SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(An Autonomous Institution)
Puducherry - 605107

Department of Information Technology

BOARD OF STUDIES - SEVENTH MEETING

MINUTES

Date and Time
04.03.2024 at 02.00 PM

2. A. 4.1

2. A. 4. 2

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

Department of Information Technology

Minutes of Board of Studies

The Board of Studies Seventh meeting of Department of Information Technology was held on 04th March 2024 from 2:00 P.M to 5:00 P.M in the Application Programming Laboratory, Department of Information Technology with the Head of the Department as the Chair.

The following members were present for the BoS meeting.

Sl.No	Name of the Member with Designation and official Address	Members as Per University norms
1	**Dr. R. Raju, M.Tech, Ph.D** Professor & Head Department of IT, SMVEC	Chairperson
2	**Dr. S. Kanmani** Professor, Department of Information Technology Puducherry Technological University, Puducherry	Subject Expert (University Nominee)
3	**Dr.R.Manoharan, M. Tech., Ph.D** Professor, Department of CSE Puducherry Technological University, Puducherry	Subject Expert (Academic Council Nominee)
4	**Dr.N.Pughazendi,** Professor, Department of CSE Panimalar Engineering College, Chennai	Subject Expert (Academic Council Nominee)
5	**Mr.Ashin Antony,** CTO,IGNITHO Technologies, Chennai-600018	Representative from Industry
6	**Dr. P. Victer Paul,** Senior Assistant Professor, Department of Computer Science and Engineering, Indian Institute of Information Technology, Kottayam	Post Graduate Alumnus (nominated by Principal)
7	**Dr. S. Balaji** Associate Professor/IT	Member Secretary
8	**Dr. K. Lakshmi** Professor/IT	Member
9	**Dr. R. Saravanan** Professor/IT	Member
10	**Dr. N. Thilagavathi** Associate Professor/IT	Member
11	**Dr. B. Vijayakumar** Associate Professor/IT	Member
12	**Dr. Puspita Dash** Associate Professor /IT	Member

13	**Dr. R. Anandkumar** Assistant Professor/IT	Member
14	**Mr. R. Suresh** Associate Professor/IT	Member
15	**Mrs. V. Padmapriya** Associate Professor/IT	Member
16	**Mrs. N. Kalaiselvi** Assistant Professor/IT	Member
17	**Mrs. K. Bhavani** Assistant Professor/IT	Member
18	**Mrs. M. Lakshmiprabha** Assistant Professor/IT	Member
19	**Mrs. E. Valarmathi** Assistant Professor/IT	Member
20	**Mr. P. Praveenkumar** Assistant Professor/IT	Member
21	**Mr. G. Prabu** Assistant Professor/IT	Member
22	**Mrs. C. Vanaja** Assistant Professor/IT	Member
23	**Ms. L. Durgadevi** Assistant Professor/IT	Member
24	**Mr. T. Periasamy** Assistant Professor/IT	Member
25	**Mr. T. Maheswaran** Assistant Professor/IT	Member
26	**Mrs. N. Nandhini** Assistant Professor/IT	Member
27	**Mr. R. Vijayaprabhu** Assistant Professor/IT	Member
28	**Mr. D. Prabhu** Assistant Professor/IT	Member
29	**Ms. M. Madhumitha** Assistant Professor/IT	Member
30	**Ms. A. Sowbarnika** Assistant Professor/IT	Member
31	**Dr.N.S.N. Cailassame** Professor& Head Department of Management Studies, SMVEC	Member
32	**Dr. K. Karthikeyan** Associate Professor Department. of Chemistry, SMVEC	Member
33	**Prof. M. Devanathan** Assistant Professor Department of Mathematics, SMVEC	Member
34	**Dr. P. Jayachitra** Professor and Head Department of English, SMVEC	Member
35	**Dr.T.Jayavarthanan** Professor Department. of Physics, SMVEC	Member

Agenda of the Meeting	
Item:2024.7.1	To welcome the members and apprise about the college
Item:2024.7.2	To Apprise about College Highlights such as Infrastructure Facilities, Centre of Excellence, Idea Lab, Research and Development, Training and Placements, Accreditation details, etc.,
Item:2024.7.3	To Apprise about the Achievements of the College and Department.
Item:2024.7.4	To Apprise about the Composition of Governing body, Academic Council and Finance Committee as per UGC Regulation 2018 and 2023
Item:2024.7.5	To Apprise about the Composition of Previous Board of Studies as per UGC Regulation 2018 and details of previous meetings held
Item:2024.7.6	To Apprise about the Composition of New Board of Studies as per UGC Regulation 2023.
Item:2024.7.7	To Apprise about the Highlights of R-20 Regulations and Curriculum
Item:2024.7.8	To Apprise about the Suggestions received from the previous Meetings of BoS, Curriculum Advisory Committee and Stake holders for revision of Regulation 20 , curriculum and syllabi
Item:2024.7.9	To Apprise about the Highlights of R-23 Regulations and Curriculum
Item:2024.7.10	To Confirm the minutes of the Sixth BoS meeting held on 21.7.2023
Item:2024.7.11	To discuss the Syllabi of III and IV semesters, under Autonomous Regulations R-23 for the B. Tech - Information Technology students admitted from the Academic Year 2023-24.
Item:2024.7.12	To discuss the new courses offered in R-23 curriculum
Item:2024.7.13	To discuss the Syllabus of course offered in IV semester for Honour Degree programme.
Item:2024.7.14	To discuss the equivalent papers in R-23 curriculum for the courses offered in Regulation R-20.
Item:2024.7.15	To Apprise about the Pass Percentage of the students
Item:2024.7.16	To Approve the Certificate Courses offered to the students

Minutes of the Meeting
Dr. R. Raju, Chairperson, BoS / B.Tech Information Technology officially announced the opening of the meeting and welcomed the members. He also thanked them for accepting the invitation and giving us their valuable time. The meeting thereafter deliberated on agenda items that had been approved by the Chairperson.

Item:2024.7.1	**To welcome the members and apprise about the college**
	The Chairperson Dr.R.Raju welcomed the newly constituted members of Board of Studies and apprised about the successful functioning of the college
Item:2024.7.2	**To Apprise about College Highlights such as Infrastructure Facilities, Centre of Excellence, Idea Lab, Research and Development, Training and Placements, Accreditation details, etc.,**
	The Chairperson exclusively presented the highlights of the College such as Infrastructure Facilities, Centre of Excellence, Idea Lab, Research and Development facilities , Training and Placements along with the Accreditation details
Item:2024.7.3	**To Apprise about the Achievements of the College and Department.**
	The Board of Studies Chairperson briefed the recent achievements of the College, department faculty and students in the year 2023-2024
Item:2024.7.4	**To Apprise about the Composition of Governing body, Academic Council and Finance Committee as per UGC Regulation 2018 and 2023**
	The Chairperson apprised the composition of Governing body, Academic Council and Finance Committee as per UGC Regulation 2018 and 2023
Item:2024.7.5	**To Apprise about the Composition of Previous Board of Studies as per UGC Regulation 2018 and details of previous meetings held**
	The Chairperson apprised the composition of Previous Board of Studies as per UGC Regulation 2018 and the details of previous meetings were discussed
Item:2024.7.6	**To Apprise about the Composition of New Board of Studies as per UGC Regulation 2023.**
	The Chairperson apprised the composition of New Board of Studies as per UGC Regulation 2023 to the BoS members
Item:2024.7.7	**To Apprise about the Highlights of R-20 Regulations and Curriculum**
	The Chairperson apprised about the highlights of R-2020 Regulations and Curriculum, exclusively the discussion was carried on curriculum structure, Examination process and mark distributions
Item:2024.7.8	**To Apprise about the Suggestions received from the previous Meetings of BoS, Curriculum Advisory Committee and Stake holders for revision of Regulation 2020 , curriculum and syllabi**
	The Chairperson apprised about the suggestions received from the previous six Meetings of BoS, Curriculum Advisory Committee and Stake holders for revision of Regulation 2020 , curriculum and syllabi
Item:2024.7.9	**To Apprise about the Highlights of R-23 Regulation and Curriculum**
	To Apprise about the Highlights of Regulation R-23, program structure, Curriculum structure, Assessment procedure, Scheme for Continuous Assessment, Evaluation system etc.,

Item:2024.7.10	**To Confirm the minutes of the Sixth BoS meeting held on 21.7.2023**
	All the members have accepted the action taken report for suggestions given during sixth BoS meeting
Item:2024.7.11	**To discuss the Syllabi of III and IV semesters, under Autonomous Regulations R-23 for the B. Tech - Information Technology students admitted from the Academic Year 2023-24.**

The BoS Members recommended to carry out the following changes in the III and IV Semester of Regulation 2023.

- The BoS members suggested to remove the course Design and analysis of Algorithm from (Theory cum Practical) and move to Professional Core Course.
- The BoS members suggested to interchange Data Communication and Computer Networks & Operating System from III to IV Semester and vice versa.
- As per suggestion of the BoS members the following are the changes carried in the curriculum

S.No.	Existing Course Name	Existing in Semester	Corrected/Retained with Course Name	Moved to Semester
1.	Data Communication and Computer Networks Data Communication and Computer Networks Laboratory `	III	Data Communication and Computer Networks Data Communication and Computer Networks Laboratory	IV
2.	Automata and Compiler Design	III	Automata Languages and Computation	III
3.	Design and Analysis of Algorithms (T+P)	III	Algorithms Design and Analysis (T) Algorithms Design and Analysis Laboratory (P)	IV
4.	Microprocessors and Embedded Systems (T) Microprocessors and Embedded Systems Laboratory (P)	III	Microcontrollers and its Interfacing (T+P)	III
5.	Operating Systems Operating Systems Laboratory	IV	Operating Systems Operating Systems Laboratory	III
6.	Database Management Systems Database Management Systems Laboratory	IV	Database Management Systems Database Management Systems Laboratory	III

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- As per the suggestion of the BoS members the following Professional Elective Courses are replaced with the new courses.

Professional Elective - I (Offered in Semester IV)		
Sl. No.	**Existing Course List**	**After BoS – Approved Course List**
1	Object Oriented Analysis and Design	Object Oriented Analysis and Design
2	Web Application Development	Web Application Development
3	Information Coding Techniques	Information Coding Techniques
4	Agile Methodologies	Agile Methodologies
5	Mobile Adhoc Network	Data Warehousing and Data Mining
Professional Elective - II (Offered in Semester V)		
Sl. No.	**Existing Course Title**	**BoS – Approved Course Title**
1	Parallel and Distributed Computing	Theory of Compiler Design
2	Data Warehousing and Data Mining	Data Visualization
3	Business Intelligence and Applications	Business Intelligence and Applications
4	Software Testing	Software Testing
5	Wireless and Mobile Communication	Automation Techniques and Tools
Professional Elective - III (Offered in Semester VI)		
Sl. No.	**Existing Course Title**	**BoS – Approved Course Title**
1	Distributed Databases	Quantum Computing
2	Bio-Inspired Computing	Full Stack Development
3	Software Defined Networks	Software Defined Networks
4	Natural Language Processing	Natural Language Processing
5	Edge and Fog Computing	Edge and Fog Computing
Professional Elective - IV (Offered in Semester VII)		
Sl. No.	**Existing Course Title**	**BoS – Approved Course Title**
1	Full Stack Development	Six Sigma
2	Cyber Security and Forensics	Cyber Security and Forensics
3	Robotic Process Automation	Robotic Process Automation
4	Digital Image Processing	Digital Image Processing
5	Intrusion Detection System	Intrusion Detection System
Professional Elective – V (Offered in Semester VIII)		
Sl. No.	**Existing Course Title**	**BoS – Approved Course Title**
1	Quantum Computing	Cloud Services Management
2	Human Computer Interaction	Human Computer Interaction
3	GPU Computing	Bio-Inspired Computing
4	Automation Techniques & Tools	Storage Technologies
5	Augmented Reality and Virtual Reality	Augmented Reality and Virtual Reality
Professional Elective - VI (Offered in Semester VIII)		
Sl. No.	**Existing Course Title**	**BoS – Approved Course Title**
1	Green Computing	Green Computing
2	Social Network Analysis	Generative AI
3	Wireless Sensor Networks	Wireless Sensor Networks
4	Computer Vision	Game Development
5	E-Commerce	E-Commerce

Item:2024.7.12	**To discuss the new courses offered in R-23 curriculum**
	The list of new courses introduced in the R-23 curriculum has been discussed and more than 40 percentage of content covered in Gate syllabus
Item:2024.7.13	**To discuss the Syllabus of course offered in IV semester for Honour Degree programme.**
	The Subject Expert and the University Nominee suggested to proceed the Honors degree without any specialization like Network Security and instructed to follow the common procedure after discussing with the Dean Academics to check for the possibilities to give the honors without specialization. As per regulation if no possibilities the members advised to carry out the changes in the courses listed in Honors Degree.

Sl. No.	Sem	Course Code	Existing Course Title	BoS-Updated Course Title	Category	Periods			Credits
						L	T	P	
1	IV	U23ITH401	Wireless Networks	Wireless Networks	PC	3	1	0	4
2	V	U23ITH502	Enterprise Network Design	Enterprise Network Design	PC	3	1	0	4
3	VI	U23ITH603	Digital Forensics	Security and Privacy in Cloud	PC	3	1	0	4
4	VII	U23ITH704	Ethical Hacking for Network Administrators	Ethical Hacking for Network Administrators	PC	3	1	0	4
5	VIII	U23ITH805	Computer Security	Social Network Security	PC	3	1	0	4
	Total								**20**

1	IV to VII	U23ITHN01	Wireless Ad Hoc and Sensor Networks	**3**
2			Computer Networks	**3**
3			Information security	**3**
4			Ethical Hacking, Cyber Security and Privacy	**3**
5			Information Security - secure Systems Engineering, Cryptography And Network Security	**3**

Item:2024.7.14	**To discuss the equivalent papers in R-23 curriculum for the courses offered in Regulation R-20.**
	The list of equivalent papers in R-23 curriculum for the courses offered in Regulation R-20 curriculum has been discussed with the BoS members and the members accepted and approved the same
Item:2024.7.15	**To Apprise about the Pass Percentage of the students**
	The Chairperson proudly stated that we are continuously maintaining 100% pass percentage in the past years
Item:2024.7.16	**To Approve the Certificate Courses offered to the students**
	The Certification courses list to be offered to the students has been discussed and the same has been approved

The meeting for the above Agenda regarding B.Tech - Information Technology was concluded by 5:00 pm by **Dr. R.Raju**, Chairperson-BoS and Head of Department, Department of Information Technology, Sri Manakula Vinayagar Engineering College.

Members Present

S.NO.	Name of the Member	Designation	Signature
1.Head of the Department Concern (Chairperson)			
1	**Dr. R. Raju** Professor & Head	Chairperson	
2.All faculty members of the Department			
2	**Dr. S. Balaji** Associate Professor	Member Secretary	
3	**Dr. K. Lakshmi** Professor	Member	
4	**Dr. R. Saravanan** Professor	Member	
5	**Dr. N. Thilagavathi** Associate Professor	Member	
6	**Dr. B. Vijayakumar** Associate Professor	Member	
7	**Dr. Puspita Dash** Associate Professor	Member	
8	**Dr. R. Anandkumar** Assistant Professor	Member	
9	**Mr. R. Suresh** Associate Professor	Member	
10	**Mrs. V. Padmapriya** Associate Professor	Member	
11	**Mrs. N. Kalaiselvi** Assistant Professor	Member	
12	**Mrs. K. Bhavani** Assistant Professor	Member	
13	**Mrs. M. Lakshmiprabha** Assistant Professor	Member	
14	**Mrs. E. Valarmathi** Assistant Professor	Member	
15	**Mr. P. Praveenkumar** Assistant Professor	Member	
16	**Mr. G. Prabu** Assistant Professor	Member	
17	**Mrs. C. Vanaja** Assistant Professor	Member	
18	**Ms. L. Durgadevi** Assistant Professor	Member	
19	**Mr. T. Periasamy** Assistant Professor	Member	
20	**Mr. T. Maheswaran** Assistant Professor	Member	
21	**Mrs. N. Nandhini** Assistant Professor	Member	
22	**Mr. R. Vijayaprabhu** Assistant Professor	Member	
23	**Mr. D. Prabhu** Assistant Professor	Member	

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24	**Ms. M. Madhumitha** Assistant Professor	Member	
25	**Ms. A. Sowbarnika** Assistant Professor	Member	
26	**Mr. M. Devanathan** Assistant Professor Department of Mathematics , SMVEC	Member	
27	**Dr. P. Jayachitra** Professor and Head Department of English, SMVEC	Member	
28	**Dr. K. Karthikeyan** Associate Professor Department of Chemistry, SMVEC	Member	
29	**Dr. T. Jayavarthanan** Professor and Head Department of Physics, SMVEC	Member	
30	**Dr. N.S.N. Cailassame** Professor & Head/MBA, SMVEC	Member	
3. Two subject experts from outside the Parent University			
31	**Dr. R.Manoharan, M. Tech., Ph.D.** Professor, Department of CSE Puducherry Technological University, Puducherry rmanoharan@pec.edu, 9443468480	Subject Expert	
32	**Dr. N.Pughazendi**, Professor, Department of CSE Panimalar Engineering College, Chennai pughazendi@gmail.com, 9962969429	Subject Expert	
4. Expert nominated by the Vice-Chancellor recommended by the Autonomous college Principal as a University Nominee			
33	**Dr. S. Kanmani** Professor, Department of Information Technology Puducherry Technological University, Puducherry kanmani@ptuniv.edu.in , 9443206299	Subject Expert	
5. One representative from industry areas to nominated by the Principal			
34	**Mr. Ashin Antony**, CTO, IGNITHO Technologies, Chennai-600018 ashin.antony@ignitho.com, 9444150791	Member	
6. One member of the College Alumni to be nominated by the principal			
35	**Dr. P. Victer Paul,** Senior Assistant Professor, Department of Computer Science and Engineering, Indian Institute of Information Technology, Kottayam victerpaul@iiitkottayam.ac.in , 9944913170 Specialization: Bio-Inspired Optimization, Data Analytics	Member	

Dr. R. Raju
Chairperson - BoS (IT)

Dr.V.S.K. Venkatachalapathy
Director cum Principal
Chairperson - Academic Council

2.A.4.13

2. A. 4. 12

ANNEXURE - I

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(An Autonomous Institution)

Puducherry

B. TECH. INFORMATION TECHNOLOGY

ACADEMIC REGULATIONS 2023
(R-2023)

CURRICULUM & SYLLABI

9.A.4.15

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society

Mission

M1 :	**Quality Education**	:	To provide comprehensive academic system that amalgamates the cutting-edge technologies with best practices
M2 :	**Research and Innovation**	:	To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues
M3:	**Employability and Entrepreneurship**	:	To inculcate the employability and entrepreneurial skills through value and skill-based training
M4 :	**Ethical Values**	:	To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society

DEPARTMENT VISION AND MISSION

Vision

To be a pioneer in the field of Information Technology by achieving academic excellence, involving in research & development and promoting technical & professional expertise

Mission

M1: Expertise: To impart quality education and create excellent engineers with strong analytical, Programming and Problem solving Skills to meet the ever changing demands of IT industry

M2: Eminence: To kindle creative thinking, innovation and foster value-based research in the field of information technology

M3: Complaisant: To enrich the employability skills, inculcate entrepreneurial ideology and promote professional expertise

M4: Exemplar: To instil human values, ethical responsibilities and empowering graduates to be socially responsible and technically competent

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PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge:

Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis:

Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions:

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems:

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage:

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society:

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability:

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work:

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication:

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance:

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning:

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Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Fortify

To prepare the students with fundamental knowledge in programming languages and in developing applications.

