

B.E. - BIOMEDICAL ENGINEERING

Curriculum & Syllabus for Semester I and II

REGULATIONS 2024 (Academic Year 2024-25 Onwards)





K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215
(Autonomous)
DEPARTMENT OF BIOMEDICAL ENGINEERING
B.E. – Biomedical Engineering
(REGULATIONS 2024)

Vision of the Institution

IV	We envision to achieve status as an excellent educational institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.
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Mission of the Institution

IM 1	To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.
IM 2	To foster and maintain a mutually beneficial partnership with global industries and institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department / Programme: (Biomedical Engineering)

DV	To Produce erudite Biomedical Engineers, Research and Entrepreneurs with ethical values to meet the global challenges.
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Mission of the Department / Programme: (Biomedical Engineering)

DM 1	Impart quality education to enhance problem solving skills, leadership qualities and team spirit through teaching and learning process with ethical responsibilities.
DM 2	Enrich interdisciplinary skills by providing state of the art laboratories and facilities.
DM 3	Enhance research and entrepreneurship skills with social responsibilities to meet social needs.

Programme Educational Objectives (PEOs): (Biomedical Engineering)


The graduates of the programme will be able to	
PEO 1	Core Competency: Apply their foundational knowledge of biomedical engineering, life sciences, and problem-solving skills to develop innovative solutions that improve healthcare.
PEO 2	Professionalism: Demonstrate ethical responsibility, effective communication, and leadership in multidisciplinary teams while adhering to professional standards in biomedical engineering.
PEO 3	Higher studies and Entrepreneurship: Pursue continuous learning through higher studies and exhibit an entrepreneurial mindset by transforming biomedical advancements into impactful enterprises.

Programme Outcomes (POs) of B.E. - Biomedical Engineering**Engineering Graduates will be able to:**

PO1	Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)
PO5	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcomes (PSOs)


PSO1	Medical Device Design and Development: To design and develop medical devices to enhance the quality of life for the end user by applying fundamentals of biomedical engineering.
PSO2	Computing and Automation Skills: To apply software skills in developing algorithms for solving healthcare related problems.

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215							Curriculum UG R - 2024		
Department		Department of Biomedical Engineering									
Programme		B.E. Biomedical Engineering									
SEMESTER I											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
Induction Programme			-	-	-	-	-	-	-	-	-
THEORY COURSES											
1	24ENT19	Professional Communication	HSMC	3	0	0	3	3	40	60	100
2	24EET06	Basics of Electrical and Electronics Engineering	ESC	3	0	0	3	3	40	60	100
3	24ITT16	Programming for Problem Solving	ESC	3	0	0	3	3	40	60	100
4	24GET19	தமிழர் மரபு / Heritage of Tamils	HSMC	1	0	0	1	1	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
5	24MAI19	Matrices and Calculus	BSC	2	1	2	5	4	50	50	100
6	24PHI07	Engineering Physics	BSC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
7	24ITP16	Programming for Problem Solving Laboratory	ESC	0	0	2	2	1	60	40	100
8	24MEP16	Engineering Graphics Laboratory	ESC	1	0	2	3	2	60	40	100
9	24GEP16	Engineering Experience Laboratory	ESC	0	0	2	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES											
10	24SSP19	Aptitude and Coding Skills - I	EEC	0	0	2	2	1	60	40	100
MANDATORY COURSE											
11	24MCP09	Mandatory Course-I	MC	0	0	2	2	0	-	-	-
TOTAL				16	1	14	31	23	1000		

SEMESTER II											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	24CST29	Python Programming	ESC	3	0	0	3	3	40	60	100
2	24ECT21	Design Thinking	PCC	2	0	0	2	2	40	60	100
3	24BMT21	Medical Physics	PCC	3	0	0	3	3	40	60	100
4	24GET29	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	HSMC	1	0	0	1	1	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
5	24MAI29	Probability and Statistics	BSC	2	1	2	5	4	50	50	100
6	24CHI06	Chemistry for Engineers	BSC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
7	24ENP29	Professional Communication Laboratory	HSMC	0	0	2	2	1	60	40	100
8	24CSP29	Python Programming Laboratory	ESC	0	0	2	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES											
9	24SSP29	Aptitude and Coding Skills – II	EEC	0	0	2	2	1	60	40	100
TOTAL				14	1	10	25	20	900		
SEMESTER III											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	24MAT36	Transforms and Complex Variables	BSC	3	1	0	4	4	40	60	100
2	24CST36	Data Structures and Algorithms	ESC	3	0	0	3	3	40	60	100
3	24BMT31	Anatomy and Human Physiology	PCC	3	0	0	3	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
4	24BMI31	Electronic Devices and Circuits	PCC	3	0	2	5	4	50	50	100
5	24BMI32	Biosciences	PCC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
6	24CSP36	Data Structures and Algorithms Laboratory	ESC	0	0	2	2	1	60	40	100
7	24BMP31	Anatomy and Human Physiology Laboratory	PCC	0	0	2	2	1	60	40	100
8	24BMP32	Design Studio-I	PCC	0	0	2	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES											
9	24SSP39	Aptitude and Coding Skills - III	EEC	0	0	2	2	1	60	40	100
TOTAL				15	1	12	28	22	1100		

