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

Department of Information Technology

SIXTH BOARD OF STUDIES MEETING

MINUTES

Date and Time
21.7.2023 at 1.30 PM

2.A.4.1

2.A.4.2

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

Department of Information Technology

Minutes of Board of Studies

The Sixth Board of Studies meeting of Department of Information Technology was held on 21st July 2023 from 1:30 P.M to 3:45 P.M in the Seminar Hall, 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	Chairman
2	**Dr. R. Geetha Ramani, M.Tech, Ph.D** Professor, Department of Information Science and Technology, College of Engineering Guindy, Anna University, Chennai	Subject Expert (University Nominee)
3	**Dr. A.S. Anakath, M.E, Ph.D** Professor, Department of IT, E.G.S. Pillay Engineering College, Nagapattinam	Subject Expert (Academic Council Nominee)
4	**Dr. S. Padmavathi, M.E, Ph.D** Professor, Department of IT, Thiagarajar College of Engg., Madurai	Subject Expert (Academic Council Nominee)
5	**Mr. L. Ashok** CEO - Futurenet Technologies (India) Private Limited, Chennai.	Representative from Industry
6	**Dr. G. Arun Kumar** Associate Professor, Department of CSE, Mandanapalli Institute of Technology and Science, Andhra Pradesh	Post Graduate Alumnus (nominated by Principal)
7	**Dr. K. Lakshmi Ph.D** Professor Department of IT, SMVEC.	Internal Member
8	**Dr. R.Saravanan M.E, Ph.D** Associate Professor Department of IT, SMVEC.	Internal Member
9	**Dr. S. Balaji M.Tech, Ph.D** Associate Professor Department of IT, SMVEC	Internal Member

10	**Dr.N.S.N. Cailassame** Professor& Head, Department of Management Studies, SMVEC	Internal Member
11	**Dr. K. Karthikeyan** Associate Professor , Department. of Chemistry, SMVEC	Internal Member
12	**Prof. M. Devanathan** Department of Mathematics, SMVEC	Internal Member
13	**Prof. G. Namitha** Department of English, SMVEC	Internal Member
14	**Dr.T.Jayavarthanan** Professor , Department. of Physics, SMVEC	Internal Member

Agenda of the Meeting	
Item No. : BoS /UG/ IT 6.1	Confirmation of the minutes of fifth BoS meeting held on 16.09.2022
Item No. : BoS / UG/ IT 6.2	To discuss and get the approval for the B.Tech. Regulations R-2023, curriculum and syllabi of first and Second semesters of B.Tech. Information Technology
Item No. : BoS / UG/ IT 6.3	To discuss about the new courses offered in the Curriculum R-2023
Item No. : BoS / UG/ IT 6.4	To discuss and approve the Evaluation Systems for R-2023 Regulations
Item No. : BoS / UG/ IT 6.5	To approve the additional courses which are to be offered to award the Honours Degree of B.Tech. Information Technology
Item No. : BoS / UG/ IT 6.6	To discuss and apprise the list of Ability Enhancement Courses / Skill Enhancement Courses under R2023 regulations
Item No. : BoS / UG/ IT 6.7	To discuss and recommend the panel of BoS members to the Academic Council
Item No. : BoS / UG/ IT 6.8	To discuss and apprise about the Value Added Courses and Guest Lectures planned for the academic year 2023-2024
Item No. : BoS / UG/ IT 6.9	Any other item with the permission of chair

2.A.4.6

Minutes of the Meeting
Dr. R. Raju, Chairman, BoS / B.Tech Information Technology initiated the meeting with welcome address. The meeting thereafter deliberated on agenda items that had been approved by the Chairman.

Item No. : BoS /UG/ IT 6.1	Confirmation of the minutes of fifth BoS meeting held on 16.09.2022
	➢ All members have accepted the action taken report for suggestions given during fifth BoS meeting
Item No. : BoS / UG/ IT 6.2	To discuss and get the approval for the B.Tech. Regulations R-2023, curriculum and syllabi of first and Second semesters of B.Tech. Information Technology [Approved & Recommended to A.C.]
	➢ Dr. Padmavathi suggested that the content of the course titled "Basic Electrical and Electronics Engineering" and the laboratory practices "Basic Electrical and Electronics Engineering Laboratory" may be reduced since it will be heavy for both the faculty as well as students. ➢ She mentioned that the number of credits to be earned for honours degree is high and suggested to reduce it to 18.
Item No. : BoS / UG/ IT 6.3	To discuss about the new courses offered in the Curriculum R-2023
	➢ The list of new courses has been approved by the BoS members.
Item No. : BoS / UG/ IT 6.4	To discuss and approve the Evaluation Systems for R-2023 Regulations
	➢ No changes were suggested by the BoS members.
Item No. : BoS / UG/ IT 6.5	To approve the additional courses which are to be offered to award the Honours Degree of B.Tech. Information Technology
	➢ BoS members approved the courses listed.
Item No. : BoS / UG/ IT 6.6	To discuss and apprise the list of Ability Enhancement Courses / Skill Development Courses under R2023 regulations
	➢ BoS members approved the courses listed.
Item No. : BoS / UG/ IT 6.7	To discuss and recommend the panel of BoS members to the Academic Council
	➢ BoS members recommended the list of panel members given.
Item No. : BoS / UG/ IT 6.8	To discuss and apprise about the Value Added Courses and Guest Lectures planned for the academic year 2023-2024
	➢ The Board of Studies discussed and suggested the Value added courses and Guest Lectures based on the industrial needs.

2.A.4.7

Item No. : BoS / UG/ IT 6.9	Any other item with the permission of chair
	➢ Chairperson of the Board presented the students admission and placement data. BoS members appreciated the good work of the department.

The meeting for the above Agenda regarding B.Tech – Information Technology was concluded by 3:45 pm by **Dr. R.Raju**, Chairman-BoS and Head of Department, Department of Information Technology, Sri Manakula Vinayagar Engineering College.

2.A.4.8

Members Present

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	**Dr. R. Raju, M.Tech, Ph.D** Professor & Head Department of IT, SMVEC	Chairman	
External Members			
2	**Dr. R. Geetha Ramani, M.Tech, Ph.D** Professor, Department of Information Science and Technology, College of Engineering Guindy, Anna University, Chennai	Subject Expert (University Nominee)	
3	**Dr. A.S. Anakath, M.E, Ph.D** Professor, Department of IT, E.G.S. Pillay Engineering College, Nagapattinam	Subject Expert (Academic Council Nominee)	
4	**Dr. S. Padmavathi, M.E, Ph.D** Professor, Department of IT, Thiagarajar College of Engg., Madurai	Subject Expert (Academic Council Nominee)	
5	**Mr. L. Ashok** CEO - Futurenet Technologies (India) Private Limited, Chennai.	Representative from Industry	
6	**Dr. G. Arun Kumar** Associate Professor, Department of CSE, Mandanapalli Institute of Technology and Science, Andhra Pradesh	Post Graduate Alumnus (nominated by Principal)	
Internal Members			
7	**Dr. K. Lakshmi Ph.D** Professor Department of IT, SMVEC.	Internal Member	
8	**Dr. R.Saravanan, M.E, Ph.D** Associate Professor Department of IT, SMVEC.	Internal Member	
9	**Dr. S. Balaji, M.Tech, Ph.D** Associate Professor Department of IT, SMVEC	Internal Member	
Co-opted Members			
10	**Dr.N.S.N. Cailassame** Professor& Head, Department of Management Studies, SMVEC	Internal Member	
11	**Dr. K. Karthikeyan** Associate Professor , Department. of Chemistry, SMVEC	Internal Member	
12	**Prof. M. Devanathan** Assistant Professor, Department of Mathematics, SMVEC	Internal Member	

13	**Prof. G. Namitha** Assistant Professor, Department of English, SMVEC	Internal Member	
14	**Dr.T.Jayavarthanan** Professor , Department. of Physics, SMVEC	Internal Member	

Dr. R. Raju
Chairman - BoS (IT)

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

2.A.4.10

SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(An Autonomous Institution)

Puducherry

B. TECH. INFORMATION TECHNOLOGY

ACADEMIC REGULATIONS 2023
(R-2023)

CURRICULUM & SYLLABI

2.A.11

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

2.A.24.12

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:

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.

2.A.4.13

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

2.A.4.14

STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAMME

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**

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

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**

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

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**

2.A.H.15

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

**** Certification courses are to be selected from the list given in Annexure III**

2.A.4.16

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

2.A.4.17

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	U23ITTC02	Microprocessors and Embedded Systems	PC	3	0	0	3	25	75	100
3	U23CSDC01	Automata and Compiler Design	PC	3	0	0	3	25	75	100
4	U23ITT302	Software Engineering and Project Management	PC	3	0	0	3	25	75	100
5	U23ITT303	Data Communication and Computer Networks	PC	3	0	0	3	25	75	100
Theory cum Practical											
6	U23CSBC01	Design and Analysis of Algorithms	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	U23ITPC02	Microprocessors and Embedded Systems Laboratory	PC	0	0	2	1	50	50	100
10	U23ITP301	Data Communication and Computer Networks 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 *	SEC	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**

2.A.24.18

SEMESTER – IV										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23MATC05	Discrete Mathematics	BS	3	1	0	4	25	75	100
2	U23ITTC03	Programming in Java	ES	3	0	0	3	25	75	100
3	U23CSTC05	Operating Systems	PC	3	0	0	3	25	75	100
4	U23CSTC06	Database Management Systems	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	U23ITB401	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	U23ITPC03	Programming in Java Laboratory	ES	0	0	2	1	50	50	100
9	U23CSPC03	Operating Systems Laboratory	PC	0	0	2	1	50	50	100
10	U23CSPC04	Database Management Systems 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 *	SEC	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

2.A.4.19

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	U23CSTC07	Artificial Intelligence	PC	3	0	0	3	25	75	100
3	U23ITT504	Information and Network Security	PC	3	0	0	3	25	75	100
4	U23ITT505	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	U23ITP502	Information and Network Security Laboratory	PC	0	0	2	1	50	50	100
9	U23ITP503	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

2.A.4.20

SEMESTER – VI										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23ITTC04	Machine Learning	PC	3	0	0	3	25	75	100
2	U23ITT606	Mobile Application Development	PC	3	0	0	3	25	75	100
3	U23ITT607	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	U23ITB602	IoT Programming	PC	2	0	2	3	50	50	100
Practical										
7	U23ITPC04	Machine Learning Laboratory	PC	0	0	2	1	50	50	100
8	U23ITP604	Mobile Application Development Laboratory	PC	0	0	2	1	50	50	100
9	U23ITP605	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

2.A.24.21

SEMESTER – VII										
Sl. No.	Course Code	Course Title	Cate-gory	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U23ITT708	Neural Network and Deep Learning	PC	3	0	0	3	25	75	100
2	U23ITT709	Cloud Computing and Virtualization	PC	3	0	0	3	25	75	100
3	U23ITT710	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	U23ITP706	Neural Network and Deep Learning Laboratory	PC	0	0	2	1	50	50	100
7	U23ITP707	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

2.A.4.22

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

2.A.4.23

ANNEXURE I

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	Mobile Adhoc Networks
Professional Elective - II (Offered in Semester V)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE506	Parallel and Distributed Computing
2	U23ITE507	Data Warehousing and Data Mining
3	U23CBEC01	Business Intelligence and Applications
4	U23ITE508	Software Testing
5	U23ITE509	Wireless and Mobile Communication
Professional Elective - III (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE610	Distributed Databases
2	U23ITE611	Bio-Inspired Computing
3	U23ITEC01	Software Defined Networks
4	U23ITEC02	Natural Language Processing
5	U23ITE612	Edge and Fog Computing
Professional Elective - IV (Offered in Semester VII)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE713	Full Stack Development
2	U23ITE714	Cyber Security and Forensics
3	U23ITEC03	Robotic Process Automation
4	U23ITE715	Digital Image Processing
5	U23ITE716	Intrusion Detection System
Professional Elective – V (Offered in Semester VIII)		
Sl. No.	**Course Code**	**Course Title**
1	U23ITE817	Quantum Computing
2	U23ITEC04	Human Computer Interaction
3	U23ITE818	GPU Computing
4	U23ITE819	Automation Techniques & Tools
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	Social Network Analysis
3	U23ECEC02	Wireless Sensor Networks
4	U23ITE822	Computer Vision
5	U23ITE823	E-Commerce