PEO2: Equip

To develop skill in understanding the complexity in networking, security, data mining, web technology and mobile communication so as to develop innovative applications and projects in these areas for the betterment of society, as well as to enable them to pursue higher education

PEO3: Endow

To enable the students as full-fledged professionals by providing opportunities to enhance their analytical, communication skills and problem solving skills along with organizing abilities

PEO4: Conventional

To familiarize the students with the ethical issues in engineering profession, issues related to the World-wide economy, nurturing of current job related skills and emerging technologies

PROGRAMME SPECIFIC OBJECTIVES (PSOs)

PSO1: Establishment of Mathematical and computer systems concepts

To use mathematical and system concepts to solve multidisciplinary problems using appropriate mathematical analysis, system and programming concepts on various computing environments.

PSO2: Establishment of applications and information concepts

To inculcate good breadth of knowledge to create applications and enhance informatics with cutting edge technologies

PSO3: Establishment of Business, Technological concepts

The ability to interpret and respond to business agility with relevant software tools and skills and provide newer ideas and innovations in information technology research

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STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAMME

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

Sl.No	Course Category	Breakdown of Credits
1.	Humanities, Social Sciences and Management Courses (HS)	**15**
2.	Basic Science Courses (BS)	**20**
3.	Engineering Science including Workshop, Drawing, Basics of Electrical/Mechanical/Computer etc., (ES)	**18**
4.	Professional Core Courses(PC)	**77**
5.	Professional Elective Courses (PE)	**18**
6.	Open Electives Courses (PE)	**9**
7.	Project Work and Internship (PA)	**13**
8.	Ability Enhancement Courses (AEC*)	-
9.	Mandatory Courses (MC*)	-
	Total	**170**

**** AEC and MC are not included for CGPA calculation***

Sl.No	Course Category	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1.	Humanities and Social Sciences (HS)	5	3	1	1	2	-	-	3	15
2.	Basic Sciences (BS)	4	7	5	4	-	-	-	-	20
3.	Engineering Sciences (ES)	9	5	-	4	-	-	-	-	18
4.	Professional Core (PC)	3	8	17	11	12	15	11	-	77
5.	Professional Electives (PE)	-	-	-	3	3	3	3	6	18
6.	Open Electives (OE)	-	-	-	-	3	3	3	-	9
7.	Project Work (PA)	-	-	-	-	1	1	2	8	12
8.	Internship (PA)	-	-	-	-	-	-	1	-	1
9.	Ability Enhancement Courses (AEC*)	-	-	-	-	-	-	-	-	-
10.	Mandatory courses (MC*)	-	-	-	-	-	-	-	-	-
Total		**21**	**23**	**23**	**23**	**21**	**22**	**20**	**17**	**170**

HONOURS DEGREE PROGRAMME:

The student is permitted to opt for earning an *honours degree* in the same discipline of engineering in addition to the degree in his/her own discipline. To earn an honours degree the student is required to earn an additional 18 - 20 credits (over and above the total 170 credits prescribed in the curriculum) starting from fourth semester onwards by completing 5 additional courses offered in respective semesters. A student is eligible to exercise this option if he/she has passed all the courses offered upto third semester in the first attempt itself and has earned a CGPA / GPA* (*for lateral entry) of not less than 8.0. The prescribed courses offered for Honours degree are given in **Annexure - IV**

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LIST OF ANNEXURES

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ANNEXURE I:

LIST OF COURSES IN CURRICULUM

2.A.4.23

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SEMESTER – I										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC01	Engineering Mathematics - I	BS	3	1	0	4	25	75	100
2	U23ESTC03	Basics of Electrical and Electronics Engineering	ES	3	0	0	3	25	75	100
3	U23CSTC01	Programming in C	ES	3	0	0	3	25	75	100
4	U23ITT101	IT Essentials	PC	3	0	0	3	25	75	100
5	U23HSTC01	Universal Human Values - II	HS	2	0	0	2	25	75	100
Theory cum Practical										
6	U23ENBC01	Communicative English - I	HS	2	0	2	3	50	50	100
Practical										
7	U23ESPC01	Basics of Electrical and Electronics Engineering Laboratory	ES	0	0	2	1	50	50	100
8	U23CSPC01	Programming in C Laboratory	ES	0	0	2	1	50	50	100
9	U23ESPC03	Engineering Graphics using AutoCAD	ES	0	0	2	1	50	50	100
Ability Enhancement Course										
10	U23ITC1XX	Certification Course - I **	AEC	0	0	4	-	100	-	100
Mandatory Course										
11	U23ITM101	Induction Programme	MC	2 Weeks			-	-	-	-
							21	425	575	1000

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SEMESTER – II											
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory											
1	U23MATC02	Engineering Mathematics - II	BS	3	1	0	4	25	75	100
2	U23BSTC01	Physical Science for Engineers	BS	3	0	0	3	25	75	100
3	U23ADTC01	Programming in Python	ES	3	0	0	3	25	75	100
4	U23CSTC03	Data Structures	PC	3	0	0	3	25	75	100
5	U23ITTC01	Digital Design and System Architecture	PC	3	0	0	3	25	75	100
Theory cum Practical											
6	U23ENBC02	Communicative English - II	HS	2	0	2	3	50	50	100
Practical											
7	U23ESPC02	Design Thinking and IDEA Lab	ES	0	0	2	1	50	50	100
8	U23ADPC01	Programming in Python Laboratory	ES	0	0	2	1	50	50	100
9	U23CSPC02	Data Structures Laboratory	PC	0	0	2	1	50	50	100
10	U23ITPC01	Digital Design and System Architecture Laboratory	PC	0	0	2	1	50	50	100
Ability Enhancement Course											
11	U23ITC2XX	Certification Course - II **	AEC	0	0	4	-	100	-	100
Mandatory Course											
12	U23ITM202	Sports Yoga and NSS	MC	0	0	2	-	100	-	100
							23	575	625	1200

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SEMESTER – III										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC03	Probability and Statistics	BS	3	1	0	4	25	75	100
2	U23CSTC04	Database Management Systems	PC	3	0	0	3	25	75	100
3	U23CSTC05	Operating Systems	PC	3	0	0	3	25	75	100
4	U23ITT302	Automata Languages and Computation	PC	3	0	0	3	25	75	100
5	U23ITT303	Software Engineering and Project Management	PC	3	0	0	3	25	75	100
Theory cum Practical										
6	U23ITB301	Microcontrollers and its Interfacing	PC	2	0	2	3	50	50	100
Practical										
7	U23ENPC01	General Proficiency - I	HS	0	0	2	1	50	50	100
8	U23MAPC01	Engineering Mathematics Laboratory	BS	0	0	2	1	50	50	100
9	U23CSPC03	Database Management Systems Laboratory	PC	0	0	2	1	50	50	100
10	U23CSPC04	Operating Systems Laboratory	PC	0	0	2	1	50	50	100
Ability Enhancement Course										
11	U23ITC3XX	Certification Course – III **	AEC	0	0	4	-	100	-	100
12	U23ITS301	Skill Enhancement Course - I *	AEC	0	0	2	-	100	-	100
Mandatory Course										
13	U23ITM303	Climate Change	MC	2	0	0	-	100	-	100
							23	675	625	1300

*** Skill Enhancement Courses (I and II) are to be selected from the list given in Annexure III**

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SEMESTER – IV										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC05	Discrete Mathematics and Graph Theory	BS	3	1	0	4	25	75	100
2	U23ITTC02	Programming in Java	ES	3	0	0	3	25	75	100
3	U23ITT404	Algorithms Design and Analysis	PC	3	0	0	3	25	75	100
4	U23ITT405	Data Communication and Computer Networks	PC	3	0	0	3	25	75	100
5	U23ITE4XX	Professional Elective I #	PE	3	0	0	3	25	75	100
Theory cum Practical										
6	U23ITB402	Internet Programming	PC	2	0	2	3	50	50	100
Practical										
7	U23ENPC02	General Proficiency - II	HS	0	0	2	1	50	50	100
8	U23ITPC02	Programming in Java Laboratory	ES	0	0	2	1	50	50	100
9	U23ITP401	Algorithms Design and Analysis Laboratory	PC	0	0	2	1	50	50	100
10	U23ITP402	Data Communication and Computer Networks Laboratory `	PC	0	0	2	1	50	50	100
Ability Enhancement Course										
11	U23ITC4XX	Certification Course - IV **	AEC	0	0	4	-	100	-	100
12	U23ITS402	Skill Enhancement Course - II *	AEC	0	0	2	-	100	-	100
Mandatory Course										
13	U23ITM404	Right to Information and Good Governance	MC	2	0	0	-	100	-	100
							23	675	625	1300

 # Professional Electives are to be selected from the list given in Annexure I

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SEMESTER – V										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23HSTC02	Research Methodology	HS	2	0	0	2	25	75	100
2	U23CSTC06	Artificial Intelligence	PC	3	0	0	3	25	75	100
3	U23ITT506	Information and Network Security	PC	3	0	0	3	25	75	100
4	U23ITT507	Data Analytics	PC	3	0	0	3	25	75	100
5	U23ITE5XX	Professional Elective II #	PE	3	0	0	3	25	75	100
6	U23XXO5XX	Open Elective I $	OE	3	0	0	3	25	75	100
Practical										
7	U23CSPC05	Artificial Intelligence Laboratory	PC	0	0	2	1	50	50	100
8	U23ITP503	Information and Network Security Laboratory	PC	0	0	2	1	50	50	100
9	U23ITP504	Data Analytics Laboratory	PC	0	0	2	1	50	50	100
Project Work										
10	U23ITW501	Micro Project	PA	0	0	2	1	100	-	100
Ability Enhancement Course										
11	U23ITC5XX	Certification Course - V **	AEC	0	0	4	-	100	-	100
Mandatory Course										
12	U23ITM505	Essence of Indian Traditional Knowledge	MC	2	0	0	-	100	-	100
							21	600	600	1200

$ Open electives are to be selected from the list given in Annexure II

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SEMESTER – VI										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23ITTC03	Machine Learning	PC	3	0	0	3	25	75	100
2	U23ITT608	Mobile Application Development	PC	3	0	0	3	25	75	100
3	U23ITT609	Blockchain Technology	PC	3	0	0	3	25	75	100
4	U23ITE6XX	Professional Elective III #	PE	3	0	0	3	25	75	100
5	U23XXO6XX	Open Elective II $	OE	3	0	0	3	25	75	100
Theory cum Practical										
6	U23ITB603	IoT Programming	PC	2	0	2	3	50	50	100
Practical										
7	U23ITPC03	Machine Learning Laboratory	PC	0	0	2	1	50	50	100
8	U23ITP605	Mobile Application Development Laboratory	PC	0	0	2	1	50	50	100
9	U23ITP606	Blockchain Technology Laboratory	PC	0	0	2	1	50	50	100
Project										
10	U23ITW602	Mini Project	PA	0	0	2	1	100	-	100
Ability Enhancement Course										
11	U23ITC6XX	Certification Course - VI **	AEC	0	0	4	-	100	-	100
Mandatory Course										
12	U23ITM606	Gender Equality	MC	2	0	0	-	100	-	100
							22	625	575	1200

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SEMESTER – VII										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23ITT710	Neural Network and Deep Learning	PC	3	0	0	3	25	75	100
2	U23ITT711	Cloud Computing and Virtualization	PC	3	0	0	3	25	75	100
3	U23ITT712	IT Operations and Management	PC	3	0	0	3	25	75	100
4	U23ITE7XX	Professional Elective IV #	PE	3	0	0	3	25	75	100
5	U23XXO7XX	Open Elective III $	OE	3	0	0	3	25	75	100
Practical										
6	U23ITP707	Neural Network and Deep Learning Laboratory	PC	0	0	2	1	50	50	100
7	U23ITP708	Cloud Computing and Virtualization Laboratory	PC	0	0	2	1	50	50	100
Project										
8	U23ITW703	Project Phase - I	PA	0	0	4	2	50	50	100
9	U23ITW704	Internship / Inplant Training	PA	0	0	2	1	100	-	100
							20	375	525	900

SEMESTER – VIII										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23HSTC03	Entrepreneurship and Business Management	HS	3	0	0	3	25	75	100
2	U23ITE8XX	Professional Elective V #	PE	3	0	0	3	25	75	100
3	U23ITE8XX	Professional Elective VI #	PE	3	0	0	3	25	75	100
Project										
8	U23ITW805	Project Phase - II	PA	0	0	16	8	50	100	150
							17	125	325	450

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ANNEXURE II:

LIST OF PROFESSIONAL ELECTIVES

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PROFESSIONAL ELECTIVE COURSES (18 CREDITS)

Professional Elective - I (Offered in Semester IV)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE401	Object Oriented Analysis and Design
2	U23ITE402	Web Application Development
3	U23ITE403	Information Coding Techniques
4	U23ITE404	Agile Methodologies
5	U23ITE405	Data Warehousing and Data Mining
Professional Elective - II (Offered in Semester V)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE506	Theory of Compiler Design
2	U23ITE507	Data Visualization
3	U23ITE508	Software Testing
4	U23ITE509	Automation Techniques and Tools
5	U23CBEC01	Business Intelligence and Applications
Professional Elective - III (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE610	Quantum Computing
2	U23ITE611	Full Stack Development
3	U23ITE612	Edge and Fog Computing
4	U23ITEC01	Software Defined Networks
5	U23ITEC02	Natural Language Processing
Professional Elective - IV (Offered in Semester VII)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE713	Six Sigma
2	U23ITE714	Cyber Security and Forensics
3	U23ITE715	Digital Image Processing
4	U23ITE716	Intrusion Detection System
5	U23ITEC03	Robotic Process Automation
Professional Elective – V (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE817	Cloud Services Management
2	U23ITE818	Bio-Inspired Computing
3	U23ITE819	Storage Technologies
4	U23ITEC04	Human Computer Interaction
5	U23ITEC05	Augmented Reality and Virtual Reality
Professional Elective - VI (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE820	Green Computing
2	U23ITE821	Generative AI
3	U23ITE822	Game Development
4	U23ITE823	E-Commerce
5	U23ECEC02	Wireless Sensor Networks

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ANNEXURE III:

LIST OF OPEN ELECTIVES

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DEPARTMENT OF IT

OPEN ELECTIVE COURSES

S. No	Course Code	Course Title	Offering Department	Permitted Departments
Open Elective – I (Offered in Semester V/VI)				
1	U23ITOC01	Database System: Design & Development	IT	EEE, ECE, ICE, BME,MECH,CIVIL, MECHATRONICS
2	U23ITOC02	Computer Hardware and Troubleshooting	IT	EEE, ECE, ICE, CCE, BME, MECH, MECHATRONICS
Open Elective – II (Offered in Semester VII)				
1	U23ITOC03	Essentials of Data Science	IT	EEE, ECE, ICE, CSE, MECH, CIVIL, CCE, BME, MECHATRONICS
2	U23ITOC04	Big Data Technologies	IT	EEE, ICE, MECH, CIVIL, CCE, BME

ANNEXURE IV:

LIST OF ABILITY ENHANCEMENT COURSES

(A) – CERTIFICATION COURSES

(B) – SKILL ENHANCEMENT COURSES

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SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
Puducherry – 605 107
TRAIN LAB ACADEMY

The following courses are provided by Trainlab Academy for Regulation 2023:

ABILITY ENHANCEMENT COURSES – (A) CERTIFICATION COURSES

S. No	Course Code	Course Title	Certified By
1	U23XXCX01	Adobe Photoshop	Adobe
2	U23XXCX02	Adobe Animate	Adobe
3	U23XXCX03	Adobe Dreamweaver	Adobe
4	U23XXCX04	Adobe After Effects	Adobe
5	U23XXCX05	Adobe Illustrator	Adobe
6	U23XXCX06	Adobe InDesign	Adobe
7	U23XXCX07	Autodesk AutoCAD -ACU	Autodesk
8	U23XXCX08	Autodesk Inventor - ACU	Autodesk
9	U23XXCX09	Autodesk Revit - ACU	Autodesk
10	U23XXCX10	Autodesk Fusion 360 - ACU	Autodesk
11	U23XXCX11	Autodesk 3ds Max - ACU	Autodesk
12	U23XXCX12	Autodesk Maya - ACU	Autodesk
13	U23XXCX13	Cloud Security Foundations	AWS
14	U23XXCX14	Cloud Computing Architecture	AWS
15	U23XXCX15	Cloud Foundation	AWS
16	U23XXCX16	Cloud Practitioner	AWS
17	U23XXCX17	Cloud Solution Architect	AWS
18	U23XXCX18	Data Engineering	AWS
19	U23XXCX19	Machine Learning Foundation	AWS
20	U23XXCX20	Robotic Process Automation / Medical Robotics	Blue Prism
21	U23XXCX21	Advance Programming Using C	CISCO
22	U23XXCX22	Advance Programming Using C ++	CISCO
23	U23XXCX23	C Programming	CISCO
24	U23XXCX24	C++ Programming	CISCO
25	U23XXCX25	CCNP Enterprise: Advanced Routing	CISCO
26	U23XXCX26	CCNP Enterprise: Core Networking	CISCO
27	U23XXCX27	Cisco Certified Network Associate - Level 2	CISCO
28	U23XXCX28	Cisco Certified Network Associate- Level 1	CISCO
29	U23XXCX29	Cisco Certified Network Associate- Level 3	CISCO
30	U23XXCX30	Fundamentals Of Internet of Things	CISCO