SEMESTER IV											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	24MAT46	Linear Algebra and Numerical Methods	BSC	3	1	0	4	4	40	60	100
2	24GET49	Universal Human Values	HSMC	3	0	0	3	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
3	24BMI31	Sensors and Measurements	PCC	3	0	2	5	4	50	50	100
4	24BMI32	Biomedical Instrumentation	PCC	3	0	2	5	4	50	50	100
5	24BMI33	Analog and Digital Integrated Circuits	PCC	3	0	2	5	4	50	50	100
6	24BMI34	Biosignal Processing	PCC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
7	24BMP41	Design Studio-II	PCC	0	0	2	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES											
8	24SSP49	Aptitude and Coding Skills – IV	EEC	0	0	2	2	1	60	40	100
TOTAL				18	1	12	31	25	800		
SEMESTER V											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	24BMT51	Hospital Management	PCC	3	0	0	3	3	40	60	100
2		Professional Elective - I	PEC	3	0	0	3	3	40	60	100
3		Professional Elective - II	PEC	3	0	0	3	3	40	60	100
4		Open Elective - I	OEC	3	0	0	3	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
5	24BMI51	Medical Image Processing	PCC	3	0	2	5	4	50	50	100
6	24BMI52	Diagnostic and Therapeutic Equipment	PCC	3	0	2	5	4	50	50	100
7	24BMI53	Biocontrol Systems	PCC	3	0	2	5	4	50	50	100
LABORATORY COURSES											
8	24BMP51	Medical Equipment Calibration Lab	PCC	1	0	2	3	2	100	-	100
EMPLOYABILITY ENHANCEMENT COURSES											
9	24BMP52	Internship – I *	EEC	0	0	0	0	1	100	-	100
MANDATORY COURSE											
10		Mandatory Course – II	MC	2	0	0	2	0	100	-	100
TOTAL				24	0	8	32	27	1000		
*The students should undergo internship during the IV semester summer vacation											

SEMESTER VI											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	24BMT61	Radiological Equipment	PCC	3	0	0	3	3	40	60	100
2		Professional Elective - III	PEC	3	0	0	3	3	40	60	100
3		Open Elective - II	PEC	3	0	0	3	3	40	60	100
4		Open Elective - III	OEC	3	0	0	3	3	40	60	100
THEORY COURSES WITH LABORATORY COMPONENT											
5	24BMI61	AI and ML for Biomedical Engineers	PCC	3	0	2	5	4	50	50	100
6	24BMI62	Embedded systems and IoMT	PCC	3	0	2	5	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSES											
7	24BMP61	Mini Project	EEC	0	0	4	4	2	60	40	100
MANDATORY COURSE											
8		Mandatory Course - III	MC	2	0	0	2	0	100	-	100
TOTAL				20	0	8	28	22	800		
SEMESTER VII											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
THEORY COURSES											
1	24GET79	Professional Ethics	HSMC	3	0	0	3	3	40	60	100
2		Management Elective	HSMC	3	0	0	3	3	40	60	100
3		Professional Elective – IV	PEC	3	0	0	3	3	40	60	100
4		Professional Elective – V	PEC	3	0	0	3	3	40	60	100
5		Professional Elective - VI	PEC	3	0	0	3	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSES											
6	24BMP71	Project Work – Phase I	EEC	0	0	4	4	2	60	40	100
7	24BMP72	Internship – II *	EEC	0	0	0	0	1	100	-	100
TOTAL				15	0	4	19	18	700		
*The students should undergo internship during the VI semester summer vacation											
SEMESTER VIII											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
EMPLOYABILITY ENHANCEMENT COURSES											
1	24BMP81	Project Work - Phase II	EEC	0	0	16	16	8	60	40	100
TOTAL				0	0	16	16	8	100		
TOTAL CREDITS								165			
TOTAL NUMBER OF CREDITS TO BE EARNED FORWARD OF THE DEGREE = 165											
Note: HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES- Engineering Science Courses, PC-Professional Core Courses, PE-Professional Elective Courses, OE- Open Elective Courses, EEC-Employability Enhancement Courses & MC- Mandatory Courses											