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ANNEXURE - II

OPEN ELECTIVE COURSES

S. No	Course Code	Course Title	Offering Department	Permitted Departments
Open Elective – II (Offered in Semester 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 – III (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

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Annexure – III

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	U23AECX01	Adobe Photoshop	Adobe
2	U23AECX02	Adobe Animate	Adobe
3	U23AECX03	Adobe Dreamweaver	Adobe
4	U23AECX04	Adobe After Effects	Adobe
5	U23AECX05	Adobe Illustrator	Adobe
6	U23AECX06	Adobe InDesign	Adobe
7	U23AECX07	Autodesk AutoCAD -ACU	Autodesk
8	U23AECX08	Autodesk Inventor - ACU	Autodesk
9	U23AECX09	Autodesk Revit - ACU	Autodesk
10	U23AECX10	Autodesk Fusion 360 - ACU	Autodesk
11	U23AECX11	Autodesk 3ds Max - ACU	Autodesk
12	U23AECX12	Autodesk Maya - ACU	Autodesk
13	U23AECX13	Cloud Security Foundations	AWS
14	U23AECX14	Cloud Computing Architecture	AWS
15	U23AECX15	Cloud Foundation	AWS
16	U23AECX16	Cloud Practitioner	AWS
17	U23AECX17	Cloud Solution Architect	AWS
18	U23AECX18	Data Engineering	AWS
19	U23AECX19	Machine Learning Foundation	AWS
20	U23AECX20	Robotic Process Automation / Medical Robotics	Blue Prism
21	U23AECX21	Advance Programming Using C	CISCO
22	U23AECX22	Advance Programming Using C ++	CISCO
23	U23AECX23	C Programming	CISCO
24	U23AECX24	C++ Programming	CISCO
25	U23AECX25	CCNP Enterprise: Advanced Routing	CISCO
26	U23AECX26	CCNP Enterprise: Core Networking	CISCO
27	U23AECX27	Cisco Certified Network Associate - Level 2	CISCO
28	U23AECX28	Cisco Certified Network Associate- Level 1	CISCO
29	U23AECX29	Cisco Certified Network Associate- Level 3	CISCO
30	U23AECX30	Fundamentals Of Internet Of Things	CISCO
31	U23AECX31	Internet Of Things	CISCO

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32	U23AECX32	Java Script Programming	CISCO
33	U23AECX33	NGD Linux Essentials	CISCO
34	U23AECX34	NGD Linux I	CISCO
35	U23AECX35	NGD Linux II	CISCO
36	U23AECX36	Advance Java Programming	Ethnotech
37	U23AECX37	Android Programming / Android Medical App Development	Ethnotech
38	U23AECX38	Ansys	Ethnotech
39	U23AECX39	Catia	Ethnotech
40	U23AECX40	Communication Skills for Business	Ethnotech
41	U23AECX41	Coral Draw	Ethnotech
42	U23AECX42	Data Science Using R	Ethnotech
43	U23AECX43	Digital Marketing	Ethnotech
44	U23AECX44	Embedded System Using C	Ethnotech
45	U23AECX45	Embedded System With IOT	Ethnotech
46	U23AECX46	English For IT	Ethnotech
47	U23AECX47	Entrepreneurship And Business Plan	Ethnotech
48	U23AECX48	Estimation And Current Practices	Ethnotech
49	U23AECX49	Financial Planning, Banking and Investment Management	Ethnotech
50	U23AECX50	Foundation Of Stock Market Investing	Ethnotech
51	U23AECX51	Machine Learning / Machine Learning for Medical Diagnosis	Ethnotech
52	U23AECX52	IOT Using Python	Ethnotech
53	U23AECX53	Plaxis	Ethnotech
54	U23AECX54	Soft Skills, Verbal, Aptitude	Ethnotech
55	U23AECX55	Software Testing	Ethnotech
56	U23AECX56	Solar And Smart Energy System With IOT	Ethnotech
57	U23AECX57	Solid Edge	Ethnotech
58	U23AECX58	Solid works	Ethnotech
59	U23AECX59	Staad Pro	Ethnotech
60	U23AECX99	Total Station	Ethnotech
61	U23AECX60	Hydraulic	Festo
62	U23AECX61	Plc	Festo
63	U23AECX62	Numatics	Festo
64	U23AECX63	Agile Methodologies	IBM
65	U23AECX64	Block Chain	IBM
66	U23AECX65	Devops	IBM
67	U23AECX66	Artificial Intelligence	ITS
68	U23AECX67	Cloud Computing	ITS
69	U23AECX68	Computational Thinking	ITS
70	U23AECX69	Cyber Security	ITS
71	U23AECX70	Data Analytics	ITS
72	U23AECX71	Databases	ITS
73	U23AECX72	Java Programming	ITS
74	U23AECX73	Networking	ITS
75	U23AECX74	Python Programming	ITS
76	U23AECX75	Web Application Development (HTML, CSS, JS)	ITS
77	U23AECX76	Network Security	ITS & Palo alto
78	U23AECX77	MATLAB	MathWorks
79	U23AECX78	Azure Fundamentals	Microsoft
80	U23AECX79	Azure AI (AI-900)	Microsoft

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81	U23AECX80	Azure Data (DP -900)	Microsoft
82	U23AECX81	Microsoft 365 Fundamentals (SS-900)	Microsoft
83	U23AECX82	Microsoft Security, Compliance and Identity (SC-900)	Microsoft
84	U23AECX83	Microsoft Power Platform (PI-900)	Microsoft
85	U23AECX84	Microsoft Dynamics Fundamentals 365 – CRM	Microsoft
86	U23AECX85	Microsoft Excel	Microsoft
87	U23AECX86	Microsoft Excel Expert	Microsoft
88	U23AECX87	Securities Market Foundation	NISM
89	U23AECX88	Derivatives Equinity	NISM
90	U23AECX89	Research Analyst	NISM
91	U23AECX90	Portfolio Management Services	NISM
92	U23AECX91	Cyber Security	Palo alto
93	U23AECX92	Cloud Security	Palo alto
94	U23AECX93	PMI – Ready	PMI
95	U23AECX94	Tally – GST & TDS	Tally
96	U23AECX95	Advance Tally	Tally
97	U23AECX96	Associate Artist	Unity
98	U23AECX97	Certified Unity Programming	Unity
99	U23AECX98	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 Academic (Core)
(Dr. Arivalagar.AA)

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

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

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ANNEXURE - III

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***

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ANNEXURE - IV

Honours Programme – Network Security

COURSE DETAILS											
Sl. No.	Semester	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	Digital Forensics	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	Computer Security	PC	3	1	0	4	25	75	100
	Total							**20**	**125**	**375**	**500**
Equivalent NPTEL courses[##]											
1	IV to VII Semester	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			

[##]Any one course to be selected from the list

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Department	Mathematics	Programme: B.Tech.					
Semester	I	Course Category : BS			End Semester Exam Type: TE		
Course Code	U23MATC01	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	Engineering Mathematics – I	3	1	-	4	25	75	100

(Common to ALL Branches Except CSBS)

Prerequisite	Basic Mathematics	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Understand the concept of Eigen values and Eigen vectors, Diagonalization of a Matrix	K3
	CO2 Solve higher order differential equations	K3
	CO3 Understand the different types of partial differential equations	K3
	CO4 Know about the Applications of double and triple integrals	K3
	CO5 Gain the knowledge about Vector Calculus and its Applications	K3

UNIT – I	Matrices	Periods:12
Rank of a Matrix – Systems of Linear Equations – Characteristic equation – Cayley Hamilton Theorem – Eigen values and Eigen vectors of a real Matrix – Diagonalization of Matrices.		CO1
UNIT – II	**Differential Equations (Higher Order)**	**Periods:12**
Linear Differential equations of higher order with constant coefficients – Euler's linear equation of higher order with variable coefficients – Method of Variation of parameters.		CO2
UNIT – III	**Functions of Several Variables**	**Periods:12**
Partial derivatives – Total derivatives – Maxima and Minima of two variables – Lagrange's Method of multipliers.		CO3
UNIT – IV	**Multiple Integrals**	**Periods:12**
Multiple Integrals – Change of order of integration (Cartesian form). Applications: Area as a double integral (Cartesian form) – Volume as a triple integral (Cartesian form).		CO4
UNIT – V	**Vector Calculus**	**Periods:12**
Gradient – Divergence and Curl – Directional derivatives – Irrotational and Solenoidal vector fields – Properties (Statement only) – Gauss Divergence Theorem and Stoke's Theorem (without proofs).		CO5

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

Text Books

1. M.K. Venkataraman, "Engineering Mathematics", The National Publishing Company, 2nd Edition Chennai, 2016.
2. N. P Bali and Manish Goyal, "A Text Book of Engineering Mathematics", Lakshmi Publications, New Delhi, 9th Edition, 2018.
3. S.Narayanan and T.K. Manickavasagam Pillay," Differential Equations and Its Applications", Viswanathan. S, Printers & Publishers Pvt Ltd, 2009.

Reference Books

1. G. Balaji, "Matrices and Calculus (Engineering Mathematics – I)" Balaji Publications, 9th Edition June 2023
2. A. Singaravelu, "Engineering Mathematics – I", Meenakshi publications, 1998.
3. Erwin Kreyszig, "Advanced Engineering Mathematics ", Wiley, 10th Edition, 2019.
4. B.V. Ramana," Higher Engineering Mathematics", Tata McGraw – Hill, New Delhi, 6th Edition, 2018.
5. C W. Evans, "Engineering Mathematics", A Programmed Approach, 3rd Edition, 2019.

Web References

1. http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra –slides- systems of equation-handout.pdf
2. http://www.math.cum.edu/~wn0g/2ch6a.pdf
3. https://nptel.ac.in/courses/122/104/122104017/
4. https://nptel.ac.in/courses/111/106/111106051/
5. https://nptel.ac.in/courses/111/108/111108081/

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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	-	2	1	1	-	-	-	-	1	3	-	-
2	3	2	1	1	-	1	1	-	-	-	-	1	3	-	-
3	3	2	1	1	-	1	1	-	-	-	-	1	3	-	-
4	3	2	1	1	-	1	1	-	-	-	-	1	3	-	-
5	2	2	1	-	-	-	1	-	-	-	-	1	3	-	-

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

Evaluation Methods

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

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

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Department	EEE and ECE	Programme: B.Tech.						
Semester	I / II	Course Category: ES				End Semester Exam Type: TE		
Course Code	U23ESTC03	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Basics of Electrical and Electronics Engineering	3	-	-	3	25	75	100

(Common to CSE, IT, MECH, CIVIL, MCTR, CCE, AI&DS, FT and CSBS Branches)

Prerequisite	Mathematics and Physics	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Apply the basic concepts and various laws in DC circuits.	K3
CO2	Analyze the AC circuits and develop resonance conditions for transmitter and receiver circuits.	K3
CO3	Gain the knowledge of power system components, importance of electrical safety measures and real time applications of transformer and motor.	K2
CO4	Understand the operator of semiconductor diode and its applications.	K2
CO5	Explain the characteristics and operation of BJT and FET.	K2
CO6	Relate and Explain Different Communication Systems.	K2

Section A – Electrical Engineering

UNIT - I	DC Circuits	Periods: 8	
Concept of Potential Difference, Current, Resistance, Inductance and Capacitance, Work, Power, Energy, Current and Voltage sources - ideal and practical sources - concept of dependent and independent sources, Ohm's law, Kirchhoff's law, Series parallel combination of R, L, C components, Voltage Divider and Current Divider Rules, Mesh and Nodal analysis, Star/Delta transformation, Network Theorems - Superposition, Thevenin, Norton and Maximum Power Transfer.			CO1

UNIT - II	AC Circuits	Periods: 8	
AC waveform definitions - form factor, peak factor, R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, Resonance in series and parallel circuits, band-width and quality factor, Three Phase balanced AC Circuits (Y-Δ and Y-Y) - Power Measurement – Two Wattmeter method.			CO2