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31	U23XXCX31	Internet Of Things / Solar and Smart Energy System with IoT	CISCO
32	U23XXCX32	Java Script Programming	CISCO
33	U23XXCX33	NGD Linux Essentials	CISCO
34	U23XXCX34	NGD Linux I	CISCO
35	U23XXCX35	NGD Linux II	CISCO
36	U23XXCX36	Advance Java Programming	Ethnotech
37	U23XXCX37	Android Programming / Android Medical App Development	Ethnotech
38	U23XXCX38	Angular JS	Ethnotech
39	U23XXCX39	Catia	Ethnotech
40	U23XXCX40	Communication Skills for Business	Ethnotech
41	U23XXCX41	Coral Draw	Ethnotech
42	U23XXCX42	Data Science Using R	Ethnotech
43	U23XXCX43	Digital Marketing	Ethnotech
44	U23XXCX44	Embedded System Using C	Ethnotech
45	U23XXCX45	Embedded System with IOT / Arduino	Ethnotech
46	U23XXCX46	English For IT	Ethnotech
47	U23XXCX47	Plaxis	Ethnotech
48	U23XXCX48	Sketch Up	Ethnotech
49	U23XXCX49	Financial Planning, Banking and Investment Management	Ethnotech
50	U23XXCX50	Foundation Of Stock Market Investing	Ethnotech
51	U23XXCX51	Machine Learning / Machine Learning for Medical Diagnosis	Ethnotech
52	U23XXCX52	IOT Using Python	Ethnotech
53	U23XXCX53	Creo (Modelling & Simulation)	Ethnotech
54	U23XXCX54	Soft Skills, Verbal, Aptitude	Ethnotech
55	U23XXCX55	Software Testing	Ethnotech
56	U23XXCX56	MX-Road	Ethnotech
57	U23XXCX57	CLO 3D	Ethnotech
58	U23XXCX58	Solid works	Ethnotech
59	U23XXCX59	Staad Pro	Ethnotech
60	U23XXCX60	Total Station	Ethnotech
61	U23XXCX61	Hydraulic Automation	Festo
62	U23XXCX62	Industrial Automation	Festo
63	U23XXCX63	Pneumatics Automation	Festo
64	U23XXCX64	Agile Methodologies	IBM
65	U23XXCX65	Block Chain	IBM
66	U23XXCX66	Devops	IBM
67	U23XXCX67	Artificial Intelligence	ITS
68	U23XXCX68	Cloud Computing	ITS
69	U23XXCX69	Computational Thinking	ITS
70	U23XXCX70	Cyber Security	ITS
71	U23XXCX71	Data Analytics	ITS
72	U23XXCX72	Databases	ITS
73	U23XXCX73	Java Programming	ITS
74	U23XXCX74	Networking	ITS
75	U23XXCX75	Python Programming	ITS
76	U23XXCX76	Web Application Development (HTML, CSS, JS)	ITS
77	U23XXCX77	Network Security	ITS & Palo alto
78	U23XXCX78	MATLAB	MathWorks

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79	U23XXCX79	Azure Fundamentals	Microsoft
80	U23XXCX80	Azure AI (AI-900)	Microsoft
81	U23XXCX81	Azure Data (DP -900)	Microsoft
82	U23XXCX82	Microsoft 365 Fundamentals (SS-900)	Microsoft
83	U23XXCX83	Microsoft Security, Compliance and Identity (SC-900)	Microsoft
84	U23XXCX84	Microsoft Power Platform (PI-900)	Microsoft
85	U23XXCX85	Microsoft Dynamics Fundamentals 365 – CRM	Microsoft
86	U23XXCX86	Microsoft Excel	Microsoft
87	U23XXCX87	Microsoft Excel Expert	Microsoft
88	U23XXCX88	Securities Market Foundation	NISM
89	U23XXCX89	Derivatives Equinity	NISM
90	U23XXCX90	Research Analyst	NISM
91	U23XXCX91	Portfolio Management Services	NISM
92	U23XXCX92	Cyber Security	Palo alto
93	U23XXCX93	Cloud Security	Palo alto
94	U23XXCX94	PMI – Ready	PMI
95	U23XXCX95	Tally – GST & TDS	Tally
96	U23XXCX96	Advance Tally	Tally
97	U23XXCX97	Associate Artist	Unity
98	U23XXCX98	Certified Unity Programming	Unity
99	U23XXCX99	VR Development	Unity

DineshKumar A
Branch Manager
Trainlab Academy

Dr.A. Vijayalakshmi
Professor and Head,
Department of BME
Trainlab – Coordinator

Dr J. Madhusudanan
Professor and Head,
Department of AI & DS &
Trainlab – Coordinator

Dean Academics (Core)
(Dr. Arivalagar.AA)

Dean Academic (Circuit)
(Dr.S. Anbumalar)

Director Cum Principal
(Dr.V.S.K. Venkatachalapathy)

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ANNEXURE - IV

ABILITY ENHANCEMENT COURSES - (B) SKILL ENHANCEMENT COURSES

Sl. No.	Course Code	Course Title
1.	U23ITS301	Skill Enhancement Course 1: Technical Seminar
2.	U23ITS402	Skill Enhancement Course 2: NPTEL/MOOC

**** Any one course to be selected from the list***

ANNEXURE V:

DETAILS OF HONORS DEGREE

Honours Programme – Network Security

COURSE DETAILS											
Sl. No.	Sem	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
					L	T	P		CAM	ESM	Total
Theory											
1	IV	U23ITH401	Wireless Networks	PC	3	1	0	4	25	75	100
2	V	U23ITH502	Enterprise Network Design	PC	3	1	0	4	25	75	100
3	VI	U23ITH603	Security and Privacy in Cloud	PC	3	1	0	4	25	75	100
4	VII	U23ITH704	Ethical Hacking for Network Administrators	PC	3	1	0	4	25	75	100
5	VIII	U23ITH805	Social Network Security	PC	3	1	0	4	25	75	100
	Total							**20**	**125**	**375**	**500**
Equivalent NPTEL courses##											
1	IV to VII	U23ITHN01	Wireless Ad Hoc and Sensor Networks					**3**	**12 WEEK Course**		
2			Computer Networks					**3**			
3			Information security					**3**			
4			Ethical Hacking, Cyber Security and Privacy					**3**			
5			Information Security - secure Systems Engineering, Cryptography And Network Security					**3**			

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ANNEXURE VI:

SYLLABUS (III & IV SEMESTER)

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III - SEMESTER

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Department	Mathematics	Programme: B.Tech.						
Semester	Third	Course Category Code: BS				*End Semester Exam Type: TE		
Course Code	U23MATC03	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	PROBABILITY AND STATISTICS	3	1	-	4	25	75	100

(Common to All Branches Except CSBS)

Prerequisite	Basic Probability	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Understand the concept of probability.	**K3**
	CO2 Solve the problem on Random variables.	**K3**
	CO3 Understand the concepts of Analysis of variance.	**K3**
	CO4 Learn the applications of Large Samples.	**K3**
	CO5 Analyze the problems in small samples.	**K3**

UNIT – I	**THEORY OF PROBABILITY**	**Periods:12**
Random Experiments - Sample Space - Exhaustive events- Axioms of probability – Conditional probability – Total probability – Bayes theorem.		**CO1**
UNIT – II	**RANDOM VARIABLES**	**Periods:12**
Discrete Random Variable – Binomial distribution – Poisson distribution. Continuous Random Variable – Exponential distribution – Normal distribution (Excluding Derivation of Mean, Variance and MGF)		**CO2**
UNIT – III	**STATISTICS & ANALYSIS OF VARIANCES**	**Periods:12**
Correlation – Rank correlation and Regression. Analysis of variance: One-way classifications and two-way classifications.		**CO3**
UNIT – IV	**LARGE SAMPLES**	**Periods:12**
Large Samples: Single Propositions – Difference of Proportions – Single Mean – Difference of Mean – Difference of Standard Deviations		**CO4**
UNIT – V	**SMALL SAMPLES**	**Periods:12**
Test for Single and Difference Mean – Test for Ratio of Variances – Chi-Square test for Goodness of Fit and Independence of Attributes.		**CO5**

Lecture Periods:45	**Tutorial Periods:15**	**Practical Periods: -**	**Total Periods:60**

Text Books

1. T. Veerarajan, "Probability, Statistics and Random Processes", Tata McGraw-Hill, 3rd Edition, 2008.
2. A. Singaravelu, "Probability and Statistics", Meenakshi Agency, 2019.
3. S.C. Gupta, V.K. Kapur "Fundamental of Mathematical Statistics" Sultan Chand & sons, 12th Edition, 2022.

Reference Books

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 3rd Edition,2017
2. William Mendenhall, Robert J. Beaver and Barbara M. Beaver: "Introduction to Probability & Statistics", Cengage Learning, 15thEdition, 2019.
3. Richard. A. Johnson, Irwin Miller and John E. Freund," Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2018.
4. Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh, "An Introduction to Probability and Statistics", Wiley, 3rd Edition 2008.

Web References

1. www.stat110.net
2. http://www.nptel.ac.in/courses/111105035 (R.V)
3. http:// www.probabilitycourse.com.
4. www.edx.org/Probability
5. http://www2.aueb.gr/users/demos/pro-stat.pdf

* TE – Theory Exam, LE – Lab Exam

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COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	-	-	-	-	-	-	-	1	2	1	1
2	3	2	1	1	-	-	-	-	-	-	-	1	2	1	1
3	2	2	-	-	-	1	-	-	-	-	-	1	2	1	1
4	3	2	1	1	-	1	-	-	-	1	-	1	2	1	1
5	3	2	1	1	-	1	-	-	-	1	-	1	2	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Computer Science and Engineering	Programme: B.Tech.						
Semester	Third	Course Category Code: PC				*End Semester Exam Type: TE		
Course Code	U23CSTC04	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	DATABASE MANAGEMENT SYSTEMS	3	0	0	3	25	75	100

(Common to CSE, IT and CCE)

Prerequisite	Computer Programming and Data Structures	
Course Outcome	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Explain the concepts of Database Management System and develop Entity Relationship model and Relational Models for a given application	K2
	CO2 Manipulate and build database queries using Structured Query Language and relational algebra	K3
	CO3 Use data normalization principles to develop a normalized database for a given application	K3
	CO4 Illustrate various transactions and recovery techniques	K2
	CO5 Apply tools like NoSQL, MongoDB, Cassandra on real time applications	K3

Unit- I	Introduction	Periods: 09
Database Systems - Data Models - Database System Architecture - Entity-Relationship Model - ER Diagram - Extended ER Model - ER into Relational Model - Relational Model: Structure of Relational Databases, Database Schema, Keys, Tables		CO1
Unit- II	**Database Languages**	**Periods: 09**
Relational Algebra - Extended-Relational Algebra - Relational Calculus - SQL: Introduction - DDL - DML - Integrity Constraints - Set Operations - Joins - Nested Queries - View- Trigger - Stored Procedures.		CO2
Unit- III	**Relational-Database Design and Data Storage**	**Periods: 09**
Relational database design: Domain and Data Dependency - Lossless Design - Armstrong's axioms - Functional Dependencies - Normal Forms - 1NF, 2NF, 3NF, BCNF, 4NF. **Data Storage: RAID -** File Organization - Indexing: Types of Indexing.		CO3
Unit- IV	**Transactions**	**Periods: 09**
Transaction concepts and states- Concurrent Execution - Serializability - Query Processing - Concurrency Control: Lock based Protocol - Timestamp based Protocol - Recovery System: - Log-Based Recovery - Shadow Paging.		CO4
Unit- V	**NoSQL Databases**	**Periods: 09**
NoSQL - Document Database: MongoDB - Multi-dimensional: Cassandra		CO5

Lecture Periods: 45	Tutorial Periods:	Practical Periods:	Total Periods: 45

Text Books

1. Silberschatz, Korth, Sudarshan, Database System Concepts, 7th Edition - McGraw-Hill Higher Education, International Edition, 2019.
2. Ramez Elmasri, and Shamkant B. Navathe, Fundamentals of Database Systems (7th edition),Publisher: Pearson, 2016.
3. Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.

Reference Books

1. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, McGraw-Hill College Publications, 2015.
2. Date C J, Kannan A and Swamynathan S, "An Introduction to Database Systems", 8th Edition, Pearson Education, New Delhi, 2006.
3. Alan Beaulieu, "Mastering SQL Fundamentals", Second Edition, O'Reilly,2009
4. Kristina Chodorow; Shannon Bradshaw, "MongoDB: The Definitive Guide", 3rd Edition, O'Reilly Media, Inc., 2018.
5. Pramod J. Sadalage (Author), Martin Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", 1stEdition, Kindle Edition

Web References

1. http://www.database.com/
2. http://cassandra.apache.org/
3. https://www.mongodb.com/

2.A.4.57

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	-	-	-	-	-	-	-	-	-	-	3	3	2
2	3	2	1	1	3	-	-	-	-	-	-	-	3	3	2
3	3	2	1	1	-	-	-	-	-	-	-	-	3	3	2
4	2	1	-	-	-	-	-	-	-	-	-	-	3	3	2
5	3	2	1	1	3	-	-	-	-	-	-	-	3	3	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.4.58

Department	**Computer Science and Engineering**	Programme: **B.Tech.**						
Semester	**Third**	Course Category Code: **PC**			*End Semester Exam Type: **TE**			
Course Code	**U23CSTC05**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**OPERATING SYSTEMS**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to CSE and IT)								
Prerequisite	IT Essentials, Digital Design and System Architecture							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe the various OS functionalities, structures, and layers	**K2**
	CO2 Usage of system calls related to OS management and interpreting different stages of various process states and process scheduling	**K4**
	CO3 Apply and explore the communication between inter process and Deadlock avoidance	**K3**
	CO4 Implement page replacement algorithms, memory management problems and segmentation	**K2**
	CO5 Apply various disk scheduling algorithms and I/O Hardware	**K4**

Unit- I	**Introduction to Operating Systems**	**Periods: 09**
Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services, Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual Machine, Resource Manager view, process view and hierarchical view of an OS.		**CO1**
Unit- II	**Process Management and Scheduling Algorithms**	**Periods: 09**
Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. **Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. **Scheduling algorithms:** Pre-emptive and non-pre-emptive, FCFS, SJF, RR.		**CO2**
Unit- III	**Process Synchronization, Threads and Deadlocks**	**Periods: 09**
Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Semaphores, Peterson's Solution, The Producer / Consumer Problem, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem. **Concurrent Programming:** Critical region, conditional critical region, monitors, concurrent languages, communicating sequential process (CSP); Deadlocks - prevention, avoidance, detection, and recovery. **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads. **Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention and **Deadlock Avoidance:** Banker's algorithm, Deadlock detection and Recovery.		**CO3**
Unit- IV	**Memory Management**	**Periods: 09**
Memory Management: Basic concept, Logical and Physical address maps, Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction. **Virtual Memory:** Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page allocation, Partitioning, Paging, Page fault, Working Set, Segmentation, Demand paging, Page Replacement algorithms: Optimal, First In First Out (FIFO, Not Recently Used (NRU) and Least Recently Used (LRU).		**CO4**
Unit- V	**File, I/O and Device Management**	**Periods: 09**
File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. **I/O Hardware:** I/O devices, Device controllers, Direct Memory Access, Principles of I/O. Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN.		**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods:**	**Total Periods: 45**

2.A.4.59

Text Books

1. Abraham Silberschatz, Peter B. Galvin, "Greg Gagne-Operating System Concepts", Wiley, 10th Edition, 2019.
2. William Stallings, "Operating Systems: Internals and Design Principles", Pearson, 9th Edition, 2018.
3. Andrew S. Tanenbaum, "Modern Operating Systems", Pearson, 4th Edition,2016.
4. Tanenbaum, Andrew S., and Albert S. Woodhull. "Operating systems: design and implementation", Vol. 68. Englewood Cliffs: Prentice Hall, 1997.

Reference Books

1. Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau, "Operating Systems: Three Easy Pieces", Arpaci-Dussea Books, Inc 2015.
2. Thomas Anderson and Michael Dahlin, "Operating Systems principles and practicell", Wiley, 2nd Edition, 2014.
3. Gary Nutt," Operating System, A modern perspective", 3rd Edition, Addison Wesley, 2004.
4. B.L. Stuart, "Principles of Operating Systems Cengage learning", India Edition, 2004.
5. Deitel, Harvey M., Paul J. Deitel, and David R. Choffnes, "Operating systems", Delhi. Pearson Education: Dorlin Kindersley, 2004.

Web References

1. https://nptel.ac.in/courses/106108101/
2. http://www.tcyonline.com/tests/operating-system-concepts
3. http://www.galvin.info/history-of-operating-system-concepts-textbook
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/index.html
5. https://www.cse.iitk.ac.in/pages/CS330.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	1	-	1	1	1	1	-	-	-	-	-	2	1	2
2	-	2	-	2	2	2	2	-	-	-	-	2	2	1	2
3	2	2	2	2	2	-	-	-	-	-	2	-	2	1	2
4	3	3	-	3	3	3	3	3	-	-	3	3	2	1	2
5	3	3	3	3	3	3	3	3	-	3	-	3	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2. A. 4. 60

Department	Information Technology	Programme: B.Tech.						
Semester	Third	Course Category Code: PC				*End Semester Exam Type: TE		
Course Code	U23ITT302	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	AUTOMATA LANGUAGES AND COMPUTATION	3	-	-	3	25	75	100

Prerequisite	Discrete Mathematics, Design and Analysis of Algorithms	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Understand and construct various types of finite automata.	**K3**
	CO2 Write regular expressions for given pattern and convert it to automata	**K3**
	CO3 Convert push down Automata to context free grammar and context free grammar to push down automata	**K4**
	CO4 Design Turing Machine to accept regular languages and perform computations	**K4**
	CO5 Explore the un-decidability and NP-class problems.	**K4**

UNIT-I	**AUTOMATA AND REGULAR EXPRESSIONS**	**Periods:9**
Need for automata theory - Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA – conversion of NFA into DFA. Finite Automata with Epsilon transitions – Equivalence of NFAs with and without ε-moves – conversion of NFA ε-moves into NFA. Finite Automata with output – Mealy and Moore machines		**CO1**

UNIT-II	**REGULAR EXPRESSIONS AND LANGUAGES**	**Periods:9**
Regular expression – Regular Languages - Equivalence of Finite Automata and regular expressions – Conversion of regular expression into NFA ε-moves - Conversion of regular expression into DFA (Direct and indirect method). Minimization of DFAs. Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages.		**CO2**

UNIT-III	**CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA**	**Periods:9**
Types of Grammar - Chomsky's hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG - convert CFG to PDA – PDA to CFG – Deterministic Pushdown Automata.		**CO3**

UNIT-IV	**NORMAL FORMS AND TURING MACHINES**	**Periods:9**
Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages – Turing Machine : Basic model – definition and representation – Instantaneous Description – Turing Machine for accepting Regular languages – TM as Computer of Integer functions(Addition & subtraction) – Programming techniques for Turing machines: Storage on Finite control - subroutine		**CO4**

UNIT-V	**UNDECIDABILITY**	**Periods:9**
Unsolvable Problems and Computable Functions –PCP-MPCP- Recursive and recursively enumerable languages – Properties - Universal Turing machine – Introduction to Tractable and Intractable problems - P and NP completeness – Kruskal's algorithm – Travelling Salesman Problem- 3-CNF SAT problems.		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. John C Martin , "Introduction to Languages and the Theory of Computation", 4th Edition, Tata McGraw Hill, 2011.
2. Hopcroft J.E., Motwani R. & Ullman J.D., "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2008.

