EF	DECENTRALISED COMPUTING WITH WEB3 AND DAPPS	DCW	E	0	0	6	4	4	10	NIL
17	HEC	23CS05EF	PYTHON FULL STACK DEVELOPMENT WITH DJANGO	PFSD	E	0	0	6	4	4	10	NIL
18	HEC	23CS06EF	MERN STACK WEB DEVELOPMENT	MSWD	E	0	0	6	4	4	10	NIL

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Annexure-7

B.TECH 2023-24 ADMITTED BATCH MINOR PROGRAMS INTRODUCED

S. NO	COURSE CODE	COURSE TITLE	MODE	L	T	P	S	CR	CH
MINOR DEGREE IN BLOCKCHAIN & CRYPTOCURRENCIES									
1	23CSB3203R	INTRODUCTION TO BLOCKCHAIN & CRYPTO CURRENCIES	R	2	0	2	0	3	4
2	23CSB3304R	DIGITAL FORENSICS	R	3	0	2	4	5	9
3	23CSB3406M	PROGRAMMING FOR SMART CONTRACTS	R	3	0	0	0	3	3
4	23CSB3510	SECURITY GOVERNANCE & MANAGEMENT	R	3	0	0	0	3	3
5	23CSB3405M	DATABASE SYSTEM AND SECURITY	R	3	0	0	0	3	3
6	23SDCS05A	CLOUD BASED SECURITY SPECIALITY	A	0	0	6	4	4	10
MINOR DEGREE IN COMPUTER SCIENCE									
1	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	R	3	0	2	4	5	9
2	23SC1203	COMPUTATIONAL THINKING FOR OBJECT ORIENTED DESIGN	R	2	0	2	4	4	8
3	23CS2103R	ADVANCED OBJECT ORIENTED PROGRAMMING	R	3	0	2	4	5	9
4	23CS2205R	DESIGN & ANALYSIS OF ALGORITHMS	R	3	0	2	4	5	9
5	23SDCS12A	FULL STACK APPLICATION DEVELOPMENT	A	0	0	6	4	4	10
MINOR DEGREE IN COMPUTER ENGINEERING									
2	23AD2102R	DATABASE MANAGEMENT SYSTEMS	R	3	0	2	0	4	5
3	23CS2205R	DESIGN & ANALYSIS OF ALGORITHMS	R	3	0	2	4	5	9
4	23CI2001	ADAPTIVE SOFTWARE ENGINEERING	R	3	1	0	0	4	4
5	23SDCS12A	FULL STACK APPLICATION DEVELOPMENT	A	0	0	6	4	4	10

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S. NO	COURSE CODE	COURSE TITLE	MODE	L	T	P	S	CR	CH
MINOR DEGREE IN CYBER SECURITY & FORENSICS									
1	23CSB3101R	CRYPT ANALYSIS & CYBER DEFENSE	R	3	0	2	4	5	9
2	23AD2102R	DATABASE MANAGEMENT SYSTEMS	R	3	0	2	0	4	5
3	23CSB3304R	DIGITAL FORENSICS	R	3	0	2	4	5	9
4	23CSB3202R	NETWORK AND INFRASTRUCTURE SECURITY	R	3	0	0	0	3	3
5	23SDCS05A	CLOUD BASED SECURITY SPECIALITY	A	0	0	6	4	4	10
MINOR DEGREE IN GAME DEVELOPMENT									
1	23CS2104R	OPERATING SYSTEMS	R	3	0	2	0	4	5
2	23SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	R	3	0	2	4	5	9
3	23SC1203	COMPUTATIONAL THINKING FOR OBJECT ORIENTED DESIGN	R	2	0	2	4	4	8
4	23GDU3101R	PROGRAMMING FOR GAME DEVELOPMENT	R	3	0	2	4	5	9
5	23SDCS06A	CERTIFIED GAME DEVELOPER	A	0	0	6	4	4	10
MINOR DEGREE IN QUANTUM COMPUTING									
1	23MT1001	LINEAR ALGEBRA AND CALCULUS FOR ENGINEERS	R	2	2	0	0	4	4
2	23AD2001O	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	R	3	0	2	0	4	5
3	23CS3203	QUANTUM COMPUTING	R	2	2	0	0	4	4
4		QUANTUM MACHINE LEARNING FOR DATA SCIENTISTS	R	2	0	2	4	4	8
5	23SDCS07A	CLOUD BASED AI/ML SPECIALITY	A	0	0	6	4	4	10
MINOR DEGREE IN UX DESIGN									
1	23CS2104R	OPERATING SYSTEMS	R	3	0	2	0	4	5
2	23GDU3506	PRINCIPLES OF GAME DESIGN	R	3	0	0	0	3	3

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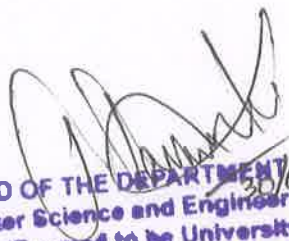Guntur District, Andhra Pradesh

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S. NO	COURSE CODE	COURSE TITLE	MODE	L	T	P	S	CR	CH
3	23GDU3101R	PROGRAMMING FOR GAME DEVELOPMENT	R	3	0	2	4	5	9
4	23GDU3303R	AR & VR APPLICATION DEVELOPMENT	R	3	0	2	4	5	9
5	23SDCS06A	CERTIFIED GAME DEVELOPER	A	0	0	6	4	4	10

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