UNIT - III	Electrical Safety and Electrical Machines	Periods: 7	
Layout of electrical power system and its functions, Wiring Accessories, Types of domestic wiring, Necessity of earthing, insulators and cables, Safety devices - fuse, relay and circuit breaker - Sensors and its types. Faraday's Law of electromagnetic induction, Fleming's Right and Left hand rule - DC Generator and DC Motor - construction, principle, load test and performance characteristics - Auto transformer, Single phase transformer- construction, principle, load test - Single phase capacitor start and run induction motor – Load test.			CO3

Section B – Electronics Engineering

UNIT - IV	Semiconductor Diodes And Applications	Periods: 7	
Introduction semiconductor materials – Doping - Intrinsic and Extrinsic Semiconductor – PN junction diode, structure, characteristics - diffusion and depletion capacitance - Rectifier, Half wave and Full wave rectifier - zener diode characteristics - zener diode as regulator – Light Emitting Diode (LED) - Solar Cell.			CO4

UNIT - V	Transistors	Periods: 7	
Bipolar Junction Transistor - construction – operation - Common Base, Common Emitter, Common collector Configuration – characteristics – Biasing - numerical application. Junction Field Effect Transistor (JFET), Metal oxide semiconductor Field Effect Transistor, EMOSFET-DMOSFET operation characteristics - Numerical application.			CO5

UNIT - VI	Communication Systems	Periods: 8	
Need for Modulation – Block diagram of analog communication System - AM, FM, PM Definitions and Waveforms – Comparison of digital and analog communication system- Block diagram of digital communication system – Electromagnetic Spectrum. Wired and wireless Channel – Block diagram of communication systems – satellite communication – Cellular Mobile Communication – Fibre Optical Communication System.			CO6

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

Text Books

1. R. K. Rajput, "Basic Electrical and Electronics Engineering", University Science Press, 2nd Edition, 2017.
2. Dr. R. Saravanakumar, Dr.V. Jegathesan, Dr. K. Vinoth Kumar, Dr. K. Kowsalya, "Basic Electrical and Electronics Engineering", Wiley Publisher, 2nd Edition, 2022.
3. R. Muthusubramaniam, S. Salivahanan and K. A. Mureleedharan, "Basic Electrical Electronics and Computer Engineering", Tata McGraw Hill, 2018.

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Reference Books

1. A. Sudhakar and S. P. Shyam Mohan, "Circuits and Networks: Analysis and Synthesis", Tata McGraw Hill Publishing Company Ltd., New Delhi, 4th Edition, 2017.
2. D. P. Kothari and I. J. Nagrath, "Electric Machines", Tata McGraw Hill, New Delhi, 5th Edition, 2017.
3. B. L. Theraja, A. K. Theraja, "A Textbook of Electrical Technology – Volume - II", S Chand & Co. Ltd., New Delhi, 23rd Edition, 2009.
4. David. A. Bell, "Electronic Devices and Circuits", PHI Learning Private Ltd, India, 4th Edition, 2020
5. Wayne Tomasi, "Electronic Communication Systems- Fundamentals Theory Advanced", Pearson Education, 6th Edition, 2018.

Web References

1. https://nptel.ac.in/courses/108/108/108108076/
2. https://www.electrical4u.com/
3. https://nptel.ac.in/courses/108/102/108102146/
4. https://onlinecourses.nptel.ac.in/noc21_ee55/
5. https://nptel.ac.in/courses/117/102/117102059

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	3	2	-
2	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
3	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
4	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
5	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
6	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-

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

Evaluation Methods

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	5	5	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	**I / II**	Course Category: **ES**			End Semester Exam Type: **TE**			
Course Code	**U23CSTC01**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Programming in C**	**3**	**-**	**-**	**3**	**25**	**75**	**100**

(Common to All Branches Except CSBS and FT)

Prerequisite	NIL	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Comprehend the basics of Computers.	**K2**
	CO2 Illustrate the concepts of control structures and looping.	**K2**
	CO3 Implement programs using arrays and functions.	**K3**
	CO4 Demonstrate programs using Structure and Pointers.	**K3**
	CO5 Build the programs using Union and File management Operations.	**K3**

UNIT - I	**Introduction**	**Periods: 09**
Generation and Classification of Computers - Block Diagram of a Computer –Categories of Software – Network Structure - Number System – Binary – Decimal – Conversion – Algorithm – Pseudo code – Flow Chart.		**CO1**

UNIT - II	**C Programming Basics**	**Periods: 09**
Introduction to 'C' Programming – Basic structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations – Decision Making and Branching – Looping statements.		**CO2**

UNIT - III	**Arrays and Functions**	**Periods: 09**
Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations- Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion		**CO3**

UNIT - IV	**Structure and Pointers**	**Periods: 09**
Structure Introduction – Structure definition – Structure declaration – Structure within a structure –Self Referential Structure. Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays -Pointer to Function –Pointer and Structure- Simple programs.		**CO4**

UNIT - V	**Unions and Files**	**Periods: 09**
Union Introduction - Programs Using Structures and Unions – Introduction to File - File Operations - File Input and Output Functions - Random Access to Files - File System Functions - Command Line Arguments- Storage Classes - Pre-Processor Directives- Dynamic Memory Functions.		**CO5**

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

Text Books

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, 8thEdition,2019.
2. YashvantKanetkar, "Let us C", BPB Publications, 16th Edition, 2017.
3. Herbert Schildt," C: The Complete Reference", McGraw Hill, FourthEdition,2014.

Reference Books

1. Vikas B. Agarwal Jyoti P. Mirani, "Computer Fundamentals , Nirali Prakashan Aug-2019.
2. Ashok N Kamthane, "Computer Programming", Pearson education, Second Impression,2012.
3. VikasVerma, "A Workbook on C ", Cengage Learning, Second Edition,2012.
4. P.Visu, R.Srinivasan and S.Koteeswaran, "Fundamentals of Computing and Programming", Fourth Edition, Sri Krishna Publications, 2012.
5. PradipDev, ManasGhoush, "Programming in C", Second Edition, Oxford University Press, 2011.

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1. https://www.programiz.com/c-programming
2. https://www.geeksforgeeks.org/c-language-set-1-introduction/
3. https://www.tutorialspoint.com/cprogramming
4. https://www.assignment2do.wordpress.com/.../solution-programming-in-ansi-c
5. https://nptel.ac.in/courses/106/104/106104128/

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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	2	1	-	-	3	-	-	-	-	-	-	-	3	-	3
2	2	1	-	-	3	-	-	-	-	-	-	-	3	-	3
3	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3
4	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3
5	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3

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

Evaluation Methods

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

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

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Department	Information Technology	Programme: B.Tech.						
Semester	I	Course Category : PC			*End Semester Exam Type: TE			
Course Code	U23ITT101	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	IT Essentials	3	-	-	3	25	75	100

Prerequisite	Nil	
Course Outcome	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Classify the types and fundamentals of servers	K2
	CO2 Develop scripting using PHP	K2
	CO3 Explain the basics of networking and Internet	K2
	CO4 Summarize the fundamentals and components of mobile communication	K2
	CO5 Explain the architectures and features of current trends in information Technology	K2

UNIT- I	Web Essentials	Periods: 9	
Website Essentials: Client-Server Paradigm - Browser Fundamentals - Authoring tools - Types of Servers: Application Server - Web Server - Database Server			CO1
UNIT- II	**Scripting Essentials**	**Periods: 9**	
Need for Scripting languages - Types of scripting languages - Working Principle - Client-Side scripting - Server-Side scripting - PHP: Variables and Constants - Flow Control and Looping - Functions - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts			CO2
UNIT- III	**Telecommunications and Networking Essentials**	**Periods: 9**	
Fundamental computer network concepts - Communication media and channels - Ethernet - TCP/IP - Wireless Local Area Network - WiFi - Network Routing - Switching - Network communication			CO3
UNIT- IV	**E-Commerce and M-Commerce Essentials**	**Periods: 9**	
Basic concepts - Types of E-Commerce - B2C Electronic commerce - B2B Electronic commerce - Ethical and legal issues - M-Commerce concept - M-Commerce applications.			CO4
UNIT- V	**Information Systems Essentials**	**Periods: 9**	
Transaction Processing Systems - Functional area Information systems - Information system for marketing and management - Information system for Human Resource Management - ERP planning systems - ERP system for business process.			CO5

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

Text Books

1. R. Kelly Rainer, Brad Prince, Introduction to Information Systems, Wiley, 9th Edition, 2021.
2. Joel Murach and Ray Harris, murach's PHP and MySQL, Murach, 4th Edition 2022.
3. P. T. Joseph, E-Commerce: An Indian Perspective , 6th Edition , 2019.

Reference Books

1. Brian.K.Williams, Stacey.C.Sawyer using Information Technology - A Practical Introduction to Computers and Communication, Tata McGraw Hill Publishing Company Ltd., New Delhi, 11th Education, 2015.
2. V.Rajaraman, Introduction to Information Technology, PHI Learning, Second Edition, 2013.
3. Introduction to Information Technology, Pearson Education, ITL Education solutions Ltd., 2012.
4. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition, O'REILLY, 2014.
5. Pelin Aksoy, Laura DeNardis, Introduction to Information Technology, Cengage Learning, Fourth Indian Reprint 2010.
6. IT essentials Companion Guide v7, Cisco Networking Academy,2020.

Web References

1. it-ebooks.org
2. https://www.computer-pdf.com/tutorials-it-essentials
3. https://www.ebooknetworking.net/ebooks/it-essentials.html
4. https://edurev.in/p/68703-/IT-Essentials

* TE – Theory Exam, LE – Lab Exam

2.A.4.37

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	2	2	2	-	-	-	-	1	-	-	3	3	3
2	2	2	2	2	2	-	-	-	-	1	-	-	3	3	3
3	2	2	2	2	2	-	-	-	-	1	-	-	3	3	3
4	2	2	2	2	2	-	-	-	-	1	-	-	3	3	3
5	2	2	2	2	2	-	-	-	-	1	-	-	3	3	3

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

Evaluation Methods

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

2.A.4.38

Department	Information Technology	Programme: B. Tech.						
Semester	I / II	Course Category: HS				End Semester Exam Type: TE		
Course Code	U23HSTC01	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Universal Human Values – II	2	-	-	2	25	75	100

(Common to all Branch)

Prerequisite	UHV – I	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Evaluate the significance of value inputs in formal education and start applying them in their life and profession	K2
	CO2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	K2
	CO3 Analyze the value of harmonious relationship based on trust and respect in their life and profession	K2
	CO4 Examine the role of a human being in ensuring harmony in society and nature.	K2
	CO5 Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.	K2

UNIT - I	Introduction to Value Education	Periods: 06
Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) - Understanding Value Education - Self-exploration as the Process for Value Education - Basic Human Aspirations - Happiness and Prosperity - Current Scenario- Method to Fulfil the Basic Human Aspirations		CO1
UNIT - II	**Harmony in the Human Being**	**Periods: 06**
Understanding Human being as the Co-existence of the Self and the Body-Distinguishing between the Needs of the Self and the Body-The Body as an Instrument of the Self-Understanding Harmony in the Self-Harmony of the Self with the Body-Programme to ensure self-regulation and Health		CO2
UNIT - III	**Harmony in the Family and Society**	**Periods: 06**
Harmony in the Family - Basic Unit of Human Interaction- 'trust' - Foundational Value in Relationship - 'Respect' - as the Right Evaluation - Other Feelings, Justice in Human-to-Human Relationship - Understanding Harmony in the Society-Vision for the Universal Human Order.		CO3
UNIT - IV	**Harmony in the Nature / Existence**	**Periods: 06**
Understanding Harmony in the Nature-Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature - Realizing Existence as Co-existence at All Levels - Holistic Perception of Harmony in Existence		CO4
UNIT - V	**Implications of the Holistic Understanding - A Look at Professional Ethics**	**Periods: 06**
Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct - Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics-Holistic Technologies, Production Systems and Management Models-Typical Case Studies-Strategies for Transition towards Value - based Life and Profession		CO5

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

Text Book

1. R. R. Gaur, R. Asthana, G. P. Bagaria, "A Foundation Course in Human Values and Professional Ethics", Excel Books, 2nd Revised Edition, New Delhi, 2019.