Reference Books

1. Peter Linz, "An Introduction to Formal Language and Automata", 6th Edition, Jones & Bartlett, 2016.
2. Harry R Lewis and Christos H Papadimitriou , "Elements of the Theory of Computation", 2nd Edition, Prentice Hall of India, 2015.
3. K.L.P.Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata Languages and Computation", 3rd Edition, Prentice Hall of India, 2006.

Web References

1. https://onlinecourses.nptel.ac.in/noc21_cs83/preview
2. https://www.geeksforgeeks.org/theory-of-computation-automata-tutorials/
3. https://www.javatpoint.com/automata-tutorial
4. https://www.gatevidyalay.com/tag/theory-of-computation-tutorial/

2.A.4.61

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	3	2	3	-	-	-	-	1	1	2	3	1	3	2
2	2	2	3	2	1	-	-	-	3	3	2	3	3	1	2
3	2	2	3	2	1	-	-	-	1	3	1	2	1	2	2
4	2	2	2	1	-	-	-	-	1	3	3	2	1	3	2
5	2	2	2	1	1	-	-	-	1	1	3	2	3	1	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2. A. 4. 62

Department	Information Technology	Programme: B.Tech.						
Semester	Third	Course Category Code: PC				*End Semester Exam Type:TE		
Course Code	U23ITT303	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	SOFTWARE ENGINEERING AND PROJECT MANAGEMENT	3	-	-	3	25	75	100

Prerequisite	Basic Computer Knowledge, IT Essentials	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain various process models software project development	**K2**
	CO2 Develop Software Requirement Specification for a given application	**K3**
	CO3 Prepare Software design for an application	**K3**
	CO4 Discuss various software testing methods	**K2**
	CO5 Describe various aspects of software project management	**K2**

UNIT-I	**The Software Process**	**Periods:9**
Introduction to Software Engineering - Ethics in Software Engineering - Software Process - Software Engineering Practice - Software Process Models: Waterfall Models - Incremental - Evolutionary and Unified Process model - Comparison Study of Software Process Models - Agile Process and Models		**CO1**

UNIT-II	**Requirements Analysis and Specification**	**Periods:9**
Requirement Gathering and Analysis - Software Requirement Specification: Users of SRS - Characteristics of Good & Bad SRS - Important Categories of Customer Requirements - Documenting Functional Requirements - Traceability - Organization of SRS - Techniques for Representing Complex Logics - Feasibility Study - Case Study: Software Requirements Specification (SRS) for Application Project.		**CO2**

UNIT-III	**Software Design**	**Periods:9**
Overview of the Design Process - Characteristics of Good Software Design - Cohesion and Coupling - Layered Arrangements of Modules - Approaches to Software Design - Function Oriented Software Design: Data Flow Diagram - Transformation of DFD model into structure chart - Object Modelling Using UML: UML Diagrams - Use Case Model - Class diagrams - Interaction Diagrams - Activities Diagrams - State Chart Diagram		**CO3**

UNIT-IV	**Software Coding and Testing**	**Periods:9**
Coding, Code Review - Software Documentation - Testing - Unit Testing - Black-box testing - White-box testing - Debugging - Program Analysis Tools - Integration Testing - Testing Object - Oriented Programs - System Testing		**CO4**

UNIT-V	**Project Management**	**Periods:9**
Software Project Management Complexities - Responsibilities of a Software Project Manager - Project Planning - Metrics for Project Size Estimation - Project Estimation Techniques - Empirical Estimation Techniques - COCOMO Estimation Technique - Staffing Estimation - Scheduling - Organization and Team Structures - Staffing - Risk Management - Configuration Management		**CO5**

Lecture Periods:45	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. Roger Pressman, Bruce Maxim, "Software Engineering - A Practitioner's Approach", 9th Edition, McGraw Hill International Edition, 2019.
2. Rajib Mall, "Fundamentals of Software Engineering", Fifth Edition, PHI Learning Private Limited, 2018.
3. Ian Sommerville, "Software Engineering", Tenth Edition, Pearson Education Asia, 2016.

Reference Books

1. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
2. Watts S. Humphrey., "Managing the Software Process", Pearson Education, 2008.

Web References

1. https://archive.nptel.ac.in/courses/106/105/106105182/
2. https://www.coursera.org/learn/introduction-to-software-engineering
3. https://www.udemy.com/course/software-engineering-101/

2.A.4.63

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	-	-	-	-	-	-	2	-	-	-	1	2	2	2
2	3	2	1	1	-	-	-	-	-	-	-	1	2	2	2
3	3	2	1	1	-	-	-	-	-	-	-	1	2	2	2
4	2	-	-	-	-	-	-	-	-	-	-	1	2	2	2
5	2	-	-	-	-	-	-	-	3	3	3	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2. A. 4. 64

Department	Information Technology	Programme: B.Tech.					
Semester	Third	Course Category Code: PC			*End Semester Exam Type: TE		
Course Code	U23ITB301	Periods / Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	MICROCONTROLLERS AND ITS INTERFACING	2	0	2	3	50	50	100

Prerequisite	Digital Design and System Architecture	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Distinguish the basics of microprocessor and describe the 8051 Microcontroller architecture and its programming.	**K2**
	CO2 Explain the concepts of PIC16F Microcontroller architecture and its programming.	**K2**
	CO3 To understand the memory and I/O device interfacing of 8051 and PIC16F Microcontroller.	**K2**
	CO4 Use 8051 Microcontroller for Peripheral Interfacing.	**K3**
	CO5 Use PIC16F Microcontroller for Peripheral Interfacing.	**K3**

Unit- I	**Basics of Microprocessor and 8051 Microcontroller**	**Periods: 10**
Basic Introduction of Microprocessor, Microcomputers and Microcontrollers, Intel 8051 Microcontroller: Architecture-Pin configuration-stack and memory organization-Addressing Modes-Instruction set-Ports-Timers.		**CO1**

Unit- II	**Introduction to PIC 16F Microcontroller**	**Periods: 10**
Overview of PIC Family-PIC 16F microcontrollers: History and features –Architecture – memory organization – addressing modes –Special Function Registers-Status Register-Pin Diagram- instruction set – PIC programming – Data Conversion, RAM & ROM Allocation, on chip peripherals: I/O port		**CO2**

Unit- III	**Programming and Interfacing of Intel 8051 and PIC16F**	**Periods: 10**
Intel 8051 Programming and interfacing: Assembly Language Programming on I/O Interfacing: LCD, Keyboard, Stepper Motor-7 Segment LED Display. **PIC16F Programming and Interfacing**: PIC to LCD – Keyboard– parallel and serial ADC, DAC– Stepper motor interfacing		**CO3**

Unit- IV	**Peripheral Interfacing and it ALP of 8051 Microcontroller**	**Periods: 15**
1. Develop and Execute an ALP on Arithmetic operations using INTEL 8051 Microcontroller. 2. Develop and Execute an ALP on LED Blinking using INTEL 8051 Microcontroller. 3. Develop and Execute an ALP on Logical and Compare instructions using 8051 Microcontroller. 4. Develop and Execute an ALP on BCD and ASCII code conversion using 8051 Microcontroller. 5. Develop and Execute Programs on branching instructions and Looping using PIC Microcontroller. 6. Interface LCD with 8051 Microcontroller. 7. Interface Keyboard with 8051 Microcontroller.		**CO4**

Unit- V	**Peripheral Interfacing and it Programming of PIC 16F**	**Periods: 15**
1. Develop and Execute an ALP on Programs on Arithmetic instructions using PIC16F Microcontroller 2. Develop and Execute Programs on Logical and Compare instructions using PIC16F Microcontroller. 3. Develop and Execute Programs on BCD and ASCII code conversion using PIC16F Microcontroller. 4. Develop and Execute Programs on branching instructions and Looping using PIC16F Microcontroller. 5. Interface LCD with PIC16F Microcontroller.. 6. Interface Keyboard with PIC16F Microcontroller. 7. Interface ADC/DAC with PIC16F Microcontroller. 8. Interface stepper motor with PIC16F Microcontroller.		**CO5**

Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 60**

Text Books

1. Kenneth J.Ayala," 8051 Microcontroller Architecture, Programming and Application", PHI Learning New Delhi, July 2004, ISBN: 978-1401861582
2. Muhammad Ali Mazidi ,"8051 Microcontroller and Embedded. Systems. Using Assembly and C", Pearson, Second Edition.
3. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey ,"PIC Microcontroller and Embedded Systems using Assembly and C for PIC18", Pearson Education 2008 .
4. John Iovine, "PIC Microcontroller Project Book", McGraw Hill 2000
5. Gaonkar R. S.,"PIC Microcontroller",Penram International Publishing (India) Pvt. Ltd.

2.A.4.65

Reference Books

1. Verle Milan,"PIC Microcontrollers – Programming in C",Mikroelektronika, 1st Edition, 2009.
2. Matic Nebojsa,"PIC Microcontroller",Mikroelektronika, 1st Edition 2008
3. Rajkamal,"Microcontrollers: Architecture, Programming, Interfacing and System Design", Second Edition,January 2011. ISBN-13: 978-8131759905
4. MATHUR, SUNIL , Panda Jeebananda,"MICROPROCESSORS AND MICROCONTROLLERS", PHI Learning, New Delhi,2016.
5. Krishna Kant,"MICROPROCESSORS AND MICROCONTROLLERS: Architecture Programming and system design",PHI Learning,New Delhi,2016

Web References

1. http://www.faqs.org/faqs/microcontroller-faq/8051/
2. https://archive.nptel.ac.in/courses/108/105/108105102/
3. http://en.wikipedia.org/wiki/PIC_microcontroller
4. www.microchip.com/pic/
5. www.engineersgarage.com/articles/pic-microcontroller-tutorial
6. www.pic18-simulator-ide.software.informer.com
7. www.best-microcontroller-projects.com/pic-microcontroller.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
2	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
3	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
4	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3
5	3	3	3	2	3	-	-	-	-	-	-	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM) – Maximum 50 Marks									#End Semester Examination (ESE) Marks (Theory)	Total Marks
	Continuous Assessment (Theory)					Continuous Assessment (Practical)					
	CAT 1	CAT 2	Model	Attendance	Total	Conduction of Practical	Report	Viva	Total	#End Semester Examination (ESE) Marks (Practical-Internal Evaluation)	
Marks	5	5	5	5	20*	15	10	5	30*	30	75**	100
*To be weighted for 10 Marks					10	*To be weighted for 10 Marks			10		*To be weighted for 50 Marks	

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2. A. 4. 66

Department	**Mathematics**	Programme: **B.Tech.**					
Semester	**Third**	Course Category Code: **BS**			*End Semester Exam Type: **LE**		
Course Code	**U23MAPC01**	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**ENGINEERING MATHEMATICS LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**

(Common to all Branches Except CSBS)

Prerequisite	Matrices, Fourier Transforms, Laplace Transforms	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Perform and evaluate Matrix Operations	**K3**
	CO2 Solve Differential and Integral Equations	**K3**
	CO3 Construct Fourier series and Fourier Transforms of the given function	**K3**
	CO4 Find the Measures of Central tendency	**K3**
	CO5 Analyze Correlation and Regression lines	**K3**

List of Experiments:

1. Find the Inverse, Rank, Eigen values and Eigen Vectors of the matrix.
2. Solve the first order differential equation.
3. Find the integration of $\int_a^b f(x)dx$.
4. Find the Fourier series of f(x).
5. Find the Fourier Transform of f(x).
6. Find the Laplace Transform of f(x).
7. Find the Mean, Median and Mode.
8. Construct the Pie and Bar Diagram.
9. Find the Correlation coefficient.
10. Find the Regression lines.

Lecture Periods:- Nil	**Tutorial Periods:- Nil**	**Practical Periods: 3 0**	**Total Periods :30**

Reference Books

1. T. Veerarajan, "Engineering Mathematics, Tata McGraw Hill Education (India) Private Limited Chennai 2nd Edition Paperback - 1, January 2018.
2. M.K. Venkataraman, "Engineering Mathematics, The National Publishing Company, Madras, 2016.
3. Dr. A. Singaravelu, "Probability and Statistics", Meenakshi Agency, Paperback - 1, 2019.

Web References

1. https://www.mccormick.northwestern.edu/documents/students/undergraduate/introduction-to-matlab.pdf
2. https://www.nrigroupindia.com/niist/wp-content/uploads/sites/6/2022/02/lab-manual-it406matlab.pdf
3. https://www.studocu.com/row/document/comsats-university-islamabad/signals-and-systems/lab-lab-manual/38332410

* TE – Theory Exam, LE – Lab Exam

2.A.4.67

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	1	1	-	1	-	-	-	-	-	1	1	1	1
2	3	2	1	1	-	1	-	-	-	-	-	1	1	1	1
3	2	1	-	-	-	1	-	-	-	-	-	1	1	1	1
4	2	1	-	-	-	1	-	-	-	-	-	1	1	1	1
5	3	2	1	1	-	1	-	-	-	-	-	1	1	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2.A.4.68

Department	English	Programme: B.Tech.						
Semester	Third	Course Category Code: HS			*End Semester Exam Type: LE			
Course Code	U23ENPC01	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	GENERAL PROFICIENCY - I	0	0	2	1	50	50	100

(Common to ALL Branches except CSBS)

Prerequisite	Basics of English Language	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Interpret meaning and apply reading strategies in technical and non-technical context	**K3**
	CO2 Develop interpersonal communication skills professionally	**K4**
	CO3 Demonstrate various forms of formal writing	**K3**
	CO4 Decode graphical data coherently	**K2**
	CO5 Apply the techniques of verbal aptitude in competitive exams	**K3**

UNIT- I	**COMPREHENSION ANALYSIS**	**Periods:6**
Listening: Dialogue based on social contexts (IELTS based) - Speaking: Break the iceberg (IELTS based) Submitting Video Recording - Reading: Reading technical passage (IELTS based) - Writing: Writing Task: 2 (IELTS Academic) - Vocabulary: Synonyms (IELTS)		**CO1**
UNIT- II	**PERSONALITY DEVELOPMENT**	**Periods:6**
Listening: Monologue about the everyday social issues (IELTS based) - Interview Videos - Speaking: Speak about the topic in the Flash Card (IELTS based) - Reading: British & American Vocabulary - Writing: SWOT Analysis - Vocabulary: Idioms and Phrases (IELTS)		**CO2**
UNIT- III	**INFERENTIAL LEARNING**	**Periods:6**
Listening: Conversation between 4 people regarding education (IELTS based), Anecdotes - Speaking: Structure Discussion (IELTS based) - Reading: Distinguish between facts & opinions (IELTS based), - Writing: Writing Conversation to different context - Vocabulary: Phrasal Verbs (IELTS)		**CO3**
UNIT- IV	**INTERPRETATION AND FUNCTIONAL WRITING**	**Periods:6**
Listening: Monologue on an academic subject (IELTS based), Group Discussion videos - Speaking: Group Discussion Practice - Reading: Read and review (Books, Magazines) - Writing: Writing Task 1: (IELTS Academic: Graph/ chart/tables description) - Vocabulary: Collocations (IELTS)		**CO4**
UNIT-V	**VERBAL APTITUDE - I**	**Periods:6**
Language Enhancement: Articles, Preposition, Conjunction **Verbal Ability Enhancement:** Ordering of sentences, Blood Relation, Completing Statements- Cloze test, Spotting Errors - Sentence Improvement, Word Analogy, Word Groups **(GATE)**		**CO5**

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods:30**	**Total Periods:30**

Reference Books

1.Lewis, Norman, "Word Power Made Easy".Goyal Publishers and Distributors Pvt.Ltd., Latest Edition, 2020.
2.Patterson,Kerry, Joseph Grenny,Ron McMillan, Al Switzler, "Crucial Conversation Tools for talking when Stakes are High", Kindle Publication,2nd Edition, 2011.
3.Comfort, Jeremy,et.al. "Speaking Effectively: Developing Speaking Skills for Business English", Cambridge University Press, Cambridge: Reprint 2011.
4.Agarwal, R. S. "A Modern Approach to Verbal & Non Verbal Reasoning". S. Chand, 2010.
5.Wren, Percival Christopher, and Wren Martin. "High School English Grammar and Composition". S Chand, 2005.

Web References

1.https://www.ielts-exam.net/grammar/
2.https://ieltsfocus.com/2017/08/02/collocations-ielts/
3.https://www.fresherslive.com/online-test/blood-relations-questions-and-answers
4.https://www.toppr.com/guides/english-language/reading-comprehension/cloze-test/
5.https://www.examsbook.com/word-analogy-test-questions-with-answers

2.A.4.69

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
2	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
3	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
4	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
5	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1

Correlation Level: 1-Low, 2-Medium, 3-High

Evaluation Methods

Practical				
Continuous Assessment Internal Evaluation		**End Semester External Evaluation**		**Total Marks**
50 marks		**50 marks**		100
Conduction of Practical (Assignment 1&2 -10 Marks Performance in practical classes - 5 Marks)	15	Listening (L)	20	
Record	5	Speaking(S)	10	
Viva	5	Reading(R)	10	
Model Practical Examination (Model Exam is conducted for 50 Marks that will be converted to 15 Marks)	15	Writing(W)	10	
Attendance	10			

2.A.4.70

Department	Computer Science and Engineering	Programme: B.Tech.						
Semester	Third	Course Category: PC				End Semester Exam Type: LE		
Course Code	U23CSPC03	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Database Management Systems Laboratory	0	0	2	1	50	50	100

(Common to CSE, IT and CCE)

Prerequisite	Data Structures and Algorithms	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Implement relational database systems using SQL statements.	K3
	CO2 Use typical data definitions and manipulation commands in various applications.	K3
	CO3 Demonstrate applications using Nested and Join Queries	K3
	CO4 Execute various advance SQL queries related to Transaction Processing.	K3
	CO5 Build commercial relational database systems using trigger and cursor concept.	K3

List of Exercises

Structured Query Language:

1. Data Definition Language
2. Data Manipulation Language
3. Data Selection and Projection statements
4. Aggregate Functions
5. Joins
6. Built in Functions
7. Nested Queries
8. Set Operations
9. View
10. Transaction Control Language
11. Data Control Language

PL/SQL:

12. Simple PI/SQL Programs
13. Trigger
14. Cursor : Implicit Cursor and Explicit Cursor

Lecture Periods: -	Tutorial Periods: -	Practical Periods:30	Total Periods:30

Reference Books

1. Oracle Developer Handbook
2. SQL/PL/SQL for Oracle by P.S. Deshpande, IIT Madras, Dream Tech Press.
3. Alan Beaulieu, Mastering SQL Fundamentals, 2nd Edition, O"Reilly,2009
4. Silberschatz, Korth, Sudarshan, Database System Concepts, 7thEdition - McGraw-Hill Higher Education, 2019

Web References

1. www.oracle-developer.net
2. www.oracle.com/DBA

2.A.4.71

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	3	2	2	1	-	2	1	-	2	2	3	2
2	3	2	3	3	2	2	1	-	2	1	-	-	3	3	3
3	3	3	3	3	2	2	2	-	2	1	-	-	3	2	3
4	3	2	3	3	2	2	1	-	2	1	-	-	3	3	3
5	3	3	3	3	2	2	2	-	2	1	-	-	3	2	3

Correlation Level: 1-Low, 2-Medium, 3-High.

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2.1.4.72

Department	**Computer Science and Engineering**	Programme: **B.Tech.**						
Semester	**Third**	Course Category: **PC**			End Semester Exam Type: **LE**			
Course Code	**U23CSPC04**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**OPERATING SYSTEMS LABORATORY**	**0**	**0**	**2**	**1**	**50**	**50**	**100**
Prerequisite	NIL							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Understand the basic commands for Linux.	**K2**
CO2	Develop simple shell programs.	**K2**
CO3	Implement different Scheduling Algorithms	**K5**
CO4	Apply the basic concepts of Deadlock Handling procedures.	**K4**
CO5	Simulate Disk Scheduling Algorithms.	**K4**

List of Exercises

1. Study of Basic commands to understand the system and working of Linux.
2. Shell scripting (I/O, decision making, looping)
3. Creating Child process (using fork), Zombie, Orphan. Displaying system information using C.
4. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d) priority
5. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
6. IPC (Threads, Pipes)
7. Process synchronization (Producer Consumer / Reader Writer/Dining Philosopher using semaphores)
8. Dynamic Memory Allocation Algorithms (First fit, Best fit, Worst fit)
9. Page Replacement Algorithms. (FIFO, LRU, Optimal)
10. Disk Scheduling Algorithms.

Lecture Periods: -	**Tutorial Periods:** -	**Practical Periods:30**	**Total Periods:30**

Reference Books

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.
3. Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau, Operating Systems, Three Easy Pieces, Arpaci- Dusseau Books, nc, 2015.
4. Dhamdhere, Dhananjay M. Operating systems: a concept-based approach, 2E. Tata McGraw-Hill Education, 2006.
5. Deitel, Harvey M., Paul J. Deitel, and David R. Choffnes. Operating systems. Delhi. Pearson Education: Dorling Kindersley, 2004.

Web References

1. https://www.geeksforgeeks.org
2. http://avanthioslab.blogspot.com/2016/08/file-organization-techniques.html
3. https://www.programming.com/programs/c-programs/285-page-replacement-programs-in-c

* TE – Theory Exam, LE – Lab Exam

2.A.4.73

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	1	-	1	1	1	1	-	-	-	-		-	-	2
2	-	2	-	2	2	2	2	-	-	-	-	2	-	-	2
3	2	2	2	2	2	2	-	-	-	-	2	-	-	-	2
4	2	2	2	2	3	2	-	-	-	-	2	-	-	-	2
5	2	2	2	2	3	2	-	-	-	-	2	-	-	-	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High Evaluation Methods

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

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Department	Information Technology	Programme: B.Tech.					
Semester	Third	Course Category Code: MC			*End Semester Exam Type: -		
Course Code	U23ITM303	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	CLIMATE CHANGE	2	0	0	-	100	-	100

Prerequisite	-	
Course Outcome	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Inspect the characteristics and Temperature profile of the atmosphere	K2
	CO2 Analyze past climate, human influence on global warming, and predict future climates	K3
	CO3 Analyze the impact of climate change and the risk of Irreversible Changes	K3
	CO4 Outline the carbon credits and evidences of changes in Environment	K2
	CO5 Acquire knowledge on clean development mechanism and mitigation technologies	K2

UNIT-I	ATMOSPHERE AND ITS COMPONENTS	Periods:06
Importance of Atmosphere-Physical Chemical Characteristics of Atmosphere- Vertical structure of the atmosphere-Composition of the atmosphere-Atmospheric stability-Temperature profile of the atmosphere-Lapse rates-Temperature inversion-effects of inversion on pollution dispersion.		CO1
UNIT-II	**GLOBAL CLIMATE**	**Periods:06**
Account of past climate- Environmental indicators and instrumental records – Human Footprints on global warming-Predicting future climates- Temperature regime – Extreme climate events.		CO2
UNIT-III	**IMPACTS OF CLIMATE CHANGE**	**Periods:06**
Causes of Climate change : Change of Temperature in the environment-Melting of ice Pole-sea level rise-Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions- Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.		CO3
UNIT-IV	**OBSERVED CHANGES AND ITS CAUSES**	**Periods:06**
Climate change and Carbon credits- Initiatives in India-Kyoto Protocol-Intergovernment Panel on Climate change-Climate Sensitivity and Feedbacks -The Montreal Protocol – UNFCCC – IPCC – Evidences of Changes in Climate and Environment – on a Global Scale and in India.		CO4
UNIT-V	**CLIMATE CHANGE AND MITIGATION MEASURES**	**Periods:06**
Clean Development Mechanism -Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels --- Mitigation Efforts in India and Adaptation funding. Key Mitigation Technologies and Practices- Carbon sequestration – Carbon capture and storage (CCS)- International and Regional cooperation- Remedial measures.		CO5

Lecture Periods:30	Tutorial Periods:-	Practical Periods:-	Total Periods:30

Text Books

1. Joan Fitzgerald, "Greenovation: Urban Leadership on Climate Change", Oxford University Press, 2020.
2. J. David Neelin, "Climate change and climate modelling", Cambridge University press, 2011.
3. Robin Moilveen, "Fundamentals of weather and climate", Oxford University Press, 2nd Edition, 2010.
4. Andrew Dessler and Edward A. Parson, "The Science and Politics of Global Climate Change", Cambridge University press, 3rd Edition, 2019.
5. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2007.

Reference Books

1. Bill McKibben, "The Global Warming Reader: A Century of writing about Climate Change", Penguin, 2012.
2. JasonSmerdon, "Climate Change: The Science of Global Warming and our Energy Future", Columbia University, 2009
3. Adaptation and mitigation of climate change-Scientific Technical Analysis, Cambridge University Press, 2006.
4. J.M. Wallace and P.V. Hobbs, "Atmospheric Science", Elsevier/ Academic Press, 2006.
5. Jan C. van Dam, Impacts of "Climate Change and Climate Variability on Hydrological Regimes", Cambridge University Press, 2003.

Web References

1. https://nptel.ac.in/courses/105102089/
2. https://www.warmheartworldwide
3. https://nptel.ac.in/content/storage

2. A.4. 75

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1
2	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1
3	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1
4	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1
5	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

2.A4.76

IV - SEMESTER

2. A. 4. ##

Department	Mathematics	Programme : B.Tech.						
Semester	Fourth	Course Category Code: BS				*End Semester Exam Type:TE		
Course Code	U23MATC05	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	DISCRETE MATHEMATICS AND GRAPH THEORY	3	1	-	4	25	75	100
(Common to CSE, IT, AI&DS and CCE)								
Prerequisite	Basic Mathematics							

Course Outcome	On completion of the course, the students will be able to		BT Mapping (Highest Level)
	CO1	Construct Mathematical arguments using logical connectives and truth tables.	K3
	CO2	Verify the correctness of an argument predicate logic and quantifiers.	K3
	CO3	Solve problems using counting techniques in Lattices.	K3
	CO4	Familiarize the different types of Graphs.	K3
	CO5	Understand the Applications of Shortest path algorithms.	K3

UNIT – I	LOGICS AND PROOFS	Periods:12
Introduction – Connectives – Statement formulae – Truth table – Tautologies – Equivalence of Statement formulae – NAND and NOR Connectives – Implications – Principal conjunctive and disjunctive normal forms.		CO1

UNIT – II	PREDICATE AND QUANTIFIERS	Periods:12
Predicate and Quantifiers – Rules of Inference theory – Conditional proof – Indirect method of proof.		CO2

UNIT – III	LATTICES	Periods:12
Partially Ordering – Posets – Hasse Diagram – Lattices as Posets – Properties of Lattices – Sub lattices – Complemented and Distributive lattices.		CO3

UNIT – IV	GRAPH THEORY	Periods:12
Graphs and types of Graphs – Matrix representation of graphs – Isomorphism – Connected graphs – Euler graphs – Hamilton paths and circuits.		CO4

UNIT – V	TREES	Periods:12
Trees – Properties of Trees – Algorithm – Kruskal's algorithm.		CO5

LecturePeriods:45	TutorialPeriods:15	Practical Periods:-	TotalPeriods:60

Text Books

1. P. Tremblay and R. Manohar, "Discrete Mathematical structures with Applications to computer Science", 13th reprint, Tata McGraw - Hill publishers, 2002.
2. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", Dover Publications New York, 1st Edition, 2016.
3. Dr G. Balaji "Discrete Mathematics", G. Balaji Publishers, 14th Edition 2021.

Reference Books

1. C.L. Liu, "Elements of Discrete Mathematics", Tata McGraw - Hill Education Pvt. Ltd., 3rd Edition, 2008.
2. F. Harary, "Graph theory", Narosa publishing house, New Delhi, 1988.
3. Douglas B. West, "Introduction to Graph theory", Pearson Education, 2nd Edition, 2002.
4. Oscar Levin, "Discrete Mathematics An Open Introduction", 3rd Edition, 4th Printing: 2019 ISBN: 978-1792901690
5. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw - Hill Publishing Company, Pvt. Ltd., New Delhi, 5th Edition, 2003.

Web References

1. https://www.researchgate.net/publication/1922282_Discrete_Mathematics_for_Computer_Science_Some_Notes
2. https://nptel.ac.in/courses/111/107/111107058/
3. https://nptel.ac.in/courses/106/106/106106183/
4. https://www.pdfdrive.com/discrete-mathematics-for-computer-science-e17017833.html
5. https://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

* TE – Theory Exam, LE – Lab Exam

2.D.4.79

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	1	-	-	-	-	-	-	-	1	1	-	1
2	3	3	2	1	-	-	-	-	-	-	-	1	1	-	-
3	3	3	2	1	-	-	-	-	-	-	-	1	1	-	-
4	3	3	2	1	-	1	-	-	-	1	1	1	1	-	-
5	3	3	2	1	-	1	-	-	-	1	1	1	1	-	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2. A. 4. 80

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: ES			*End Semester Exam Type: TE			
Course Code	U23ITTC02	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	PROGRAMMING IN JAVA	3	0	0	3	25	75	100
(Common to All Branches)								
Prerequisite	Programming Skills							

Course Outcome	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Articulate the concept of Java fundamentals, OOPs and Strings	K2
CO2	Demonstrate the principles of inheritance, packages and interfaces with real time applications	K2
CO3	Create real time applications using exception handling and thread programming.	K3
CO4	Build distributed applications using Collections and IO streams	K3
CO5	Design and build simple GUI programs using AWT, Swings and build database applications	K3

Unit- I	INTRODUCTION	Periods: 09
Introduction: Java: History – Features – JVM - JRE – JDK – Java Compilation and Execution – Data Types - Variables, Types, Expressions, Assignment Statements, Input/Output Statements: Scanner/System class, Type Casting (Primitives to Primitives), Conditional and Iterative Control Structures - Arrays **OOPs with Java:** Introduction to OOPs Concepts - Class – Objects – Methods - Access Modifiers – Creating Class and Objects, Object Life-Cycle - Garbage Collection-Constructors - this – static – Array of Objects – Nested Classes. **String**: String Class– Built-in Methods – StringBuilder - StringBuffer		CO1

Unit- II	INHERITANCE, INTERFACES AND PACKAGES	Periods: 09
Inheritance: Types of Inheritance – is-a Relationship, has-a Relationship – super keyword – final keyword – Polymorphism - Method overloading and Method overriding – Abstract Class **Interfaces:** Define – Extend – Implement – Access - Interfaces vs Abstract classes, Type Conversions (Primitives to Objects vice-versa): Autoboxing and Auto unboxing **Packages:** Define – Create – Access – Import		CO2

Unit- III	EXCEPTION HANDLING AND MULTITHREADING	Periods: 09
Exception Handling: Exception Hierarchy – Checked and Unchecked Exceptions – try, catch, throws, throw and finally – User Defined Exceptions. **Multithreading:** Thread – Life cycle – Defining and Running – Implementation Types – Thread Priorities – Thread Synchronization - Inter-Thread Communication		CO3

Unit- IV	COLLECTIONS AND I/O STREAMS	Periods: 09
Collections: List: ArrayList and LinkedList. Set: HashSet and TreeSet. Map: HashMap – Stack – Queue. Lambda Expressions. **I/O Streams:** Streams – Byte Streams and Character Streams – FileInputStream and FileOutputStream – FileReader and FileWriter. Object Serialization : ObjectInputStream and ObjectOutputStream		CO4

Unit- V	GUI and JDBC	Periods: 09
AWT: Components – Controls – Event Handling **SWING**: Swing Components – Layout Management. **JDBC:** JDBC Architecture – JDBC Driver Types – Implementation of JDBC.		CO5

Lecture Periods: 45	Tutorial Periods:	Practical Periods:	Total Periods: 45

Text Books

1. Allen B. Downey and Chris Mayeld, "Think Java - How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2020
2. Herbert Schildt, "Java: The Complete Reference", TMH Publishing Company Ltd, 11th Edition, 2018.
3. H.M.Dietel and P.J.Dietel, "Java How to Program", 11th Edition, Pearson Education/PHI, 2017
4. Cay S. Horstmann, Gary Cornell, "Core Java Volume - I Fundamentals", 9th Edition, Prentice Hall, 2013.

2.A.4, 84

Reference Books

1. Sagayaraj, Denis, Karthik, Gajalakshmi, "JAVA Programming for core and advanced learners", Universities Pres Private Limited, 2018.
2. Poaul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015.
3. P.J. Dietel and H.M Dietel, "Java for Programmers", Pearson Education, 9th Edition, 2011.
4. Steven Holzner, "Java 2 Black book", Dreamtech Press, 2011.

Web References

1. https://www.javatpoint.com/java-tutorial
2. https://docs.oracle.com/en/java/
3. https://www.studytonight.com/java/
4. https://onlinecourses.nptel.ac.in/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	-	1	-	-	-	-	-	-	2	3	2	1
2	3	3	3	-	3	-	-	-	-	-	-	2	3	2	1
3	3	3	3	1	3	-	-	-	-	-	-	2	3	2	1
4	3	3	3	1	3	-	-	-	-	-	-	2	3	2	1
5	3	3	3	1	3	-	-	-	-	-	-	2	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.4.9.82

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: PC				*End Semester Exam Type: TE		
Course Code	U23ITT404	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	ALGORITHMS DESIGN AND ANALYSIS	3	0	0	3	25	75	100

Information Technology

Prerequisite	Programming and Data Structures	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Analyze the efficiency of algorithms using various frameworks	K4
	CO2 Analyze divide and conquer and greedy techniques to solve problems.	K4
	CO3 Use dynamic programming techniques to solve problems	K3
	CO4 Apply backtracking method for solving problems.	K3
	CO5 Apply branch and bound technique for solving problems.	K3

Unit- I	**INTRODUCTION**	**Periods: 09**
Algorithm notation - Algorithm analysis: Time and space complexity - Asymptotic Notations and its properties Best case, Worst case and average case analysis – Recurrence relation: substitution method – Lower bounds – searching: linear search, Fibonacci search and Interpolation Search, Pattern search: The naïve string-matching algorithm - Rabin-Karp algorithm - Knuth-Morris-Pratt algorithm.		**CO1**

Unit- II	**DIVIDE AND CONQUER AND GREEDY APPROACHES**	**Periods: 09**
Divide and Conquer: General method - Binary search - Finding maximum and minimum - Merge sort - Quick sort; Greedy Technique: General method – Fractional knapsack problem - Optimal Merge pattern –Huffman Trees Minimum spanning tree: Kruskal's and Prim's algorithm - Shortest path: Dijkstra's algorithm		**CO2**

Unit- III	**DYNAMIC PROGRAMMING**	**Periods: 09**
General Method - Elements of dynamic programming — Matrix-chain multiplication - Multi stage graph — Travelling salesman problem – 0/1 knapsack problem - Optimal Binary Search Trees, Shortest path: Bellman-Ford algorithm - Floyd - Warshall algorithm		**CO3**

Unit- IV	**BACKTRACKING**	**Periods: 09**
General Method: N-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycle– Knapsack Problem.		**CO4**

Unit- V	**BRANCH AND BOUND**	**Periods: 09**
Introduction – Bounding - FIFO Branch and Bound - Least Cost (LC) Search Branch and Found –15-Puzzle Problem – Travelling Salesman Problem - 0/1 Knapsack Problem –.Assignment problem. Introduction to NP-Hard and NP-Completeness.		**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods:**	**Total Periods: 45**

Text Books

1. Gilles Brassard and Paul Bratley, Fundamentals of Algorithmics, Theory and Practice PHI, 2010.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition, Galgotia Publications, Pvt. Ltd., 2008.
3. Thomas H. Corman, Charles E. Leiserson, Ronald and L. Rivest, Introduction to Algorithms, Second Edition, Prentice-Hall of India, 2003

Reference Books

1. S. Sridhar, "Design and Analysis of Algorithms", Oxford university press, 2014.
2. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2012.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Reprint Edition, Pearson Education, 2006.