Reference Books

1. A Nagraj, Jeevan Vidya Prakashan, Amarkantak, "Jeevan Vidya: EkParichaya", 2013.
2. A.N. Tripathi, "Human Values", New Age International Publishers, New Delhi, 3rd Edition, 2019.
3. Annie Leonard, "The Story of Stuff", Free Press, Reprint Edition, 2011.
4. Mohandas Karam chand Gandhi, "The Story of My Experiments with Truth – Mahatma Gandhi Autobiography", Finger print Publisher, 2009.
5. E. F Schumacher, "Small is Beautiful", Vintage Publisher, 1993.
6. Cecile Andrews, "Slow is Beautiful", New Society Publishers, 2006.
7. J C Kumarappa, "Economy of Permanence", Sarva Seva Sangh Prakashan, 2017.
8. Pandit Sunderlal, "Bharat Mein Angreji Raj", Prabhat Prakashan Publisher, 2021.
9. Dharampal, "Rediscovering India", Stosius Inc/Advent Books Division Publisher, 1983.

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10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule", Gyan Publishing House, 2023.
11. Maulana Abdul Kalam Azad, "India Wins Freedom", Orient BlackSwan Publisher, 1st Edition, 1988.
12. Life of Vivekananda, "Romain Rolland (English)", Advaita Ashrama Publisher, India, 4th Edition, 2010.
13. Mahatma Gandhi, "Romain Rolland (English)", Srishti Publishers & Distributors, 2020.

Web References

1. https://www.uhv.org.in/uhv-ii
2. http://www.storyofstuff.com
3. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
4. https://fdp-si.aicte-india.org/8dayUHV_download.php
5. https://www.youtube.com/watch?v=8ovkLRYXIjE

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	2	2	-	-	3	-	-	-
2	-	-	-	-	-	2	3	2	2	-	-	3	-	-	-
3	-	-	-	-	-	3	3	2	2	-	-	3	-	-	-
4	-	-	-	-	-	2	3	2	2	-	-	3	-	-	-
5	-	-	-	-	-	2	3	2	2	-	-	3	-	-	-

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

Evaluation Methods

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.4.40

Department	English	Programme: B.Tech.						
Semester	I	Course Category Code: HS			*End Semester Exam Type:TE			
Course Code	U23ENBC01	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Communicative English - I	2	-	2	3	50	50	100
(Common to ALL Branches except CSBS)								
Prerequisite	Basics of English Language							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Understand the communication flow in organization and its objectives	K2
CO2	Write the technical contents with grammatically precise sentences	K2
CO3	Articulate with correct pronunciation and overcome vernacular impact in speaking	K3
CO4	Express opinions confidently in formal and informal communicative contexts	K2
CO5	Attend interview with assertiveness	K3

UNIT- I	Workstead Communication	Periods:10
Communication, Definition, Process, Channels, Barriers, Strategies for Effective Communication, Verbal and Nonverbal Communication - Listening, Types, Barriers, Enhancing Listening Skills - Bibliography: Book, Journal and Internet References		CO1
UNIT- II	**Common Errors In Writing And Comprehension Strategies**	**Periods:10**
Subject Verb Agreement, Misplaced Modifiers, Squinting Modifiers, Dangling Modifier, Fused Sentence, Comma Splice, Sentence Fragment - Reading Comprehension: Technical passage, Strategies: Skimming, Scanning, Intensive and Extensive Reading, Prediction, and Contextual Meaning		CO2
UNIT- III	**Phonetics**	**Periods:10**
Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non-silent Letters, Intonation, Spelling Rules and Words often misspelled, Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue		CO3
UNIT- IV	**Communication Practice-I**	**Periods:15**
List of Exercises **Listening**: Self Introduction videos **Speaking**: Self-Introduction, Extempore, and Role Play **Reading**: Non-Technical Comprehension Passage **Writing:** Common Errors in Writing		CO4
UNIT-V	**Interpersonal Communication-I**	**Periods:15**
List of Exercises **Listening:** Speech Sounds, Interview Videos **Speaking**: Debate, Structured Group Discussion, and Conversation **Reading**: Commonly Confused Words **Writing:** Transcription		CO5

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

Text Books

1. Richa Mishra , RatnaRao, "A textbook of English Language Communication Skills", Macmillan Publishers India Private Ltd., Revised Edition 2021.
2. Rizvi M. Ashraf, "Effective Technical Communication", New Delhi: Tata-McGraw-Hill Publishing Company Limited, 4th Edition, 2010.
3. Balasubramanian T, "English Phonetics for Indian students workbook", 2nd Edition, Trinity Press, 2016.

Reference Books

1. N.P.Sudharshana, C. Savitha," English for Engineers", Cambridge University Press, 2018.
2. Raman, Meenakshi, and Sharma, Sangeetha, "Technical Communication - Principles and Practice", 3rd Edition, Oxford University Press, 2017.
3. Comfort, Jeremy,etal., "Speaking Effectively: Developing Speaking Skills for Business English", Cambridge University Press, Cambridge, Reprint 2011.
4. Wren & Martin, "High School English Grammar and Composition", S Chandh &Co. Ltd, 2015.
5. Boove, Courtland L, "Business Communication Today", Pearson Education, New Delhi, 2002.

Web References

1. https://lemongrad.com/subject-verb-agreement-rules/
2. https://opentextbc.ca/advancedenglish/chapter/misplaced-and-dangling-modifiers/
3. https://www.hitbullseye.com/Reading-Comprehension-Tricks.php
4. https://www.softwaretestinghelp.com/how-to-crack-the-gd/
5. https://worldscholarshipvault.com/neutralize-mother-tongue-interference/

* TE – Theory Exam, LE – Lab Exam

2.A.4.41

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	-	-	-	-	-	-	-	1	3	-	1	-	-	-

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

Evaluation Method

Theory

Assessment	Continuous Assessment Marks (CAM)				End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Attendance		
Marks	10		5	5	75	60
	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	40
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.4.42

Department	EEE and ECE	Programme: **B.Tech.**						
Semester	I / II	Course Category: **ES**			End Semester Exam Type: **LE**			
Course Code	U23ESPC01	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Basics of Electrical and Electronics Engineering Laboratory**	**0**	**0**	**2**	**1**	**50**	**50**	**100**
(Common to CSE, IT, MECH, CIVIL, MCTR, CCE, AI&DS, FT, CSBS Branches)								
Prerequisite	Mathematics and Physics							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Build the different wiring for domestic and commercial applications.	K3
CO2	Design and analyze the domestic power distribution.	K3
CO3	Estimate the performance of transformer and motors by conducting load test.	K3
CO4	Describe characteristics of semiconductor diode and utilize it for different applications	K5
CO5	Relate the characteristics of various transistor	K2
CO6	Understand Rectifiers and Regulators	K2

List of Experiments

Section– A Electrical Experiments

Demonstration on Power Sources, Ammeter, Voltmeter, Wattmeter and Energy meter are Pre-requisite for conducting this Electrical Engineering Lab.

1. Electrical safety precautions and study of tools, accessories, electrical joints and electrical symbols.
2. Domestic Wiring Practice
   - Staircase wiring
   - Doctor's room wiring
   - Godown wiring
   - Wiring of Ceiling fan, LED lamps and Iron Box.
3. Design of Domestic power distribution.
4. Measurement of 3-phase power using two wattmeter method
5. Load test on DC shunt motor.
6. Load test on single phase transformer.
7. Load test on single phase Induction Motor.

Section – B Electronics Experiments

1. Study of Electronic components and equipment: Resistor, Capacitor
2. Measurement of AC signal parameter (Peak-Peak, rms period, frequency) using CRO.
3. VI Characteristics of PN junction diode, Zener diode
4. Input and output characteristics of Common Emitter configuration of BJT
5. Characteristics of JFET
6. Measurement of Ripple factor of HWR, FWR
7. Voltage Regulator using Zener Diode

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

Reference Books

1. S. Gowri, T. Jeyapoovan Nadar, "Engineering Practices Lab Manual", Vikas Publishing House Private Limited, New Delhi, 5th Edition, 2014.
2. A. Sudhakar and S. P. Shyam Mohan, "Circuits and Networks: Analysis and Synthesis", Tata McGraw Hill Publishing Company Ltd., New Delhi, 5th Edition, 2017.
3. D. P. Kothari and I.J. Nagrath, "Electric Machines", Tata McGraw Hill, New Delhi, 5th Edition, 2017.
4. Edward Hughes, John Hiley, Keith Brown, Ian McKenzie Smith, "Electrical and Electronics Technology", Pearson Education Limited, New Delhi, 12th Edition, 2016.
5. S.K. Sahdev, "Fundamentals of Electrical Engineering and Electronics", Dhanpat Rai and Co, 2017.

Web References

1. http://eie.sliet.ac.in/laboratories/basic-electrical-engineering-lab/
2. https://www.electronics-tutorials.ws/accircuits/series-circuit.html
3. https://www.allaboutcircuits.com/textbook/experiments/
4. https://www.electronicshub.org/measurements-of-ac-current/
5. http://www.electronics-tutorials.ws

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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	3	-	-	1	-	-	3	-	-	1	3	2	-
2	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
3	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
4	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
5	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
6	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-

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

Evaluation Methods

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

Department	Computer Science and Engineering	Programme: B.Tech.						
Semester	I / II	Course Category: ES				End Semester Exam Type: LE		
Course Code	U23CSPC01	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Programming in C Laboratory	0	0	2	1	50	50	100

(Common to All Branches Except CSBS and FT)

Prerequisite	NIL	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Implement logical formulations to solve simple problems leading to specific applications.	K3
CO2	Execute C programs for simple applications making use of basic constructs, arrays and strings.	K3
CO3	Experiment C programs involving functions, recursion, pointers, and structures.	K3
CO4	Demonstrate applications using sequential and random access file processing.	K3
CO5	Build solutions for online coding challenges.	K3

List of Exercises

1. Write a C program to find the Area of the triangle.
2. Develop a C program to read a three digit number and produce output like
   1 hundreds
   7 tens
   2 units
   For an input of 172.
3. Write a C program to check whether a given character is vowel or not using Switch – Case statement.
4. Write a C program to Print the numbers from 1 to 10 along with their squares.
5. Demonstrate do—While loop in C to find the sum of 'n' numbers.
6. Find the factorial of a given number using Functions in C.
7. Write a C program to check whether a given string is palindrome or not?
8. Write a C program to check whether a value is prime or not?
9. Develop a C program to swap two numbers using call by value and call by reference.
10. Construct a C program to find the smallest and largest element in an array.
11. Implement matrix multiplication using C program.
12. Write a C program to perform various string handling functions like strlen, strcpy, strcat, strcmp.
13. Develop a C program to remove all characters in a string except alphabets.
14. Write a C program to find the sum of an integer array using pointers.
15. Write a C program to find the Maximum element in an integer array using pointers.
16. Construct a C program to display Employee details using Structures
17. Write a C program to display the contents of a file on the monitor screen.
18. Write a File by getting the input from the keyboard and retrieve the contents of the file using file operation commands.
19. Write a C program to create two files with a set of values. Merge the two file contents to form a single file
20. Write a C program to pass the parameter using command line arguments.

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

Reference Books

1. Zed A Shaw," Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C)", Addison Wesley,2016.
2. Anita Goel and Ajay Mittal," Computer Fundamentals and programming in C",Pearson Education,First edition, 2011.
3. Maureen Sprankle, Jim Hubbard," Problem Solving and Programming Concepts," Pearson,9th Edition, 2011.
4. Yashwanth Kanethkar, "Let us C", BPB Publications,13th Edition,2008.
5. B.W.Kernighan and D.M. Ritchie, "The C Programming Language", Pearson Education, 2nd Edition, 2006.