Web References

1. https://archive.nptel.ac.in/courses/106/106/106106131/
2. https://nptel.ac.in/courses/106102064
3. https://onlinecourses.nptel.ac.in/noc23_cs88/preview
4. https://archive.nptel.ac.in/courses/106/106/106106127/
5. http://www.digimat.in/nptel/courses/video/106106145/L01.html

2.A.4.83

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	-	-	1	-	-	-	-	2	3	2	-
2	3	3	3	2	-	-	1	-	-	-	-	2	3	2	-
3	3	3	3	2	-	-	1	-	-	-	-	2	3	2	-
4	3	3	3	2	-	-	-	-	-	-	-	2	3	2	-
5	3	3	3	2	-	-	-	-	-	-	-	2	3	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.4.84

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: PC				*End Semester Exam Type: TE		
Course Code	U23ITT405	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	DATA COMMUNICATION AND COMPUTER NETWORKS	3	0	0	3	25	75	100

Prerequisite	Digital Design and System Architecture	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Analyze the functioning of data communication and computer network and select relevant transmission media and switching techniques as per need.	**K4**
	CO2 Analyze the transmission errors with respect to IEEE standards.	**K4**
	CO3 Configure the network component and assign IP address.	**K3**
	CO4 Articulate the significance of various Flow control and Congestion control Mechanisms	**K3**
	CO5 Illustrate the Functioning of various Application layer Protocols.	**K3**

Unit- I	**DATA COMMUNICATIONS**	**Periods: 09**
Components – Data flow – Networks: Components and Categories – Types of Connections – Topologies – The Internet - Protocols and Standards – Network Models: ISO / OSI model – Other Wired Networks: ATM - Frame Relay - ISDN Physical layer: Transmission modes – Multiplexing - Transmission Media – Switching - Circuit Switched Networks - Datagram Networks - Virtual Circuit Networks.		**CO1**
Unit- II	**DATA LINK LAYER**	**Periods: 09**
Introduction – Framing - and Error – Detection and Correction – Parity – LRC – CRC Hamming code - Flow and Error Control - Noiseless Channels - Noisy Channels – HDLC - Point to Point Protocols - Medium Access sub layer: ALOHA - CSMA/CD - LAN – Ethernet IEEE 802.3 - IEEE 802.5 – IEEE 802.11 - Random access - Controlled access - Channelization.		**CO2**
Unit- III	**NETWORK LAYER**	**Periods: 09**
Logical Addressing – Internetworking – Tunneling - Address mapping – ICMP – IGMP – Forwarding - Uni-Cast Routing Protocols - Multicast Routing Protocols – Next Generation IP.		**CO3**
Unit- IV	**TRANSPORT LAYER**	**Periods: 09**
Process to Process Delivery - UDP and TCP protocols - Data Traffic – Congestion - Congestion Control – QoS - Integrated Services - Differentiated Services - QoS in Switched Networks.		**CO4**
Unit- V	**APPLICATION LAYER**	**Periods: 09**
Domain Name System - DNS in Internet - Electronic Mail – SMTP – FTP – WWW – HTTP - SNMP.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. Andrew S Tanenbaum, Computer Networks, Pearson Education, 6th Edition, 2022.
2. Behrouz A. Forouzan, Data Communications and Networking, TMH, 5th Edition, 2012
3. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, TMH, 6th Edition, 2022

Reference Books

1. James F.Kurose & Keith W. Ross, Computer Networking: A Top-Down Approach Featuring the Internet., Pearson Education, 7th Edition, 2017
2. William Stallings, Data and Computer Communications, Pearson Education, 10th Edition, 2014
3. Prakash C. Gupta, Data Communications and Computer Networks, Kindle Edition, 2nd Edition, 2013
4. S. Keshav, An Engineering Approach to Computer Networks, Pearson Education, 3rd Edition, 2008
5. Alberto Leon-Garcia, Communication Networks – Fundamental Concepts and Key Architectures, TMH, 2nd Edition, 2017

Web References

1. https://www.geeksforgeeks.org/data-communication-definition-components-types-channels/
2. https://archive.nptel.ac.in/courses/106/105/106105082/
3. https://archive.nptel.ac.in/courses/106/105/106105183/
4. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
5. https://www.telecomtrainer.com/dcn-dedicated-core-network/

2.A.4.85

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
2	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
3	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
4	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
5	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.4.86

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: PC				*End Semester Exam Type: TE		
Course Code	U23ITE401	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Object Oriented Analysis and Design	3	0	0	3	25	75	100

Prerequisite	SOFTWARE ENGINEERING AND PROJECT MANAGEMENT	
Course Outcome	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Understand Object Oriented Software Development Process and OO Methodologies	K2
	CO2 Select an appropriate UML Diagram and design software using OO concepts	K2
	CO3 Apply object oriented analysis processes for projects	K3
	CO4 Understand different stages of design process with a case study	K2
	CO5 Apply design patterns to develop software	K3

Unit- I	INTRODUCTION	Periods: 09
Object Oriented System Development-Object Basics-OO Software Development Life Cycle-Unified Process-OO Methodology, Unified Modeling Language (UML)-Use Case-Case study: The Next Gen POS system.		CO1
Unit- II	**UML DIAGRAMS**	**Periods: 09**
UML Class Diagram-Use case Diagram-UML Interaction Diagram-Sequence Diagram-Collaboration Diagram-State Machine Diagram-Activity Diagram-Implementation Diagram.		CO2
Unit- III	**OBJECT ORIENTED ANALYSIS**	**Periods: 09**
Use case driven Object analysis – approaches for identifying classes – identifying objects, relationships attributes, methods for ATM banking system.		CO3
Unit- IV	**OBJECT ORIENTED DESIGN**	**Periods: 09**
Object oriented design process-Design axioms-Designing Classes, Methods-Access layer: object storage and object interoperability, View layer: Designing interface objects, Prototyping User interface. Case Study: Designing access layer and user interface for the ATM banking system		CO4
Unit- V	**DESIGN PATTERNS AND TESTING**	**Periods: 09**
GRASP: Designing Objects with Responsibilities-Creator-Information Expert-Low Coupling-High Cohesion-Controller. Testing: Software Quality Assurance – Impact of Object Orientation on Testing – Develop Test Cases and Test Plans.		CO5

Lecture Periods: 45	Tutorial Periods: -	Practical Periods: -	Total Periods: 45

Text Books

1. Ali Bahrami, "Object Oriented systems development", Paperback-Bigbook, 2017.
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2007.
3. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2 nd Edition, Pearson Education, 2005.

Reference Books

1. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2009.
2. Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3 rd Edition, Pearson Education, 2007.
3. Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Third Edition, 2004, O'reily Publications.

Web References

1. https://onlinecourses.nptel.ac.in/noc20_cs84/preview
2. https://en.wikipedia.org/wiki/Object-oriented_analysis_and_design
3. https://www.tutorialspoint.com/object_oriented_analysis_design/index.htm

2.A.4.87

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	3	-	-	-	-	-	-	-	1	1	2	2	3
2	3	2	2	2	2	-	-	-	2	-	-	3	1	2	-
3	2	2	1	2	-	-	-	-	-	-	-	3	2	2	-
4	3	1	2	2	1	-	-	-	3	-	-	3	-	3	1
5	3	2	1	1	-	-	-	-	2	-	-	3	-	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

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2. A. 4. 88

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: PE			*End Semester Exam Type: TE			
Course Code	U23ITE402	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	WEB APPLICATION DEVELOPMENT	3	0	0	3	25	75	100
Information Technology								

Prerequisite	IT Essentials ,Basic Programming Knowledge	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Understand program with core concepts of PHP	**K2**
	CO2 Explain the oops concepts in PHP	**K2**
	CO3 Design and build database	**K3**
	CO4 Use Ajax & JQuery to enhance the functioning of web pages.	**K2**
	CO5 Design a micro project	**K3**

Unit- I	**CORE PHP**	**Periods: 09**
PHP Foundation: Installation - Syntax - Variables - Echo / Print - Data Types - Strings - Numbers - Math - Constants - Operators: Arithmetic - Comparison - Logical - String - Arrays - If...Else...Else if - Switch - Loops - Functions - Arrays - Superglobals - RegEx.		**CO1**
Unit- II	**PHP FORMS**	**Periods: 09**
PHP Form: Form Handling - GET/POST - Using Bootstrap - Form Validation - Form Required - Form Submission.PHP Date and Time - Include - File Upload - Cookies - Sessions - Exceptions. OOPS: Classes/Objects - Constructor - Destructor - Access Modifiers - Inheritance.		**CO2**
Unit- III	**PHP AND MYSQL DATABASE**	**Periods: 09**
Database: Connect - Create Databases - Building Tables - Insert Data - Get Last ID - Insert Multiple - Prepared - Select Data -Where - Order By - Delete Data - Update Data - Limit Data		**CO3**
Unit- IV	**PHP AJAX & JQUERY**	**Periods: 09**
PHP AJAX: AJAX Database - AJAX XML - AJAX Search - AJAX Poll. Introduction of JQuery: Syntax – Selectors - Events - jQuery Syntax For Event Methods - Commonly Used jQuery Event Methods.		**CO4**
Unit- V	**MICRO PROJECT & CASE STUDY**	**Periods: 09**
Database Connectivity with PHP - Design and build a Login form and event registration form. Case Study - Student information system, Health Management System		**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. Leon Atkinson, "Core PHP Programming: Using PHP to Build Dynamic Web Sites", Paperback, 2000.
2. Keith Wald, Jason Lengstorf," Pro PHP and jQuery", Paperback, 2016.
3. Steven Suehring, Janet Valade, "PHP, MySQL, JavaScript & HTML5 All-in-One", John Wiley & Sons, Inc, 2013.

Reference Books

1. Richard Blum,"PHP, MySQL & JavaScript All-in-One", John Wiley &Sons,2018
2. Jon Duckett,"JavaScript and JQuery: Interactive Front-End Web Development", Wiley.

Web References

1. https://www.tutorialspoint.com/php/php_introduction.html
2. https://www.w3schools.com/php/php_intro.asp
3. https://www.guru99.com/cakephp-tutorial.html
4. https://www.ithands.com/blog/cms-or-php-framework-which-technology-is-better-for-my-business

2.A.4.89

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	1	-	1	-	-	-	-	-	2	3	-	-	3
2	2	1	1	-	1	-	-	-	-	-	3	3	-	-	3
3	3	2	3	-	2	-	-	-	-	-	3	3	-	-	3
4	3	2	3	-	2	-	-	-	-	-	3	3	-	-	3
5	3	2	3	-	2	-	-	-	-	-	3	3	-	-	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

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2.A.4.90

Department	Information Technology	Programme : B.Tech.						
Semester	Fourth	Course Category Code :PEC			*End Semester Exam Type:TE			
Course Code	U23ITE403	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	INFORMATION CODING TECHNIQUES	3	0	0	3	25	75	100

Prerequisite	Mathematics, Computer Networks	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Understand the notions of information and channel capacity	**K1**
	CO2 Evaluate the compression and decompression techniques	**K2**
	CO3 Analyze the various concepts of Multimedia communication	**K3**
	CO4 Analyze error correction and detection using linear block codes	**K3**
	CO5 Understand the basic concepts of cryptography	**K1**

Unit-I	**INFORMATION ENTROPY FUNDAMENTALS**	**Periods:09**
Introduction to Information Theory – Uncertainty and Information- Entropy – Source coding Theorem – Huffman coding –Shannon Fano coding – Discrete Memory less channels – channel capacity – channel coding Theorem – Channel capacity Theorem		**CO1**
Unit-II	**DATA AND VOICE CODING**	**Periods:09**
Introduction - Run length encoding- Arithmetic coding – Lempel Ziv algorithm – Pulse Code Modulation – Differential Pulse Code Modulation - Delta Modulation – Adaptive Delta Modulation – Coding speech at low bit rates - Vocoders – Linear Predictive Coding – Code Excited LPC – Perceptual Coding – Dolby AC-3.		**CO2**
Unit-III	**IMAGE AND VIDEO CODING**	**Periods:09**
Introduction – Image Compression – GIF – TIFF – Digitized Documents – JPEG Standards – Video Compression Principles – Motion Compensation and Estimation – H.261 – MPEG Standards		**CO3**
Unit-IV	**ERROR CONTROL CODING**	**Periods:09**
Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator Polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome – Convolutional codes		**CO4**
Unit-V	**CRYPTOGRAPHY**	**Periods:09**
Introduction – Encryption techniques – Symmetric cryptography – Data Encryption Standard – Asymmetric Cryptography – RSA Algorithm – Pretty Good Privacy – DH Protocol - Introduction to Physical Layer Security: Information - Theoretic Secrecy, Secret Communication Over Noisy Channels, Secret - Key Generation from Noisy Channels, Cooperative jamming. Illustrative Program: RSA algorithm.		**CO5**

Lecture Periods:45	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. Information Theory, Coding and Cryptography by Ranjan Bose, McGraw Hill, 3rd Edition, 2016.
2. Digital Communication Systems by Simon Haykin, Wiley India, 2013.
3. Physical Layer Security in Wireless Communications by Xiangyun Zhou, Lingyang Song, Yan Zhang, 1st Edition, 2016.

Reference Books

1. A Saha, N Manna and S Mandal, Information Theory, Coding and Cryptography, Pearson.2013.
2. S Gravano, Error Control Codes, Oxford University Press
3. J S Chitode, Information Theory and Coding, Technical Publications, Pune, 2009.
4. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013.

Web References

1. https://nptel.ac.in/courses/117101053/Information Theory and Coding/
2. https://www.elprocus.com/modulation-with-its-block-diagram/
3. https://www.geeksforgeeks.org/modulation techniques/

2.A.4.91

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	2	1	-	-	-	-	-	-	1	3	2	1
2	3	3	2	2	1	-	-	-	-	-	-	1	3	2	1
3	3	3	2	2	1	-	-	-	-	-	-	1	3	2	1
4	3	3	2	2	1	-	-	-	-	-	-	1	3	2	1
5	3	3	2	2	1	-	-	-	-	-	-	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.4.92

Department	**Information Technology**			Programme: **B.Tech.**				
Semester	**Fourth**			Course Category Code: **PE**		*End Semester Exam Type: **TE**		
Course Code	**U23ITE404**			Periods / Week			Credit	Maximum Marks
				L	T	P	C	CAM	ESE	TM
Course Name	**AGILE METHODOLOGIES**			**3**	**0**	**0**	**3**	**25**	**75**	**100**
Information Technology										
Prerequisite	Software Engineering and Project Management									
Course Outcome	**On completion of the course, the students will be able to**							BT Mapping (Highest Level)		
	CO1	Explain evolutionary, iterative and adaptive development methods						**K2**		
	CO2	Apply agile software process in requirement engineering						**K3**		
	CO3	Outline agile methods for project planning and development						**K2**		
	CO4	Choose agile methods for software design						**K3**		
	CO5	Apply agile based testing with quality assurance.						**K3**		

Unit- I	**INTRODUCTION**	**Periods: 09**
Iterative and Evolutionary Development; Introduction to Agile: Agile development – Classification of methods – Agile manifesto and principles – Communication and feedback – Specific agile methods – Agile modelling; Theories for Agile Management; Management Accounting for Systems; Agile Project Management: Traditional versus RAD model for project management – Task planning and effort tracking – The project manager's new work.		**CO1**
Unit- II	**REQUIREMENTS ENGINEERING FOR AGILE METHODS**	**Periods: 09**
Traditional and Agile Requirement Engineering; Methods and Tools for Agile Practitioners: Requirements elicitation – Requirements representation and documentation – Requirements analysis – Requirements management; Agile Approaches to Requirements Engineering: The customer – Requirements evolution – Non-functional requirements; Tools for Requirements Management in AMs.		**CO2**
Unit- III	**AGILE PROJECT PLANNING AND DEVELOPMENT MANAGEMENT**	**Periods: 09**
Agile Project Planning: The Project buffer and its usage – Logical collection of inventories – Critical path – Parallel path – Critical chain – Project tracking metrics; Agile Development Management: Identifying and monitoring the flow – Bottleneck; Agile Maturity Model: A new maturity model.		**CO3**
Unit- IV	**AGILE METHODS**	**Periods: 09**
Scrum: Method overview – Life cycle – Work products – Values – Roles and practices – Process mixtures – Adoption strategies; Extreme Programming; Unified Process; EVO.		**CO4**
Unit- V	**AGILE TESTING AND QUALITY ASSURANCE**	**Periods: 09**
Agile testing: Nine principles and six concrete practices for testing on agile teams; Agile Metrics: Feature driven development (FDD) – Financial and production metrics in FDD – Agile approach to quality assurance – Test driven development; SMM: A process improvement frame- work for agile requirements engineering practices–case study.		**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. David J. Anderson and Eli Schragenheim, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results ", Prentice Hall, 2003.
2. Craig Larman, "Agile and Iterative Development: A Manager's Guide ", Addison-Wesley, 2004.
3. Elisabeth Hendrickson, "Agile Testing ", Quality Tree Software Inc 2008.

Reference Books

1. Hazza, Dubinsky, "Agile Software Engineering, Series: Undergraduate Topics in Computer Science", Springer, 2009.
2. Chetankumar Patel, Muthu Ramachandran, "Story Card Maturity Model (SMM): A Process Improvement Framework for Agile Requirements Engineering Practices", Journal of Software, Academy Publishers, Vol 4, No 5, 422-435, Jul 2009.
3. Kevin C Desouza, "Agile Information Systems: Conceptualization, Construction, and Management", Butterworth-Heinemann, 2007.
4. Didar Zowghi, Zhi Jin, "Requirements Engineering", Springer, chapter 15, 2014.
5. Aybuke Aurum, Claes Wohlin, "Engineering and Managing Software Requirements", Springer 2005, chapter 14.

Web References

1. https://www.coursera.org/specializations/agile-development
2. https://www.udemy.com/course/scrum-methodology/
3. http://www.atlassian.com/jira-software/agile
4. http://agilemanifesto.org/

2.A.4.93

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
2	3	2	2	-	-	-	-	-	-	-	-	-	2	-	2
3	3	2	2	-	-	-	-	-	-	-	-	-	2	-	2
4	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
5	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.4.94

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: PE				*End Semester Exam Type: TE		
Course Code	U23ITE405	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	DATA WAREHOUSING AND DATA MINING	3	0	0	3	25	75	100

Prerequisite	Database Management Systems	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain warehousing architectures and tools for systematically organizing large database and use their data to make strategic decisions	**K2**
	CO2 Apply KDD process for finding interesting pattern from warehouse and Characterize the kinds of patterns that can be discovered by association rule mining.	**K3**
	CO3 Discover interesting patterns from large amounts of data to analyze for predictions and classification	**K4**
	CO4 Apply data mining clustering techniques to large data sets.	**K3**
	CO5 Develop a data mining application for data analysis using various tools.	**K3**

Unit- I	**INTRODUCTION TO DATA WAREHOUSING**	**Periods: 09**
Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – Schemas – Modeling: Schemas - Data Cube – OLAP Operations - Data Warehouse Implementation - Data Generalization by Attribute-Oriented Induction.		**CO1**
Unit- II	**DATA MINING AND ASSOCIATION RULE MINING**	**Periods: 09**
Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation- Architecture of A Typical Data Mining Systems- Classification of Data Mining Systems. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.		**CO2**
Unit- III	**CLASSIFICATION**	**Periods: 09**
Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines.		**CO3**
Unit- IV	**CLUSTERING**	**Periods: 09**
Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.		**CO4**
Unit- V	**DATA MINING APPLICATIONS**	**Periods: 09**
Mining Object - Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Elsevier, 3rd Edition, 2012.
2. Alex Berson and Stephen J.Smith, Data Warehousing, Data Mining and OLAP, Tata McGraw - Hill Edition, 13th Edition, 2008.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining, Pearson Education, 2007.

Reference Books

1. Gupta G.K., —Introduction to Data Mining with Case Studies, Prentice Hall of India, Eastern Economy Edition, 2006.
2. Charu C. Aggarwal, Data Mining: The Textbook, Springer, Kindle Edition, 2015.
3. Margret H. Dunham, Data Mining: Introductory and Advanced Topics, Pearson, 17th Edition, 2013.
4. George K Marakas, Modern Data Warehousing, Mining, and Visualization: Core Concepts, Pearson, 2002.
5. K.P.Soman, Insight into Data Mining: Theory and Practice, PHI Publications, 7th Edition, 2014.

Web References

1. https://onlinecourses.nptel.ac.in/noc21_cs06/preview
2. https://www.geeksforgeeks.org/difference-between-data-warehousing-and-data-mining/
3. https://www.javatpoint.com/data-warehouse
4. https://www.tutorialspoint.com/dwh/index.htm
5. https://www.guru99.com/data-warehousing-tutorial.html

2.A.4.25

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	3	-	1	2	-	-	-	-	2	3	1	1
2	3	3	2	3	-	1	2	-	-	-	-	2	3	1	1
3	3	3	2	3	-	1	2	-	-	-	-	2	3	1	1
4	3	3	2	3	-	1	2	-	-	-	-	2	3	1	1
5	3	3	2	3	-	1	2	-	-	-	-	2	3	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

9.4.96

Department	**Information Technology**	Programme: **B.Tech.**						
Semester	**Fourth**	Course Category Code: **PC**			*End Semester Exam Type:**TE**			
Course Code	**U23ITB402**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**INTERNET PROGRAMMING**	**2**	**-**	**2**	**3**	**50**	**50**	**100**
Information Technology								

Prerequisite	Basics of Programming Languages		
Course Outcome	**On completion of the course, the students will be able to**		BT Mapping (Highest Level)
	CO1	Make use of HTML5 and CSS3 to design modern website	**K3**
	CO2	Utilize JavaScript and DOM to implement dynamic web page	**K3**
	CO3	Develop responsive web applications using Servlets and AJAX	**K3**
	CO4	Build web application using ReactJS framework	**K3**
	CO5	Develop web application using NodeJS framework	**K3**

UNIT-I	**WEB ESSENTIALS**	**Periods:10**	
Web Essentials: Clients – Servers – Communication; HTTP protocol: Request and Response Messages – Functionalities of Web Client and Web Server; Web Server: Vulnerabilities – At- tacks & its prevention; HTML5: Table – List – Image – Form – Semantic elements – CSS3: Types of style sheets – Selectors –Box Model – Rule cascading – Inheritance – Transformations – Transitions – Animations.			**CO1**
UNIT-II	**CLIENT-SIDE PROGRAMMING AND FRAMEWORK**	**Periods:10**	
JavaScript: Variables – Data types – Statements – Function – Object – Array – Built-in objects– JSON: Parse – Event handling: Form, Mouse and Keyboard events– DOM: Document tree – Node object –Event handling: Event propagation. **Client-Side Framework:** Javascript for ReactJS – React elements – React DOM – React Components – Mapping Arrays with JSX			**CO2**
UNIT-III	**SERVER-SIDE PROGRAMMING AND FRAMEWORK**	**Periods:10**	
Servlets: Architecture – Life Cycle – Parameter data – Form GET and POST actions Sessions – Cookies and URL rewriting – DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - AJAX: Ajax Client Server Architecture **Server-Side Framework:** Node building blocks: Global objects, Events, Asynchronous Nature – Node and the Web: Server and Client – Build and the NodeJS using MVC: Routing, Creation of Modules, Views and Controllers			**CO3**
UNIT-IV	**LABORATORY EXERCISES**	**Periods:15**	
1. Build a web page using Table, Lists, Image, and anchor elements. 2. Create a web page that displays college information using various Style Sheets. 3. Create a web page using HTML5 and CSS3 Elements. 4. Create a web page with the following. a. Cascading Style Sheets. b. Embedded Style Sheets. c. Inline Style Sheets. Use our college Information for the web pages. 5. Validate the Registration, user login, user profile and payment by Credit Card pages using JavaScript. 6. Develop a web application to authenticate the user with servlet and MySQL.			**CO4**
UNIT-V	**LABORATORY EXERCISES**	**Periods:15**	
1. Conversion of Static Webpages into Dynamic Webpages Using JSP. 2. Develop a web application using Session tracking mechanisms, Servlet and MySQL. (Ex: Online Shopping application) 3. Develop a Popup Menu Application using AJAX. 4. Develop a front end of the Online Exam Web application using ReactJS 5. Develop a back end of the Online Exam Web application using NodeJS 6. Develop a complete Web Application for Event Registration Process			**CO5**

LecturePeriods:30	**Tutorial Periods: -**	**Practical Periods:30**	**Total Periods:60**

Text Books

1. Jeffrey C, Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011
2. Alex Banks, Eve Porcello, "Learning React: Modern Patterns for Developing React Apps", O'Reilly Media Inc., June 2020

Reference Books

1. David McFarland, "CSS3: The missing manual", O'Reilly Media, December 2012
2. Matthew MacDonald, "HTML5: The missing manual", O'Reilly Media, August 2011
3. Shelly Powers, "Learning Node 2nd Edition", 1st Edition, O'Reilly Media, June 2016
4. Sitepoint Team, "Your First Week With Node.js", SitePoint, February 2018
5." How to Hack a Web Server"

2.A.4.97

Web References

1. https://www.w3schools.com/html/html_scripts.asp
2. https://www.geeksforgeeks.org/html-css/
3. https://www.json.org/json-en.html
4. https://www.w3schools.com/js/js_json_intro.asp
5. https://www.geeksforgeeks.org/javascript/
6. https://www.geeksforgeeks.org/introduction-to-jdbc/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	-	-	-	-	-	-	-	-	-	2	-	-
2	3	2	3	-	-	-	-	-	-	-	-	-	2	-	-
3	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
5	3	2	3	-	-	-	-	-	-	-	-	-	2	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM) – Maximum 50 Marks									#End Semester Examination (ESE) Marks (Theory)	Total Marks
	Continuous Assessment (Theory)					Continuous Assessment (Practical)					
	CAT 1	CAT 2	Model	Attendance	Total	Conduction of Practical	Report	Viva	Total	#End Semester Examination (ESE) Marks (Practical-Internal Evaluation)	
Marks	5	5	5	5	20*	15	10	5	30*	30	75**	100
*To be weighted for 10 Marks					10	*To be weighted for 10 Marks			10		*To be weighted for 50 Marks	

*Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

2.A.4.98

Department	English	Programme: B.Tech.						
Semester	Fourth	Course Category Code: HS			*End Semester Exam Type: LE			
Course Code	U23ENPC02	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	GENERAL PROFICIENCY- II	0	0	2	1	50	50	100

(Common to ALL Branches except CSBS)

Prerequisite	Basics of English Language	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Infer ideas to attend international standardized test by broadening receptive and productive skills	**K2**
	CO2 Interpret the types of writing in different state of affairs	**K3**
	CO3 Acquire meticulous exposure in speaking and get rid of performance anxiety	**K2**
	CO4 Articulate the ideas and opinions effectively and coherently	**K2**
	CO5 Progress the skills to compete in various competitive exams like GATE, GRE, UPSC, etc.	**K4**

UNIT- I	**CAREER SKILLS**	**Periods:6**
Listening: Listening at specific contexts - Speaking: Demonstrative speaking practice using visual aids (charts, graphs, maps) - Reading: Read and Review -Newspaper, Advertisement, Company Handbooks, and Guidelines (IELTS based) - Writing: Integrated Writing Task (TOEFL) - Vocabulary: Synonyms and Antonyms (IELTS)		**CO1**
UNIT- II	**CORPORATE SKILLS**	**Periods:6**
Listening: Listening English news and reproducing in own words - Speaking: Team Presentation - Reading: Short texts and Longer Passages (cloze reading) - Writing: Analytical Writing: Analyzing an issue and Argument task (GRE based) - Vocabulary: Prefix and Suffix		**CO2**
UNIT- III	**FUNCTIONAL SKILLS**	**Periods:6**
Listening: Listening TED Talks - Speaking: Brainstorming & Individual Presentation - Reading: Text Completion (GRE Based) - Writing: Picture Inference - Vocabulary: Word Formation		**CO3**
UNIT- IV	**TRANSFERRABLE SKILLS**	**Periods:6**
Listening: Listening Documentaries and making notes - Speaking: Mock Interview - Reading: Read texts on emerging trends - Writing: Agreeing & Disagreeing Essay (IELTS) - Vocabulary: Euphemism, Redundancy, Clichés and Intensifiers		**CO4**
UNIT-V	**VERBAL APTITUDE - II**	**Periods:6**
Transformational Grammar: Tenses, Change of Voice, Concord **Verbal Ability Enhancement:** Letter Series, Coding &Decoding, Sentence Equivalence (GRE)Analytical Reasoning and Logical Reasoning (GATE), Syllogism, One-word Substitution, Jumbled Sentences		**CO5**

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods:30**	**Total Periods:30**

Reference Books

1. Cullen, Pauline, Amanda French, and Vanessa Jakeman. "The official Cambridge guide to IELTS for academic & general training".Cambridge, 2014.
2. Prasad, Hari Mohan, Sinha, Uma Rani, "Objective English for Competitive Examinations", Tata Mc Graw Hill: Noida,2010.
3. Lougheed, Lin. "Barron's Writing for the TOEFL IBT: With Audio CD". Barron's Educational series, 2008.
4. Grussendorf, Marion, "English for Presentations", Oxford University Press, Oxford, 2007.
5. Murphy, Raymond English Grammar in Use with answers: Reference and Practice for Intermediate students, Cambridge: CUP,2004.

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1.https://www.englishclub.com/grammar/nouns-compound.htm
2.https://lofoya.com/Verbal-Test-Questions-and-Answers/Sentence-Completion/l3p1
3.https://www.grammarwiz.com/phrases-and-clauses-quiz.html
4.https://www.clarkandmiller.com/25-english-euphemisms-for-delicate-situations/
5.http://www.englishvocabularyexercises.com/general-vocabulary/

2.A.4.99

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
2	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
3	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
4	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
5	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1

Correlation Level: 1-Low, 2-Medium, 3-High

Evaluation Methods

Practical				
Continuous Assessment Internal Evaluation		**End Semester External Evaluation**		**Total Marks**
50 marks		**50 marks**		
Conduction of Practical (Assignment 1&2 -10 Marks Performance in practical classes - 5 Marks)	15	Listening (L)	20	100
Record	5	Speaking(S)	10	
Viva	5	Reading(R)	10	
Model Practical Examination (Model Exam is conducted for 50 Marks that will be converted to 15 Marks)	15	Writing(W)	10	
Attendance	10			

2.A.4.100

Department	Information Technology	Programme: B.Tech						
Semester	Fourth	Course Category Code: ES			*End Semester Exam Type: LE			
Course Code	U23ITPC02	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	PROGRAMMING IN JAVA LABORATORY	0	0	2	1	50	50	100

(Common to All Branches)

Prerequisite	Programming Skills	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Apply and practice logical formulations to solve simple problems leading to specific applications.	**K3**
	CO2 Demonstrate the use of inheritance, interface and package in relevant applications	**K3**
	CO3 Implement robust application programs in Java using exception handling and multithreading	**K3**
	CO4 Build java distributed applications using Collections and IO streams.	**K3**
	CO5 Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java.	**K3**

List of Exercises

1. Develop simple programs using java
2. Develop a java program that implements class and object.
3. Write a java program to find the frequency of a given character in a string
4. Write a java program to demonstrate inheritance and interfaces.
5. Develop a java program that implements the Packages.
6. Create java applications using Exception Handling for error handling.
7. Develop a simple real life application program to illustrate the use of Multi-Threads.
8. Implement simple applications using Collections.
9. Develop application using the concept of I/O Streams
10. Write a Java Program to demonstrate AWT and Swing Components
11. Develop a simple application and use JDBC to connect to a back-end database.

Lecture Periods: -	Tutorial Periods: -	Practical Periods: 30	Total Periods: 30

Reference Books

1. Allen B. Downey and Chris Mayeld, "Think Java - How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2020
2. Sagayaraj, Denis, Karthik, Gajalakshmi, "JAVA Programming for core and advanced learners", Universities Press Private Limited, 2018
3. Cay.S.Horstmann and Gary Cornell, "Core Java 2", Vol 2, Advanced Features, Pearson Education, 7th Edition, 2010

Web References

1. http://www.ibm.com/developerworks/java/
2. http://docs.oracle.com/javase/tutorial/rmi/.
3. IBM's tutorials on Swings, AWT controls and JDBC.
4. https://www.edureka.co/blog.
5. https://www.geeksforgeeks.org.

* TE – Theory Exam, LE – Lab Exam

2.A.4.101

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
2	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
3	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
4	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1
5	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2. A. 4. 102.

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: PC			*End Semester Exam Type: LE			
Course Code	U23ITP401	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	ALGORITHMS DESIGN AND ANALYSIS LABORATORY	0	0	2	1	50	50	100
Information Technology								

Prerequisite	Data structures	
Course Outcome	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Develop programs for sorting a given set of elements and analyse its time complexity	K3
	CO2 Solve and analyse the problems using greedy methods	K3
	CO3 Solve and analyse the problems using dynamic programming.	K3
	CO4 Apply backtracking method to solve various problems	K3
	CO5 Apply branch and bound method to solve 0/1 knapsack problem	K4

List of Exercises

1. Implement Insertion Sort and analyse the time complexity.
2. Sort a given set of elements using the quick sort method and determine the time required to sort the sorted and unsorted elements.
3. Implement Merge sort and analyse the time complexity.
4. Apply Greedy method to compress the given data using Huffman encoding.
5. Implement fractional knapsack problem using Greedy Strategy.
6. Implement minimum spanning tree using Prim's algorithm and analyse its time complexity.
7. Find shortest path for the given graph using Dijkstra Method
8. Apply dynamic programming methodology to find all pairs shortest path of a directed graph using Floyd's algorithm.
9. Find the Shortest path from the given source to destination in multistage graph using dynamic programming
10. Implement matrix chain multiplication and find the optimal sequence of parentheses.
11. Find a subset of a given set S = {sl, s2,....., sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1, 2, 6} and {1,8}. A suitable message is to be displayed if the given problem instance doesn't have a solution.
12. Implement N-Queens problem using backtracking.
13. Implement graph coloring problem using backtracking.
14. Find all Hamiltonian cycle from given graph using backtracking
15. Find the solution to the Travelling Salesman Problem. Repeat the experiment for a graph having total number of nodes (n) = 4, 8, 12, 16, 20 and note the time required to find the solution. Plot the graph taking n on the x-axis and time on y-axis and analyze the graph to determine whether it is exponential or not

Lecture Periods: -	Tutorial Periods: -	Practical Periods: 30	Total Periods: 30

Reference Books

1. Andrew S Tanenbaum, Computer Networks, Pearson Education, 6th Edition, 2022.
2. Behrouz A. Forouzan, Data Communications and Networking, TMH, 5th Edition, 2012
3. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, TMH, 6th Edition, 2022
4. James F.Kurose & Keith W. Ross, Computer Networking: A Top-Down Approach Featuring the Internet., Pearson Education, 7th Edition, 2017
5. William Stallings, Data and Computer Communications, Pearson Education, 10th Edition, 2014

2.A.4.103

Web References

1. https://www.geeksforgeeks.org/data-communication-definition-components-types-channels/
2. https://archive.nptel.ac.in/courses/106/105/106105082/
3. https://archive.nptel.ac.in/courses/106/105/106105183/
4. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
5. https://www.telecomtrainer.com/dcn-dedicated-core-network/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
2	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
3	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
4	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
5	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2. A. 4. 104

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category Code: PC			*End Semester Exam Type: LE			
Course Code	U23ITP402	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	DATA COMMUNICATION AND COMPUTER NETWORKS LABORATORY	0	0	2	1	50	50	100
Information Technology								

Prerequisite	Digital Design and System Architecture	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Design and implement socket programs for Echo, Ping, and Talk commands.	K3
	CO2 Implement various error handling techniques in networking.	K3
	CO3 Demonstrate data transmission and flow control in networking.	K3
	CO4 Implement TCP module, services and protocols	K3
	CO5 Analyze the routing algorithm performance and select best routing algorithm.	K4