Web References

1. https://alison.com/course/introduction-to-c-programming
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://cad-lab.github.io/cadlab_data/files/1993_prog_in_c.pdf
4. https://www.tenouk.com/clabworksheet/clabworksheet.html
5. https://fresh2refresh.com/c-programming/

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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	2	1	-	-	3	-	-	-	-	-	-	-	3	-	3
2	2	1	-	-	3	-	-	-	-	-	-	-	3	-	3
3	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3
4	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3
5	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3

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

Evaluation Methods

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

Department	Mechanical Engineering			Programme : B.Tech.				
Semester	I / II			Course Category: ES		End Semester Exam Type: LE		
Course Code	U23ESPC03	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Engineering Graphics Using AutoCAD	-	-	2	1	50	50	100
(Common to all Branches)								
Prerequisite	Nil							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Familiarize with the fundamentals and standards of engineering graphics.	K3
CO2	Perform drawing of basic geometrical constructions and multiple views of objects.	K2
CO3	Visualize the isometric and perspective sections of simple solids.	K3
CO4	Connect side view associate on front view.	K4
CO5	Correlate sectional views and lateral surface developments of various solids.	K4

List of Experiments

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing a Title Block with necessary text and projection symbol.
3. Drawing 2D sketch by applying modify tools like fillet, mirror, array, etc.,
4. Drawing front view and top view of simple solids like prism, pyramid, cylinder, cone, etc., and Dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. Simple stool, V-block, Mixie Base).
6. Drawing a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
8. Drawing lateral surface development of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creating 3D model of simple object and obtaining 2D multi-view drawings.
11. Note: Plotting of drawings must be made for each exercise and attached to the records written by Students.

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

Reference Books

1. James D. Bethune, "Engineering Graphics with AutoCAD", A Spectrum book 1st Edition, Macromedia Press, Pearson, 2020.
2. NS Parthasarathy and Vela Murali, "Engineering Drawing", Oxford university press, 2015.
3. M.B Shah, "Engineering Graphics", ITL Education Solutions Limited, Pearson **Education** Publication, 2011.
4. Bhatt N.D and Panchal V.M, "Engineering Drawing: Plane and Solid Geometry", Charotar Publishing House, 2017.
5. Jeyapoovan T, "Engineering Drawing and Graphics Using AutoCAD", Vikas Publishing House Pvt Ltd., 7th Edition, New Delhi, 2016.
6. C M Agrawal, Basant Agrawal, "Engineering Graphics", McGraw Hill, 2012.
7. Dhananjay A. Jolhe, "Engineering Drawing: With An Introduction To CAD", McGraw Hill, 2016.
8. James Leach, "AutoCAD 2017 Instructor", SDC Publications, 2016.

Web References

1. http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php
2. http://www.nptelvideos.in/2012/12/computer-aided-design.html
3. https://mech.iitm.ac.in/meiitm/course/cad-in-manufacturing/
4. https://autocadtutorials.com
5. https://dwgmodels.com

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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	1	-	-	3	-	-	-	3	-	-	2	3	3	3
2	3	1	-	-	3	-	-	-	3	-	-	3	3	3	3
3	3	1	-	-	3	-	-	-	3	-	-	3	3	3	3
4	3	1	-	-	3	-	-	-	3	-	-	2	3	3	3
5	3	1	-	-	3	-	-	-	3	-	-	3	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
	Performance in practical classes			Model Practical Examination	Attendance		
	Conduction of practical	Record work	viva				
Marks	15	5	5	15	10	50	100

Department	**Information Technology**	Programme : **B.Tech.**						
Semester	**I**	Course Category: **AEC**			End Semester Exam Type: **-**			
Course Code	**U23ITC1XX**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Certification Course – I**	**-**	**-**	**4**	**-**	**100**	**-**	**100**

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.

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 50**	**Total Periods: 50**

2.A.4.49

2.A.4.50

Department	Information Technology	Programme: B.Tech.						
Semester	I	Course Category: MC			End Semester Exam Type: -			
Course Code	U23ITM101	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Induction Programme	2 Weeks			Non-Credit	-	-	-
Prerequisite	-							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Develop holistic attitude and harmony in the individual, family, and Society	K2
	CO2 Acquire grammar skills and capable to write and speak English confidently	K2
	CO3 Understand the basic concepts in Mathematics and Programming	K2
	CO4 Know about the art and culture, language and literature of this vast secular nation	K2
	CO5 Identify the inherent talent and develop it professionally	K3

UNIT- I	Universal Human Values	Periods: 12
Welcome and Introductions - Getting to know each other, Aspirations and Concerns - Individual Academic and Career, Expectations of Family, Peers, Society, Nation, Fixing one's Goals, Self-Management - Self-confidence, Peer Pressure, Time Management, Anger, Stress Personality Development, Self-improvement, Health - Health issues, Healthy diet, Healthy lifestyle, Hostel life, Relationships - Home sickness, Gratitude towards Parents, Teachers and others Ragging and interaction, Competition and Cooperation, Peer Pressure, Society - Participation in Society, Natural Environment - Participation in Nature, Sum Up - Role of Education, Need for a Holistic Perspective, Self-evaluation and Closure - Sharing and feedback.		CO1

UNIT- II	Proficiency in English	Periods: 12
Communication skills - Prognostic test on Grammar - Synonyms, Antonyms, Tenses, Sentence Completion, Idioms and Phrases, One-word Substitution, Homophones, Homonyms, Use of Prepositions, Subject-verb-Agreement - Writing - Paragraph writing, Letter writing, Essay writing, Story Development.		CO2

UNIT- III	Bridge Course in Mathematics and C Programming	Periods: 12
Mathematics: Fundamentals of differential and integral calculus: Theory and Practice, Limit of function - Fundamental results on limits - Continuity of a function - Concept of differentiation - Concept of derivative - Slope of a curve -Differentiation Techniques - Derivatives of elementary functions from first principle - Derivatives of inverse functions - Logarithmic differentiation - Method of substitution - Differentiation of parametric functions -Differentiation of implicit functions - Higher order derivatives. Integrals of functions containing linear functions -Method of integration (Decomposition method, method of substitution, integration by parts) - Definite integrals. Simple definite integrals - Properties of Definite integrals - Reduction formulae - Area and volume - Length of curve - surface area of a solid. **C Programming:** Features of C and its basic Structure - Keywords - constants - variables - operators - Data types - Formatted input and output statements - Control and Looping statement - Arrays - Functions - Strings - writing simple C programs.		CO3

UNIT- IV	Literary Activities	Periods: 12
Team building activities - Quiz - Oral Exercises - Group discussion, Debate, Extempore, Role play, சிறப்பு சொற்பொழிவு - தமிழர் மரபு மற்றும் தமிழர் தொழில்நுட்பம்.		CO4

UNIT- V	Creative Arts	Periods: 12
Introduction to painting and renowned artworks - Documentary and Short films - Music - Vocal, Instrumental - Dance - Classical, Cinematic - Mimicry - Mime.		CO5

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

Reference Books

1. R.R Gaur, R. Asthana, G.P. Bagaria," A Foundation Course in Human Values and Professional Ethics", Excel Books, New Delhi, 2nd Revised Edition, 2019.
2. Kumar Mohan R, "English Grammar for all (Functional and Applied Grammar)", Unicare Academy, 2022.
3. Seely, John," Oxford A-Z of Grammar and Punctuation, Oxford Publication, 2013.
4. B.V. Ramana," Higher Engineering Mathematics", Tata McGraw – Hill, New Delhi, 6th Edition, 2018.
5. Dr. A. Singaravelu, "Engineering Mathematics - I", Meenakshi publications, Tamil Nadu, 2019.
6. E. Balagurusamy, "PROGRAMMING IN ANSI C", Mc Graw Hill, 8th Edition, 2019.
7. Dr.K.K.Pillay,"Social Life of Tamils", A joint publication of TNTB & ESC and RMRL
8. R.Balakrishnan, "Journey of Civilization",Roja muthiah research publishers, 1st Edition 2019
9. தமிழக வரலாறு - மக்களும் பண்பாடும், பிள்ளை, கே. கே. , சென்னை : உலகத் தமிழாராய்ச்சி நிறுவனம் , 2002.
10. கணினித்தமிழ் - முனைவர் இல.சுந்தரம், விகடன் பிரசுரம்.
11. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம், தமிழக தொல்லியல் துறை

2.A.4.51

Web References

1. http://www.newsociety.com/Books/S/Slow-isBeautiful
2. https://www.aplustopper.com/formal-letter/
3. https://www.javatpoint.com/c-programming-language-tutorial
4. http://www.math.cum.edu/~wn0g/2ch6a.pdf
5. https://education.nsw.gov.au/teaching-and-learning/curriculum/creative-arts

2.A.4.52

Department	Mathematics	Programme: B.Tech.						
Semester	II	Course Category : BS			End Semester Exam Type :TE			
Course Code	U23MATC02	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Engineering Mathematics – II	3	1	-	4	25	75	100

(Common to ALL Branches Except CSBS, FT)

Prerequisite	Basic Mathematics	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Convert a periodic function into series form.	K2
	CO2 Compute Fourier transforms of various functions.	K3
	CO3 Solve Differential Equations using Laplace transforms.	K3
	CO4 Apply inverse Laplace transform of simple functions.	K3
	CO5 Solve difference equations using Z – transforms.	K3

UNIT – I	Fourier Series	Periods:12	
Dirichlet's conditions – General Fourier series – Odd and Even functions – Half-Range sine series and cosine series – Change of intervals – Parseval's Identity.			CO1
UNIT – II	**Fourier Transforms**	**Periods:12**	
Fourier Transforms and its inverse – Properties of Fourier Transform (without proof) – Fourier sine and cosine Transforms and their properties (excluding proof).			CO2
UNIT – III	**Laplace Transforms**	**Periods:12**	
Laplace transforms of elementary functions and Periodic functions – Basic properties (excluding proof) – Laplace transforms of derivatives and integrals – Initial and final value theorems.			CO3
UNIT – IV	**Inverse Laplace Transforms**	**Periods:12**	
Definition of inverse Laplace Transforms – Convolution theorem (excluding proof) – Solutions of Linear Ordinary Differential Equations of second order with constant coefficients.			CO4
UNIT – V	**Z – Transforms**	**Periods:12**	
Z-transforms – Elementary Properties – Inverse Z-transforms (using partial fraction and Residues) – Solution of difference equations using Z - transform.			CO5

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

Text Books

1. T. Veerarajan, "Engineering Mathematics", Tata McGraw Hill, New Delhi, 3rd Edition, 2011.
2. C. P. Gupta, Shree Ram Singh. M. Kumar, "Engineering Mathematics for semester I & II", Tata McGraw Hill, New Delhi, 2nd Edition, 2016.
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand, New Delhi, 22nd Edition 2019.

Reference Books

1. N.P. Bali and Dr. Manish Goyal, "A Textbook of Engineering Mathematics", University Science Press, India, 8th Edition, 2016.
2. P. Sivaramakrishna Das and C. Vijayakumari, "Engineering Mathematics", Pearson India Education services Pvt. Ltd, India 1st 2017.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New Delhi, 10th Edition, 2019.
4. G. Balaji, "Engineering Mathematics - Transforms and Partial Differential Equations", G. Balaji Publishers, 18th Edition, 2022.
5. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 2017.

Web References

1. https://nptel.ac.in/courses/111105121/
2. https://nptel.ac.in/courses/111105035/
3. https://nptel.ac.in/courses/11110711
4. https://swayam.gov.in/nd1_noc20_ma17/preview
5. https://nptel.ac.in/courses/111/103/111103021/

2.A.4.53

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	-	-	1	-	-	-	-	-	1	1	-	-
2	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-
3	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-
4	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-
5	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-

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

Evaluation Methods

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

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

2.A.4.54

Department	Physics / Chemistry	Programme: B.Tech.						
Semester	I/II	Course Category : BS				End Semester Exam Type: TE		
Course Code	U23BSTC01	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Physical Science for Engineers	3	-	-	3	25	75	100

(Common to all Branches)

Prerequisite	Physics of 12th standard or equivalent / Chemistry of 12th standard or equivalent.	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Understand the basic of properties of magnetic, dielectric and superconductors.	K2
	CO2 Identify the wave nature of the particles, physical significance of wave functions	K3
	CO3 Understand the basic principles of laser and fiber optics communication	K2
	CO4 Understand and familiar with the water treatment.	K2
	CO5 Understand the electrode potential for its feasibility in electrochemical reaction and uses of various batteries.	K2
	CO6 Understand the specific operating condition under which corrosion occurs and suggest a method to control corrosion.	K2

SECTION A - PHYSICS

UNIT - I	Magnetic, Dielectric and Superconducting Materials	Periods: 8
Introduction to magnetic materials, Ferromagnetism- Domain theory-Types of energy-Hysteresis-Hard and Soft magnetic materials-ferrites-Dielectric materials-Types of polarization – Langevin-Debye equation-Frequency effects on polarization-Dielectric breakdown- Ferroelectric materials-Superconducting materials and their properties.		CO1

UNIT - II	Quantum Mechanics	Periods: 7
Matter Waves - de Broglie Wavelength - Uncertainty Principle –Physical Significance of wave functions - Schrodinger wave Equation - Time Dependent - Time Independent - Application to Particle in a One Dimensional Box - Tunnel Diode.		CO2

UNIT - III	Laser and Fiber Optics	Periods: 7
Lasers - Principles of Laser - Spontaneous and Stimulated Emissions - Einstein's Coefficients - Population Inversion and Laser Action –components of laser - Types of Lasers - NdYAG, CO2 laser, GaAs Laser Fiber Optics - Principle and Propagation of light in optical fiber - Numerical aperture and acceptance angle - Types of optical fibers (material, refractive index, mode)		CO3

SECTION B – CHEMISTRY

UNIT - IV	Water and its Treatment	Periods: 8
Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD. Desalination of brackish water: Reverse osmosis-disadvantages of using hard water in boiler - Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment–Ion exchange demineralization and zeolite process.		CO4

UNIT - V	Electrochemical Cells and Storage Devices	Periods: 8
Galvanic cells, single electrode potential, standard electrode potential, electrochemical series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen, calomel and Ag/AgCl. Batteries and fuel cells: Types of batteries- alkaline battery-lead storage battery- nickel-cadmium battery- fuel cell H2 -O2 fuel cell-applications.		CO5

UNIT - VI	Corrosion	Periods: 7
Corrosion –Introduction - factors – types – chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control – material selection and design aspects – electrochemical protection – sacrificial anode method and impressed current cathodic method. Uses of inhibitors, metallic coating – anodic coating, cathodic coating. Metal cladding, Electroplating of Copper and electroless plating of nickel.		CO6

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

2.A.4.55

Text Books

1. V Rajendran, "Engineering Physics", 2nd Edition, TMH, New Delhi 2011.
2. S.S Dara – "A text book of Engineering Chemistry" - 15th Edition, 2021. S.Chand Publications.
3. C.Jain, Monica Jain, —"Engineering Chemistryll" 17th Ed. Dhanpat Rai Pub. Co., New Delhi, (2015).

Reference Books

1. R.Murugeshan, "Modern Physics", S. Chand &Co, New Delhi 2006.
2. William D Callister Jr., "Material Science and Engineering", 6th Edition, John Wiley and sons, 2009.
3. Jain & Jain "Engineering chemistry", 23rd Edition, DhanpatRai Publishing Company. 2022
4. Mars Fontana "Corrosion Engineering", July 2017
5. JinaRedlin, "Handbook of Electrochemistry", March 28, 2005

Web References

1. https://www.sciencedaily.com/terms/materials_science.htm.
2. https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/materials science.html.
3. https://study.com/academy/lesson/semiconductors-superconductors-definition-properties.html
4. https://mechanicalc.com/reference/engineering-materials
5. http://ndl.ethernet.edu.et/bitstream/123456789/89589/1/%5BPerez_N.%5D_Electrochemistry_and_corrosion%28BookZZ.org%29.pdf

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	-	-	-	-	-	-	-	-	-	-	-
2	3	2	3	2	-	-	-	-	-	-	-	-	-	-	-
3	3	2	3	2	-	-	-	-	-	-	-	-	-	-	-
4	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
6	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Evaluation Methods

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

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

2.A.H.56

Department	**Artificial Intelligence and Data Science**	Programme: **B.Tech**						
Semester	**II/III**	Course Category: **ES**			End Semester Exam Type: **TE**			
Course Code	**U23ADTC01**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Programming in Python**	**3**	**-**	**-**	**3**	**25**	**75**	**100**

(Common to All Branches)

Prerequisite	NIL	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Interpret the basic concepts of Python programs.	**K2**
	CO2 Articulate the concepts of Sets, Dictionaries and Object-Oriented concepts.	**K2**
	CO3 Experiment with Numpy package.	**K3**
	CO4 Apply and analyze Data Manipulation with Pandas.	**K3**
	CO5 Illustrate programming concept for Visualization with Matplotlib.	**K3**

UNIT - I	**Introduction To Python**	**Periods: 09**
Structure of Python Program – Underlying mechanism of Module Execution – Branching and Looping – Problem Solving Using Branches and Loops – Functions – Lambda Functions – Lists and Mutability – Problem Solving Using Lists and Functions.		**CO1**
UNIT - II	**Sequence Datatypes and Object-Oriented Programming**	**Periods: 09**
Sequences – Mapping and Sets – Dictionaries. Classes: Classes and Instances – Inheritance – Exception Handling – Introduction to Regular Expressions using "re" module.		**CO2**
UNIT - III	**Using Numpy**	**Periods: 09**
Basics of NumPy – Computation on NumPy – Aggregations – Computation on Arrays – Comparisons – Masks and Boolean Arrays – Fancy Indexing – Sorting Arrays – Structured Data: NumPy's Structured Array.		**CO3**
UNIT - IV	**Data Manipulation with Pandas**	**Periods: 09**
Introduction to Pandas Objects – Data indexing and Selection – Operating on Data in Pandas – Handling Missing Data – Hierarchical Indexing – Combining Data Sets. Aggregation and Grouping – Pivot Tables –Vectorized String Operations – Working with Time Series – High Performance Pandas – eval() and query().		**CO4**
UNIT - V	**Visualization With Matplotlib**	**Periods: 09**
Basic functions of Matplotlib – Simple Line Plot – Scatter Plot – Density and Contour Plots – Histograms – Binnings and Density – Customizing Plot Legends – Colour Bars – Three-Dimensional Plotting in Matplotlib.		**CO5**

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

Text Books

1. Jake VanderPlas, "Python Data Science Handbook - Essential Tools for Working with Data", O'Reily Media Inc, 2016.
2. Zhang.Y, "An Introduction to Python and Computer Programming", Springer Publications, 2016.
3. Wesley J Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2006.

Reference Books

1. John Paul Mueller, Luca Massaron, "Python for Data Science for Dummies", 2nd Edition, John Wiley& Sons, 2019.
2. Jesus Rogel-Salazar, "Data Science and Analytics with Python", CRC Press Taylor and Francis Group, 2017.
3. Brian Draper, "Python Programming A Complete Guide for Beginners to Master and Become an Expert in Python Programming Language", CreateSpace Independent Publishing Platform, 2016.
4. Mark Lutz, Laura Lewin, Frank Willison, "Programming Python", O'Reilly Media, 3rd Edition, 2006.
5. Gowrishankar S, Veena A, "Introduction to Python Programming", CRC Press, 2018.

Web References

1. https://nptel.ac.in/courses/106/106/106106212/
2. https://www.geeksforgeeks.org/data-analysis-visualization-python/
3. https://www.coursera.org/learn/python-data-analysis
4. https://www.python.org/
5. https://www.programiz.com/python-programming

2.A.M.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	-	3
2	2	2	1	3	-	-	-	-	-	-	-	2	2	2	3
2	3	2	2	3	-	-	-	-	-	-	-	2	3	2	3
3	3	3	2	3	-	-	-	-	-	-	-	3	3	3	3
2	3	3	2	3	-	-	-	-	-	-	-	2	3	3	3
3	3	3	2	3	-	-	-	-	-	-	-	3	3	3	3

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

Evaluation Methods

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

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

2.A.A.58

Department	Computer Science and Engineering	Programme: B.Tech						
Semester	II/III	Course Category: ES			End Semester Exam Type: TE			
Course Code	U23CSTC03	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Data Structures	3	-	-	3	25	75	100

(Common to All Branches)

Prerequisite	Any Programming Knowledge	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Compute time and space complexity for given problems	K2
	CO2 Demonstrate stack, queue and its operation.	K2
	CO3 Illustrate the various operations of linked list.	K3
	CO4 Use the concepts of tree for various applications.	K3
	CO5 Outline the various Tables, Graphs and Sets techniques.	K3

UNIT - I	Basic Terminologies of Data Structures	Periods: 09
Introduction: Basic Terminologies – Asymptotic Notations: Complexity analysis. Array and its operations - Searching: Linear Search and Binary Search Techniques. Sorting: Bubble Sort – Selection Sort – Insertion Sort – Heap Sort – Shell Sort. Performance and Comparison among the sorting methods.		CO1
UNIT - II	**Stack and Queue Operations**	**Periods: 09**
Stacks and Queues: ADT Stack and its operations. Applications of Stacks: Expression Conversion and evaluation. ADT Queue and its operations. Types of Queue: Simple Queue – Circular Queue – Priority Queue – Deque.		CO2
UNIT - III	**Linked List Operations**	**Periods: 09**
Linked Lists: Singly linked list: Representation in memory. Algorithms of several operations: Traversing – Searching – Insertion – Deletion. Linked representation of Stack and Queue. Doubly linked list: operations. Circular Linked Lists: operations.		CO3
UNIT - IV	**Trees**	**Periods: 09**
Trees: Basic Tree Terminologies. Different types of Trees: Binary Tree – Threaded Binary Tree – Binary Search Tree – Binary Tree Traversals – AVL Tree- Red Black Tree.		CO4
UNIT - V	**Graphs, Tables and Sets**	**Periods: 09**
Graph: Basic Terminologies and Representations – Graph traversal algorithms. Tables: Different types of tables – Hash Table and its operations - Applications. Sets: Representation of Sets- Operations and its applications.		CO5

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

Text Books

1. Ellis Horowitz, Sartaj Sahni," Fundamentals of Data Structures", Illustrated Edition, Computer Science Press, 2018.
2. Thomas H. Coreman, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", PHI, Third Edition, 2010.
3. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, "Data Structures and Algorithms", 4th Edition, 2009.

Reference Books

1. D.Samanta, "Classic Data Structures", Prentice-Hall of India, Second Edition, 2012.
2. Robert Kruse, C.L. Tondo and Bruce Leung, "Data Structures and Program Design in C" . Prentice-Hall of India, Second Edition, 2007.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, Second. Edition,2006.
4. Mark Allen Weiss," Algorithms, Data Structures and Problem Solving with C++", Illustrated Edition, Addison-Wesley Publishing Company, 1995.
5. Mark Allen Weiss," Algorithms, Data Structures and Problem Solving with C++", Addison- Wesley Publishing Company, Illustrated Edition, 1995.