List of Exercises

1. Write a socket Program for Echo/Ping/Talk commands.
2. Create a socket (TCP) between two computers and enable file transfer between them.
3. Write a program to implement Remote Command Execution (Two M/Cs may be used).
4. Write a program to implement CRC and Hamming code for error handling.
5. Write a code simulating Sliding Window Protocols.
6. Create a socket for HTTP for web page upload & Download.
7. Write a program for TCP module Implementation (TCP services).
8. Write a program for File Transfer in client-server architecture using TCP/IP
9. Write a program to implement RMI (Remote Method Invocation).
10. Write a program to implement the following routing methods
    a. Shortest path routing
    b. Flooding

Lecture Periods: -	Tutorial Periods: -	Practical Periods: 30	Total Periods: 30

Reference Books

1. Andrew S Tanenbaum, Computer Networks, Pearson Education, 6th Edition, 2022.
2. Behrouz A. Forouzan, Data Communications and Networking, TMH, 5th Edition, 2012
3. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, TMH, 6th Edition, 2022
4. James F.Kurose & Keith W. Ross, Computer Networking: A Top-Down Approach Featuring the Internet., Pearson Education, 7th Edition, 2017
5. William Stallings, Data and Computer Communications, Pearson Education, 10th Edition, 2014

Web References

1. https://www.geeksforgeeks.org/data-communication-definition-components-types-channels/
2. https://archive.nptel.ac.in/courses/106/105/106105082/
3. https://archive.nptel.ac.in/courses/106/105/106105183/
4. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
5. https://www.telecomtrainer.com/dcn-dedicated-core-network/

* TE – Theory Exam, LE – Lab Exam

2.A.y. 105

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
2	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
3	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
4	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
5	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

2. A. 4. 106

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category : MC				End Semester Exam Type:TE		
Course Code	U23ITM404	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	RIGHT TO INFORMATION AND GOOD GOVERNANCE	2	-	-	-	100	-	100

(Common to ALL Branches except CSBS)

Prerequisite	-	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe and analyze concept and legislative provisions related to RTI	K2
	CO2 Develop critical thinking skills to identify instances where public authorities have failed to meet their obligations	K3
	CO3 Critically assess the challenges and limitations faced by Central and State Information Commissions	K2
	CO4 Analyze the structure and functioning of the judiciary at different levels - local, regional, national.	K2
	CO5 Analyze the impact of the RTI Act on promoting transparency, accountability, and citizen empowerment in India	K2

UNIT-I	Introduction	Periods:06	
Conceptual background – Right to know – Open Government – Transparency in governance and accountability – Right to information under the Indian Constitution – Article 19(1)(a) and Article 21 of the Constitution – Role of NGOs and movement for right to information – Right to Information Act, 2005- Scope and objectives.			CO1
UNIT-II	**Obligation of Public Authorities**	**Periods:06**	
Obligations of public authorities: Section 4 - Designation of Public Information Officers: Section 5 - Disposal of request: Section 7 - Exemption from disclosure of information: Section 8 - Grounds for rejection to access in certain cases: Section 9 - Severability: Section 10 - Third party information: Section 11			CO2
UNIT-III	**Central and State Information Commission**	**Periods:06**	
Constitution of Central and State Information Commissions - Terms of office and conditions of service - Removal of Chief Information Commissioner or Information Commissioner - Powers and functions of Information Commissions.			CO3
UNIT-IV	**Judiciary and Right to Information Act**	**Periods:06**	
Protection of right to access the information- Role of the Supreme Court and High Courts – Recent attempts of dilution of the right to information Law			CO4
UNIT-V	**Right to Information Act, 2005 and its relevance to other laws**	**Periods:06**	
Public Records Act, 1993 - Whistle Blowers Protection Act, 2014 - Official Secrets Act, 1923			CO5

Lecture Periods:30	Tutorial Periods: -	Practical Periods:	Total Periods:30

Text Books

1. Virender Negi, Monika Negi," Right to Information: Key to Good Governance", Indu Book Services Pvt. Limited, 2019
2. R. M. Pal, Somen Chakraborty "Human Rights Education in India" Indian Social Institute, 2000
3. Sairam Bhat," Right to Information and Good Governance - Volume 3 of NLSIU book series" National Law School of India University, 2016

Reference Books

1. Sairam Bhat [ed], Right to Information and Good Governance, NLSIU Book Series-3, 2016. [ISBN-9789383363452]
2. Sairam Bhat, Right to Information, Eastern Book House, 2012. [ISBN-978838021553]
3. Praveen Dala; Consumer Protection and Right to Information; Central Information Commission, 2007.

Web References

1. https://archive.nptel.ac.in/courses/129/106/129106001/
2. https://onlinecourses.nptel.ac.in/noc20_lw01/preview
3. https://www.classcentral.com/course/swayam-right-to-information-and-good-governance-19988

2.A.4.107

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
2	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
3	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
4	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
5	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Methods

Theory						
Assessment	Continuous Assessment Marks (CAM)				End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Attendance		
Marks	-	-	-	-	-	100
	20(to be weighted for 10 marks)				(to be weighted for 50 marks)	

Practical				
Continuous Assessment Internal Evaluation		End Semester Internal Evaluation		Total Marks
30(to be weighted for 10 marks)		30 marks		
Listening (L)*	10	Listening (L)*	10	
Speaking(S)	5	Speaking(S)	5	
Reading(R)*	10	Reading(R)*	10	
Writing(W)*	5	Writing(W)*	5	

- **LRW components of Practical can be evaluated through Language Lab Software**

2.A.4.108

ANNEXURE VII:

SYLLABUS (CERTIFICATION COURSES)

U23ITC1XX	CERTIFICATION COURSE - I	L	T	P	C	Hrs
		0	0	4	0	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

U23ITC2XX	CERTIFICATION COURSE - II	L	T	P	C	Hrs
		0	0	4	0	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

U23ITC3XX	CERTIFICATION COURSE - III	L	T	P	C	Hrs
		0	0	4	0	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

U23ITC4XX	CERTIFICATION COURSE - IV	L	T	P	C	Hrs
		0	0	4	0	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

U23ITC5XX	CERTIFICATION COURSE - V	L	T	P	C	Hrs
		0	0	4	0	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

U23ITC6XX	CERTIFICATION COURSE - VI	L	T	P	C	Hrs
		0	0	4	0	50

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

2.A4.121

ANNEXURE VIII:

SYLLABUS (SKILL ENHANCEMENT COURSES)

2.A.4.123

U23ITS301	SKILL ENHANCEMENT COURSE - I TECHNICAL SEMINAR	L	T	P	C	Hrs
		0	0	2	0	30

Course Objectives

- To encourage the students to study advanced engineering developments
- To prepare and present technical reports.
- To encourage the students to use various teaching aids such as overhead projectors, power point presentation and demonstrative models.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Review, prepare and present technological developments.

CO2 - Face the placement interviews.

Method of Evaluation:

During the seminar session each student is expected to prepare and present a topic on Engineering/ Technology, for duration of about 20 minutes.

In a session of three periods per week, 8 to 10 students are expected to present the seminar.

Each student is expected to present atleast twice during the semester and the student is evaluated based on that.

At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report.

A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Evaluation is 100% internal. The marks attained for this course is not considered for CGPA calculation.

2.A.4.125

U23ITS402	SKILL ENHANCEMENT COURSE - II (NPTEL / MOOC)	L	T	P	C	Hrs
		0	0	2	0	30

Student should register online courses like MOOC / SWAYAM / NPTEL etc. approved by the Department committee comprising of HoD, Programme Academic Coordinator, Class advisor and Subject Experts. Students have to complete the relevant online courses successfully. The list of online courses is to be approved by Academic Council on the recommendation of HoD at the beginning of the semester if necessary, subject to ratification in the next Academic council meeting. The Committee will monitor the progress of the student and recommend the grade (100% Continuous Assessment pattern) based on the completion of course / marks secured in online examinations. The marks attained for this course is not considered for CGPA calculation

2.04.24

ANNEXURE IX:

SYLLABUS (HONORS: IV SEMESTER)

2.A.4.129

Department	Information Technology	Programme: B.Tech.						
Semester	Fourth	Course Category: PC			End Semester ExamType:TE			
Course Code	U23ITH401	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	WIRELESS NETWORKS	3	1	-	4	25	75	100

Prerequisite	Computer Networks	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Gain knowledge on installation, configuration and troubleshooting of WIFI Network	K3
	CO2 Comprehend the fundamentals of wireless networks	K2
	CO3 Analyse and design latest WLAN	K3
	CO4 Deal with the physical layers in Networking	K2
	CO5 Understand about the Message Authentication Code	K3

UNIT – I	Wireless LAN Infrastructure Devices	Periods:9
Access Points, Bridges, Workgroup Bridges, PCMCIA Cards , Serial and Ethernet Converters , USB Devices, PCI/ISA Devices, Residential Gateways, Enterprise Gateways, Access Point Modes, Fixed or Detachable Antennas, Advanced Filtering Capabilities, Configuration and Management, Point-to-Point Protocol over Ethernet (PPPoE), Network Address Translation (NAT), Port Address Translation (PAT), Ethernet switching , Virtual Servers, Print Serving, Fail-over routing, Virtual Private Networks (VPNs) , Dynamic Host Configuration Protocol (DHCP) Server and Client, Configurable Firewall		CO1

UNIT – II	Wireless LAN Organizations and Standards	Periods:9
802.11, 802.11b, 802.11a, 802.11g, Bluetooth, Infrared, HomeRF, FCC, IEEE, WECA, WLANA , IrDA , ETSI, ISM and UNII Bands, 900 MHz ISM Band, 2.4 GHz ISM Band, 5.8 GHz ISM Band, Lowe Band, Middle Band, Upper Band, Power Output Rules, Point-to-Multipoint (PtMP), Point-to-Point (PtP), Wireless Ethernet Compatibility Alliance		CO2

UNIT – III	802.11 Network Architecture	Periods:9
Authentication, Association, Open System authentication, Shared Key authentication , Secret keys & certificates, AAA Support, BSS, ESS, IBSS, SSID, Infrastructure Mode , Ad hoc Mode, Roaming, PSP Mode, CAM, Beacons, TIM, ATIM		CO3

UNIT – IV	Physical Layers	Periods:9
The difference between wireless LAN and Ethernet frames, Layer 3 Protocols supported by wireless LANs, Distributed Coordination Function (DCF), Point Coordination Function (PCF), CSMA/CA vs. CSMA/CD		CO4

UNIT – V	Message Authentication Code	Periods:9
Interframe spacing, RTS/CTS, Dynamic Rate Selection , Modulation and coding, Collision Handling, Fragmentation, Dynamic Rate Shifting (DRS), Distributed Coordination Function, Point Coordination Function, Interframe Spacing.		CO5

LecturePeriods:45	TutorialPeriods:-	Practical Periods:-	TotalPeriods: 45

TextBooks

1. William Stallings, "Wireless Communications and Networks", Second Edition, Pearson/Prentice Hall of India, 2007.

2. Andrew S Tanenbaum, Computer Networks, Pearson Education, 6th Edition, 2022.

3. Dharma Prakash Agrawal, Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Second Edition, Thomson India Edition, 2007.

ReferenceBooks

1.C. Siva Ram Murthy, B. S. Manoj, "Adhoc Wireless Networks: Architectures and Protocols", Second Edition, Pearson Education, 2008.

2. Jochen Schiller, "Mobile Communications", Second Edition, Person Education, 2008.

3. Vijay K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Publishers, 2007.

4.Kaveth Pahlavan, Prashant Krishnamurthy, "Principles of Wireless Networks", Pearson Education Asia, 2002.

2.A.4.131

Web References
1.https://onlinecourses.nptel.ac.in/noc20_ee61/preview
2.http://nptelvideos.com/video.php?id=553
3.https://archive.nptel.ac.in/courses/117/102/117102062/#
4.https://archive.nptel.ac.in/courses/106/105/106105160/
5.https://www.geeksforgeeks.org/wireless-communication-set-1/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
2	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
3	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
4	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-
5	3	2	2	2	3	-	-	-	-	-	-	1	3	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 – High

ANNEXURE X:

IT EQUIVALENT PAPERS

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

DETAILS OF EQUIVALENT COURSES IN R 2023 CURRICULUM FOR THE COURSES IN R 2020
DEPARTMENT OF INFORMATION TECHNOLOGY

Sl. No.	Year / Sem	Name of the Course with code under R-2020 Regulations (All the Courses in a semester to be mentioned with course code)	For Question Paper Setting with respect to R-2020 Regulations		
			Equivalent Course Name with Code in R-2023 Regulations (Courses which are not modified/ content reduced)	Course is retained with modification in the content/ Course content increased)	If Course is Removed (Yes)
1	I / I	**Theory:**			
		1. U20BST101 : Engineering Mathematics - I (Calculus and Linear Algebra)		U23MATC01 : Engineering Mathematics - I	
		2. U20EST106 : Introduction to Engineering: Distinction, Principles and Application			Yes
		3. U20EST107 : Micro Electronics and Digital System Design			Yes
		4. U20EST109 : Problem Solving Approach			Yes
		5. U20EST110 : Programming in Python		U23ADTC01 : Programming in Python	
2	I / II	**Theory:**			
		1. U20BST215 : Engineering Mathematics – II (Multiple Integrals and Transforms)		U23MATC02 : Engineering Mathematics – II	
		2. U20EST201 : Programming in C		U23CSTC01 : Programming in C	
		3. U20ITT201 : Microprocessors and Microcontrollers			Yes

2.A.4.135

		4. U20ITT202 : Front End Web Development			Yes
		5. U20ITT203 : Computer Organization and Architecture			Yes
		6. U20ITT204 : Information Systems: Theory and Applications			Yes
3	II/III	**Theory:**			
		1. U20BST322 : Numerical Methods			
		2. U20EST356 : Data Structures			Yes
		3. U20EST359 : Programming in C++			Yes
		4. U20ITT305 : Computer Networks			Yes
		5. U20ITT306 : Database Management Systems	U23CSTC04 : Database Management Systems		
		6. U20ITT307 : Software Engineering and Project Management	U23ITT303 : Software Engineering and Project Management		
4	II/IV	**Theory:**			
		1. U20BST432 : Discrete Mathematics and Graph Theory			Yes
		2. U20EST467 : Programming in Java	U23ITTC02 : Programming in Java		
		3. U20ITT408 : Operating System	U23CSTC05 : Operating Systems		
		4. U20ITT409 : Web Application Development			Yes
		Professional Electives:			
		5. U20ITE401: Storage Technologies		U23ITE819: Storage Technologies	Yes
		6. U20ITE402: Computer Vision			Yes
		7. U20ITE403: Object Oriented Analysis and Design		U23ITE401: Object Oriented Analysis and Design	
		8. U20ITE404: Agile Methodologies		U23ITE404: Agile Methodologies	

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		9. U20ITE405: Information Coding Techniques		U23ITE403: Information Coding Techniques	
		Open Electives:			
		10. U20ITO401: Database System: Design & Development		U23ITOC01: Database System: Design & Development	
		11. U20ITO402: R programming			Yes
5	III/V	**Theory:**			
		1. U20BST546: Probability and Statistics		U23MATC03: Probability and Statistics	
		2. U20ITCM02: Mobile Computing			Yes
		3. U20ITT511: Data Warehousing and Data Mining		U23ITE405: Data Warehousing and Data Mining	
		4. U20ITCM01: Network Security			Yes
		Professional Electives:			
		5. U20ITE506: Software Testing		U23ITE508: Software Testing	
		6. U20ITE507: Data Visualization		U23ITE507: Data Visualization	
		7. U20ITE508: Brain Computer Interface and its Application			Yes
		8. U20ITE509: Linux Internals			Yes
		9. U20ITCM08: Automation Techniques & Tools - DevOps		U23ITE509: Automation Techniques & Tools	
		Open Electives:			
		10. U20ITO503/ U20ITO603: Essentials of Data Science		U23ITOC03: Essentials of Data Science	
		11. U20ITO504/ U20ITO604: Mobile App Development		U23ITT608 : Mobile Application Development	
6	III/VI	**Theory:**			
		1. U20ITT613: Artificial Intelligence		U23CSTC06: Artificial Intelligence	
		2. U20ITT614: Data Science and Analytics			Yes
		3. U20ITT615: Design Thinking			Yes

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		4. U20ITT616: Block Chain Technology		U23ITT609: Blockchain Technology	
		Professional Electives:			
		5. U20ITE611: Open Source Software			Yes
		6. U20ITE612: E-Commerce		U23ITE823: E-Commerce	
		7. U20ITE613: Parallel and Distributed Systems			Yes
		8. U20ITE614: Big Data			Yes
		9. U20ITE615: Bio-inspired Computing		U23ITE818: Bio-Inspired Computing	
		Open Electives:			
		10. U20ITO503/ U20ITO603: Essentials of Data Science		U23ITOC03: Essentials of Data Science	
		11. U20ITO504/ U20ITO604: Mobile App Development		U23ITT608 : Mobile Application Development	
7	IV/VII	**Theory:**			
		1. U20ITCM05: Cloud Computing			Yes
		2. U20ITCM03: IoT and Edge Computing			Yes
		Professional Electives:			
		3. U20ITE716: Machine Learning		U23ITTC03: Machine Learning	
		4. U20ITE719: Wireless Sensor Network		U23ECEC02: Wireless Sensor Networks	
		5. U20ITCM04: Robotics Process Automation		U20ITEC03: Robotics Process Automation	
		6. U20ITCM06: Green Computing		U23ITE820: Green Computing	
		7. U20ITCM07: Social Network Analysis			Yes
		Open Electives:			
		8. U20ITCM08: Automation Techniques & Tools - DevOps		U23ITE509: Automation Techniques & Tools	
		9. U20ITO706: Augmented and Virtual Reality			Yes

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8	IV/VIII	**Theory:**			
		1. U20ITCM09: Deep Learning			Yes
		Professional Electives:			
		2. U20ITE821: Human Computing Interface			Yes
		3. U20ITE823: Information Management			Yes
		4. U20ITE824: Mixed Reality			Yes
		5. U20ITE825: Game Development		U23ITE822: Game Development	
		6. U20ITCM10: Business Intelligence			Yes
		Professional Electives:			
		7. U20ITE826: Cyber Security			Yes
		8. U20ITE827: Computer Animation: Algorithms and Techniques			Yes
		9. U20CSCM02: C# and .Net Programming			Yes
		10. U20ITE829: High Performance Computing			Yes
		11. U20ITE830: Streaming Analytics			Yes

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HOD/IT

(Dr.R.Raju)