Web References

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.javatpoint.com/data-structure-tutorial/
3. https://www.studytonight.com/data-structures/
4. https://www.tutorialspoint.com/data_structures_algorithms/
5. https://www.w3schools.in/data-structures-tutorial/intro/

* 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	1	1	-	-	-	-	-	-	-	-	3	2	3
2	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
3	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
4	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
5	3	2	1	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
	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.H.60

Department	Information Technology	Programme: B.Tech.						
Semester	II	Course Category: PC			*End Semester Exam Type: TE			
Course Code	U23ITTC01	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Digital Design and System Architecture	3	-	-	3	25	75	100

(Common to CSE and IT)

Prerequisite	Basic mathematics, Basics of Electrical and Electronics Engineering	
Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
	CO1 Demonstrate simplifications of Boolean functions.	K2
	CO2 Describe various combinational logic circuits.	K2
	CO3 Illustrate various sequential circuits.	K2
	CO4 Narrate the basic components and computer organization	K2
	CO5 Explain memory types and I/O organization	K2

UNIT - I	Review of Number Systems	Periods: 09
Review of Number systems – Conversion of Number systems – Binary addition and subtractions – Binary representation: Signed magnitude representation and Compliment representations - Binary codes – Boolean Algebra – Boolean functions – canonical forms - Simplifications of Boolean function: Theorems and laws, K-Map and Quine McCluskey method.		CO1

UNIT - II	Logic Gates and its Types	Periods: 09
Introduction to combinational circuits – Design procedures of Combinational circuits – Adders - Subtractors – Binary parallel Adder – BCD Adder – Carry look ahead adder – Decoder – Encoder – Priority Encoder – Multiplexer.		CO2

UNIT - III	Sequential Logic Design	Periods: 09
Introduction to Sequential Circuits – Latches - Types of Latches: SR Latch and D Latch – Flip-Flop- Types of Flip-Flops: RS, JK,D,T Flip-Flops – Excitation table of Flip-Flops – Counters : Asynchronous Counters – Synchronous counters – Mod counters - Shift registers – Types of Shift registers : SISO,SIPO,PISO,PIPO and Universal Shift registers – Ripple counter and Johnson counter.		CO3

UNIT - IV	Fundamentals of Computer Organization	Periods: 09
Block diagram of Digital Computer, Organization and Design: Instruction codes, Registers, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, ALU design, Execution of a complete instruction-Multiple bus organization, Hardwired control Microprogrammed control, Pipelining: Basic concepts, Data hazards, Instruction hazards, Parallel and Vector Processors.		CO4

UNIT - V	Memory and I/O Organization	Periods: 09
Memory hierarchy - Main memory, Memory chip Organization, Auxiliary memory, Associate memory, Virtual memory, Cache memory, input-output interface, asynchronous data transfer, Modes of transfer, Priority interrupt, DMA - Buses Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB), Case study – Advanced Processors.		CO5

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

Text Books

1. M. Morris Mano and Michael Ciletti, Digital Design, Sixth Edition, Pearson India Education Services, Pvt. Ltd., 2018
2. Stephen Brown and ZvonkoVranesic, "Fundamentals of Digital Logic with VHDL Design", Tata McGraw Hill Education Pvt. Ltd., 3rd Edition, 2012.
3. M. Moris Mano, Computer System Architecture, Third Edition, Pearson Education,2017: The Complete Reference", McGraw Hill, FourthEdition,2014

2.A.H.61

Reference Books

1. Tocci R J and Widmer N S, "Digital Systems - Principles and Applications", Prentice Hall of India, New Delhi,11th Edition, 2010.
2. John.F.Wakerly,"Digital Design Principles and Practices", Pearson Education,4th Edition, 2006.
3. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th edition, Tata McGraw Hill Education, 2011.
4. David A. Patterson and John L. Hennessey, "Computer Organization and Design", 5th edition, Morgan Kauffman /Elsevier, 2014
5. Roger Tokhiem, "Schaum's Outline of Digital Principles", McGraw Hill publication,3rd Edition, 1994.

Web References

1. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/
2. https://nptel.ac.in/courses/117/105/117105080/
3. https://nptel.ac.in/courses/106/105/106105163/
4. https://www.javatpoint.com/computer-organization-and-architecture-tutorial
5. http://www.ee.surrey.ac.uk/Projects/CAL/digital-logic/gatesfunc/

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	2	-	1	-	-	-	-	1	-	-	3	-	-
2	2	1	2	-	1	-	-	-	-	1	-	-	3	-	-
3	3	1	2	-	1	-	-	-	-	1	-	-	3	-	-
4	3	1	2	-	1	-	-	-	-	1	-	-	3	-	-
5	3	1	2	-	1	-	-	-	-	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	English	Programme: B.Tech.					
Semester	II	Course Category Code: HS			*End Semester Exam Type:TE		
Course Code	U23ENBC02	Periods/Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	Communicative English-II	2	-	2	3	50	50	100
(Common to ALL Branches except CSBS)								
Prerequisite	Basics of English Language							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Draft effective written communication in professional environment	K2
CO2	Apply the mechanics of creative writing with precision and clarity	K3
CO3	Acquire language skills professionally to groom the overall personality through sensitizing various etiquettes in real time situation	K2
CO4	Develop language fluency and gain self-confidence	K3
CO5	Express thoughts and ideas with clarity and focus	K2

UNIT-I	Business Correspondence	Periods:10
Business Writing: Circular, Agenda, Memoranda, Notice, Instruction, Minutes, Email Writing ,Report Writing- Official and Demi Official Letters : Applying for Educational / Car / Home Loans / Joining Report, Leave Letter, Industrial Visit, In plant Training, Letter to the Editor, Calling for a quotation, Placing Order, Letter of Complaints, Letter seeking Clarification, Resume', Job Application Letter, Bio-data, CV		CO1
UNIT-II	**Functional Writing Skills**	**Periods:10**
Four Modes of Writing, Sentence Structure , Art of condensation: Summary Writing and Note Making, Use of phrase and clause in sentence, Principles of paragraph writing, Techniques of Essay Writing, Jumbled Sentence, Paraphrasing		CO2
UNIT-III	**Etiquettes**	**Periods:10**
Etiquette: Meaning, Kinds: Corporate Etiquette, Meeting Etiquette, Telephone Etiquette, Email Etiquette, Social Media Etiquette, Dining Etiquette, Communication Etiquette		CO3
UNIT-IV	**Communication Practice-II**	**Periods:15**
List of Exercises **Listening:** Letter writing tips **Speaking:** Just a Minute, Impromptu Speech, Contemporary Issues **Reading:** Variety of examples for Modes of Writing **Writing:** Different types of letters		CO4
UNIT-V	**Interpersonal Communication-II**	**Periods:15**
List of Exercises **Listening:** Videos on different types of Etiquettes **Speaking:** Team Presentation, Negotiation Skills **Reading:** Phrases and Clauses **Writing:** Free writing on any given topic, Paraphrasing Practice		CO5

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

Text Books

1. PC Das, "Letter Writing including Official and Business Letters", New Central Book Agency, 2020.
2. Kumar, Sanjay, Pushpalatha," Communication Skills". Oxford University Press, 2018.
3. Raman, Meenakshi&Sangeetha Sharma," Communication Skills", New Delhi: OUP, 2018.

Reference Books

1. Sahukar, Nimeran , Bhalla, Prem,, "The book of Etiquettes and Manners".PustakMahal Publisher, New Delhi; 1st Edition 2009.
2. Gerson Sharon J, Steven M. Gerson, "Technical Writing Process and Product", Pearson Education Pvt. Ltd. 3rd Edition, 2009.
3. Grussendorf, Marion, "English for Presentations". Oxford University Press, Oxford, 2007.
4. Seely John, "The Oxford Guide to Writing and Speaking", Oxford University Press, 2006.
5. R.C. Sharma, Krishna Mohan, "Business Correspondence and Report Writing", Tata McGraw Hill &Co.Ltd., New Delhi, 2001.

Web References

1. https://www.indeed.com/career-advice/finding-a-job/how-to-write-an-application-letter
2. https://owlcation.com/humanities/Four-Types-of-Writing
3. https://targetstudy.com/languages/english/paragraph-writing.html
4. https://www.businessnewsdaily.com/8262-email-etiquette-tips.html
5. https://www.youtube.com/watch?v=UOceysteljo

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	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 Method

Theory

Assessment	Continuous Assessment Marks (CAM)				End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Attendance		
Marks	10		5	5	75	60
	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		40
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, 64

Department	Mechanical Engineering			Programme: B.Tech.			
Semester	I/II			Course Category: ES		*End Semester Exam Type: LE	
Course Code	U23ESPC02	Periods / Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	Design Thinking and IDEA Lab	-	-	2	1	50	50	100
(Common to ALL Branches)								
Prerequisite	Basic Knowledge of Science							

Course Outcomes	On completion of the course, the students will be able to	BT Mapping (Highest Level)
CO1	Demonstrate a comprehensive understanding of the tools and inventory associated with the IDEA Lab.	K2
CO2	Develop proficiency in ideation techniques to generate creative and innovative solutions for various design challenges and problems	K3
CO3	Acquire practical knowledge of mechanical and electronic fabrication processes, including hands-on experience with machinery, tools, and techniques used in the manufacturing and assembly of physical components.	K3
CO4	Cultivate the skills necessary for developing innovative and desirable products, including the ability to integrate user needs, market trends, and technological advancements into the design process.	K4
CO5	Apply iterative design methodologies to refine and improve solutions based on feedback, user testing, and evaluation of functional, aesthetic, and usability aspects	K4

Design process: Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, Reframe existing design problems, Principles of creativity Empathy: Customer Needs, Insight-leaving from the lives of others/standing on the shoes of others, Observation

Design team-Team formation, Conceptualization: Visual thinking, Drawing/sketching, New concept thinking, Patents and Intellectual Property, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification Prototyping: Principles of prototyping, Prototyping technologies, Prototype using simple things, Wooden model, Clay model, 3D printing; Experimenting/testing.

Sustainable product design, Ergonomics, Semantics, Entrepreneurship/business ideas, Product Data Specification, Establishing target specifications, Setting the final specifications. Design projects for teams.

List of Lab Activities and Experiments

1. Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
2. Machining of 3D geometry on soft material such as softwood or modelling wax.
3. 3D scanning of computer mouse geometry surface. 3D printing of scanned geometry using FDM or SLA printer.
4. 2D profile cutting of press fit box/casing in acrylic (3 or 6 mm thickness)/cardboard, MDF (2 mm) board using laser cutter & engraver.
5. 2D profile cutting on plywood /MDF (6-12 mm) for press fit designs.
6. Familiarity and use of welding equipment.
7. Familiarity and use of normal and wood lathe.
8. Embedded programming using Arduino and/or Raspberry Pi.
9. Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure.
10. Discussion and implementation of a mini project.
11. Documentation of the mini project (Report and video).

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

Text Books

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd.
2. Workshop / Manufacturing Practices (with Lab Manual), Khanna Book Publishing.

2.A.4.65

Reference Books

1. Ulrich and Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
2. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018.
3. The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan, Weldon Owen; 2017.
4. The Art of Electronics. 3rd edition. Paul Horowitz and Winfield Hill. Cambridge University Press.
5. Practical Electronics for Inventors. 4th edition. Paul Sherz and Simon Monk. McGraw Hill.
6. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education.
7. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill.
8. Venuvinod, PK., MA. W., Rapid Prototyping – Laser Based and Other Technologies, Kluwer
9. Chapman W.A.J, "Workshop Technology", Volume I, II, III, CBS Publishers and Distributors, 5th Edition,2002.

Web References

1. https://onlinecourses.nptel.ac.in/noc23_mg72

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	2	2	-	-	2	-	3	2	-	-	-
2	3	3	3	2	2	2	-	-	2	-	3	2	-	-	-
3	3	3	3	2	3	2	-	-	2	-	3	2	-	-	-
4	3	3	3	2	3	2	-	-	2	-	3	2	-	-	-
5	3	3	3	2	3	2	-	-	2	-	3	2	-	-	-

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

Evaluation Methods

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.14.66

Department	**Artificial Intelligence and Data Science**	Programme: **B.Tech**						
Semester	**II**	Course Category: **ES**				End Semester Exam Type: **LE**		
Course Code	**U23ADPC01**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Programming in Python Laboratory**	**-**	**-**	**2**	**1**	**50**	**50**	**100**
(Common to All Branches)								
Prerequisite	NIL							

Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Describe common Python functionality and features used for data science.	**K2**
	CO2 Query Data Frame structures for cleaning and processing.	**K2**
	CO3 Configure your programming environment	**K3**
	CO4 Experiment the concept using data visualization.	**K3**
	CO5 Analyze real time datasets,	**K3**

List of Exercises

1. Build a python program to implement Fibonacci series.
2. Build a python program to get a range of numbers from user and to separate even numbers and odd numbers respectively.
3. Build a function in Python to check duplicate letters. It must accept a string, i.e., a sentence. The function should return True if the sentence has any word with duplicate letters, else return False.
4. Build a program to perform arithmetic operations using lambda function.
5. Build a Python program that takes a list of numbers as input and returns a new list containing only the even numbers from the input list.
6. Build a python program to create a class called Car with attributes Company, model, and year. Implement a method that returns the age of the car in years.
7. Build a python program to create a base class called Shape that has a method called area which returns the area of the shape (set it to 0 for now). Then, create two derived classes Rectangle and Circle that inherit from the Shape class to calculate the area of derived classes.
8. Build a python program to implement aggregation using Numpy.
9. Build a python program to perform Indexing and Sorting.
10. Build a python program to perform Handling of missing data.
11. Build a python program to perform usage of Pivot table using Titanic datasets
12. Build a python program to perform use of eval () and query ()
13. Build a python program to perform Scatter Plot
14. Build a python program to perform 3D plotting
15. Implement an application to process a real time data.

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

Reference Books

1. Chirag Shah, "A Hands-On Introduction to Data Science", Cambridge University Press, 2020.
2. Siddhartha Chatterjee, Michal Krystyanczuk, "Python Social Media Analytics", Packt Publishing, 2017.
3. Jake VanderPlas, "Python Data Science Handbook - Essential Tools for Working with Data", O'Reily Media Inc, 2016.
4. Zhang.Y, "An Introduction to Python and Computer Programming", Springer Publications, 2016.
5. Wesley J Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2006.

Web References

1. https://nptel.ac.in/courses/106/106/106106212/
2. https://www.geeksforgeeks.org/data-analysis-visualization-python/
3. https://www.coursera.org/learn/python-data-analysis
4. https://www.python.org/
5. https://www.programiz.com/python-programming

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	2	2	1	3	-	-	-	-	-	-	-	2	2	2
2	2	3	2	2	3	-	-	-	-	-	-	-	2	3	2
3	3	3	3	2	3	-	-	-	-	-	-	-	3	3	3
4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3

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

Evaluation Methods

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	**Computer Science and Engineering**	Programme: **B.Tech.**						
Semester	**II/III**	Course Category: **PC**			*End Semester Exam Type: **LE**			
Course Code	**U23CSPC02**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Data Structures Laboratory**	**-**	**-**	**2**	**1**	**50**	**50**	**100**

(Common to all Branches)

Prerequisite	Basic Programming Knowledge

Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Analyse the algorithm's / program's efficiency in terms of time and space complexity.	**K3**
	CO2 Solve the given problem by identifying the appropriate Data Structure.	**K3**
	CO3 Solve the problems of searching and sorting techniques.	**K3**
	CO4 Solve problems in linear Data Structures.	**K4**
	CO5 Solve problems in non-linear Data Structures.	**K4**

List of Experiments:

1. Write a C program to implement recursive and non-recursive i) Linear search ii) Binary Search.
2. Write a C program to implement i) Bubble sort ii) Selection sort iii) Insertion sort iv) Shell sort v) Heap sort.
3. Write a C program to implement the following using an array. a) Stack ADT b) Queue ADT
4. Write a C program to implement list ADT to perform following operations a) Insert an element into a list. a) Delete an element from list b) Search for a key element in list c) count number of nodes in list.
5. Write a C program to implement the following using a singly linked list. a) Stack ADT b) Queue ADT.
6. Write a C program to implement the dequeue (double ended queue) ADT using a doubly linked list and an array.
7. Write a C program to perform the following operations:
   a) Insert an element into a binary search tree.
   b) Delete an element from a binary search tree.
   c) Search for a key element in a binary search tree.
8. Write a C program that use recursive functions to traverse the given binary tree in
   a) Preorder b) Inorder c) Postorder.
9. Write a C program to perform the AVL tree operations.
10. Write a C program to implement Graph Traversal Techniques.
11. Write a C program to implement the Set operations.
    a) Union b) Intersection c) Difference.

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

Reference Books

1. Yashavant Kanetkar, "Data Structures through C", BPB Publications, 3rd Edition, 2019.
2. Tenebaum Aaron M, "Data Structures using C', Pearson Publisher, 1st Edition, 2019.
3. Manjunath Aradhya M and Srinivas Subramiam, "C Programming and Data Structures", Cengage India 1st Edition, 2017.
4. Reema Thareja, "Data structures using C", Oxford University, 2nd Edition, 2014.
5. Gav.pai, "Data Structures and Algorithms", McGraw-Hill India, 1st Edition, 2013.

Web References

1. https://www.tutorialspoint.com/data_structures_algorithms/
2. https://www.w3schools.in/data-structures-tutorial/intro/
3. https://nptel.ac.in/courses/106103069/
4. https://swayam.gov.in/nd1_noc20_cs70/preview
5. https://nptel.ac.in/courses/106103069

* TE – Theory Exam, LE – Lab Exam

2.A.H.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	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
2	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
3	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
4	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
5	3	2	1	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.A.4.60

Department	**Information Technology**	Programme: **B.Tech.**					
Semester	**II**	Course Category: **PC**			End Semester Exam Type: **LE**		
Course Code	**U23ITPC01**	Periods / Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**Digital Design and System Architecture Laboratory**	-	-	2	1	50	50	100

(Common to CSE and IT)

Prerequisite	NIL	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Experiment simplifications of Boolean functions	**K3**
	CO2 Develop any combinational logic functions and design combinational circuit	**K3**
	CO3 Demonstrate the behavior of sequential circuits	**K3**
	CO4 Simulate basic knowledge of computer organizations	**K3**
	CO5 Design memory unit and simulate memory operations	**K3**

List of Exercises **Periods: 30**

1. HDL code to realize all the logic gates
2. Design and Simulation of adder, Serial Binary Adder, Multi Precession Adder, Carry Look Ahead Adder.
3. Design of 2-to-4 decoder
4. Design of 8-to-3 encoder (without and with parity)
5. Design of flip flops: SR, D, JK, T
6. Design of a N- bit Register of Serial- in Serial –out, Serial in parallel out, Parallel in Serial out and Parallel in Parallel Out.
7. Design of ALU to Perform – ADD, SUB, AND-OR, 1's and 2's Compliment,
8. Design of ALU to Perform – Multiplication, and Division.
9. Memory unit design and perform memory operations.
10. 8-bit simple ALU design
11. 8-bit simple CPU design
12. Interfacing of CPU and Memory

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

Reference Books

1. J. Bhasker, "Verilog Hdl Synthesis, a Practical Primer", Trade Paperback, 2018.
2. Massimo Alioto, Elio Consoli, Gaetano Palumbo, "Flip-Flop Design in Nanometer CMOS",Springer, 2015.
3. Charles Platt, "Make: More Electronics",Make:community, 2014.
4. M K Gooroochurn," Introduction to Digital Logic & Boolean Algebra",Paperback, 2018.
5. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", fifth edition, Tata McGraw Hill Education, 2011.

Web References

1. http://www.ee.surrey.ac.uk/Projects/CAL/digital-logic/gatesfunc/
2. https://www.javatpoint.com/computer-organization-and-architecture-tutorial
3. https://www.tutorialspoint.com/digital_circuits/digital_circuits_flip_flops
4. https://www.geeksforgeeks.org/hardware-description-language/

* TE – Theory Exam, LE – Lab Exam

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	2	1	2	-	1	-	-	-	-	1	-	-	3	-	-
2	2	1	2	-	1	-	-	-	-	1	-	-	3	-	-
3	3	1	2	-	1	-	-	-	-	1	-	-	3	-	-
4	3	1	2	-	1	-	-	-	-	1	-	-	3	-	-
5	3	1	2	-	1	-	-	-	-	1	-	-	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.A.4.72

Department	**Information Technology**	Programme: **B.Tech.**						
Semester	**I**	Course Category: **AEC**			End Semester Exam Type: -			
Course Code	**U23ITC2XX**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Certification Course – I**	-	-	**4**	-	**100**	-	**100**

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

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 50**	**Total Periods: 50**

2.A.4.73

Department	Information Technology	Programme: B.Tech.					
Semester	II	Course Category: MC			End Semester Exam Type: -		
Course Code	U23ITM202	Periods / Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	Sports Yoga and NSS	-	-	2	Non-Credit	100	-	100

Prerequisite	NIL	
Course Outcomes	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility and relaxation.	K2
	CO2 Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.	K2
	CO3 Develop understanding of psychological problems associated with age and lifestyle.	K2
	CO4 Recognize the importance of national service in community development.	K2
	CO5 Convert existing skills into socially relevant life skills.	K2

UNIT - I	**Introduction to Physical Education**	**Periods: 06**
Definition, Aims and Objectives of Physical Education - Changing trends in Physical Education **Physical Fitness, Wellness and Lifestyle:** Importance of Physical Fitness and Wellness - Components of Physical fitness - Components of Health related fitness - Components of wellness - Preventing Health Threats through Lifestyle Change - Concept of Positive Lifestyle.		**CO1**

UNIT - II	**Yoga and Lifestyle**	**Periods: 06**
Importance of Yoga - Elements of Yoga - Introduction - Asanas, Pranayama, Meditation and Yogic Kriyas - Yoga for concentration and related Asanas (Sukhasana, Tadasana, Padmasana and Shashankasana) - Relaxation Techniques for improving concentration - Yog-nidra. Asanas as preventive measures – Hypertension – Obesity - Back Pain-Diabetes - Asthema.		**CO2**

UNIT - III	**Training and Planning In Sports**	**Periods: 06**
Training - Warming up and limbering down-Skill, Technique and Style - Objectives of Planning – Tournament - Knock-Out, League/Round Robin and Combination. **Psychology and Sports** - Important of Psychology in Physical Education and Sports - Differentiate Between Growth and Development - Adolescent problems and their Management - Emotion: Concept, Type and Controlling of emotions - Concepts and Types of Aggressions in Sports - Psychological benefits of exercise - Anxiety and Fear and its effects on Sports Performance - Motivation, its type and techniques - Understanding Stress and Coping strategies		**CO3**

UNIT - IV	**Introduction to National Service Scheme**	**Periods: 06**
Orientation of NSS volunteers: History, motto, symbol, awards, structure and activities of NSS - Days of National and International Importance - Sensitizing about the thrust areas and awareness activities - Importance of tree plantation and voluntary blood donation - The role of SHGs and NGOs in community development – CSR - Life skills and youth development-extension activities in HEIs - various clubs and schemes like RRC, ELC, YRC, UBA, SBA, etc.,		**CO4**

UNIT - V	**Community Issues and the use of Technology**	**Periods: 06**
Common Problems of rural India - Technology development and its suitability – Sustainability - Value addition to agricultural products - Service learning and youth volunteering – Shramdaan - Campus cleaning - Field visit to nearby communities - village survey - Initiatives to clean and green environment - preservation of water bodies in adopted villages.		**CO5**

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

Reference Books

1. Brar Ajmer Singh, Gill Jagtar Singh, Bains Jagdish, "Modern Textbook of Physical Education Health and Sports- I", Kalyani Publishers, 6th Edition, 2014.
2. B.K.S. Iyengar, "Light on Yoga: The Definitive Guide to Yoga Practice",Thorsons Publishers, Thorsons Classics edition, 2015.
3. Joseph, Siby K, Mahodaya, "Bharat Essays on Conflict Resolution", Institute of Gandhian Studies Publishers, 2007.
4. Barman Prateeti , Goswami, "Document on Peace Education", Triveni Akansha Publishing House, New Delhi, 2009.
5. Prof R.B.S. Verma, "Field Work Practicum in Social Work-Emerging Concerns", Rapid Publisher, Lucknow, 2020.
6. Sibereisen, K , Richard M, "Lerner Approaches to Positive Youth Development", Sage Publications, New Delhi, 2007.
7. Hoshiar Singh, "Administration of Rural Development in India",Sterling Publisher, the University of Michigan, 2009.

Web References

1. http://www.thebetterindia.com/140/national-service-scheme-nss
2. http://en.wikipedia.org/wiki/national-service-scheme 19=http://nss.nic.in/adminstruct
3. http://nss.nic. in
4. http://socialworknss.org/about.html
5. Young Journal on Youth published by SAGE: http://you.sagepub.com

Evaluation methods

Assessment	Continuous Assessment Marks (CAM)			Total Marks
	Attendance	MCQ Test	Presentation / Activity / Assignment	
Marks	10	30	60	100

2.Aug.24