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Department		Department of Biomedical Engineering									
Programme		B.E. Biomedical Engineering									
HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSES (HSMC)											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
1.	24ENT19	Professional Communication	HSMC	3	0	0	3	3	40	60	100
2.	24GET19	தமிழர் மரபு / Heritage of Tamils	HSMC	1	0	0	1	1	40	60	100
3.	24GET29	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	HSMC	1	0	0	1	1	40	60	100
4.	24ENP29	Professional Communication Laboratory	HSMC	0	0	2	2	1	60	40	100
5.	24GET49	Universal Human Values	HSMC	3	0	0	3	3	40	60	100
6.	24GET79	Professional Ethics	HSMC	3	0	0	3	3	40	60	100
7.	24MGT7n	Management Elective	HSMC	3	0	0	3	3	40	60	100
TOTAL				14	0	2	16	15	700		
BASIC SCIENCE COURSES (BSC)											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
1.	24MAI19	Matrices and Calculus	BSC	2	1	2	5	4	50	50	100
2.	24PHI07	Engineering Physics	BSC	3	0	2	5	4	50	50	100
3.	24MAI29	Probability and Statistics	BSC	2	1	2	5	4	50	50	100
4.	24CHI06	Chemistry for Engineers	BSC	3	0	2	5	4	50	50	100
5.	24MAT36	Transforms and Complex Variables	BSC	3	1	0	4	4	40	60	100
6.	24MAT46	Linear Algebra and Numerical Methods	BSC	3	1	0	4	4	40	60	100
TOTAL				16	4	8	28	24	600		

ENGINEERING SCIENCES COURSES (ESC)											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
1.	24EET06	Basics of Electrical and Electronics Engineering	ESC	3	0	0	3	3	40	60	100
2.	24ITT16	Programming for Problem Solving	ESC	3	0	0	3	3	40	60	100
3.	24ITP16	Programming for Problem Solving Laboratory	ESC	0	0	2	2	1	60	40	100
4.	24MEP16	Engineering Graphics Laboratory	ESC	1	0	2	3	2	60	40	100
5.	24GEP16	Engineering Experience Laboratory	ESC	0	0	2	2	1	60	40	100
6.	24CST29	Python Programming	ESC	3	0	0	3	3	40	60	100
7.	24CSP29	Python Programming Laboratory	ESC	0	0	2	2	1	60	40	100
8.	24CST36	Data Structures and Algorithms	ESC	3	0	0	3	3	40	60	100
9.	24CSP36	Data Structures and Algorithms Laboratory	ESC	0	0	2	2	1	60	40	100
TOTAL				13	0	10	23	18	900		
EMPLOYABILITY ENHANCEMENT COURSES (EEC)											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	L
1.	24SSP19	Aptitude and Coding Skills - I	EEC	0	0	2	2	1	60	40	100
2.	24SSP29	Aptitude and Coding Skills – II	EEC	0	0	2	2	1	60	40	100
3.	24SSP39	Aptitude and Coding Skills - III	EEC	0	0	2	2	1	60	40	100
4.	24SSP49	Aptitude and Coding Skills – IV	EEC	0	0	2	2	1	60	40	100
5.	24BMP52	Internship – I *	EEC	0	0	0	0	1	100	-	100
6.	24BMP61	Mini Project	EEC	0	0	4	4	2	60	40	100
7.	24BMP71	Project Work – Phase I	EEC	0	0	4	4	2	60	40	100
8.	24BMP72	Internship – II *	EEC	0	0	0	0	1	100	-	100
9.	24BMP81	Project Work - Phase II	EEC	0	0	16	16	8	60	40	100
TOTAL				0	0	32	32	18	900		

PROFESSIONAL CORE COURSES (PCC)											
S. No.	Course Code	Course Title	Category	Periods / Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
1.	24ECT21	Design Thinking	PCC	2	0	0	2	2	40	60	100
2.	24BMT21	Medical Physics	PCC	3	0	0	3	3	40	60	100
3.	24BMT31	Anatomy and Human Physiology	PCC	3	0	0	3	3	40	60	100
4.	24BMT31	Electronic Devices and Circuits	PCC	3	0	2	5	4	50	50	100
5.	24BMT32	Biosciences	PCC	3	0	2	5	4	50	50	100
6.	24BMP31	Anatomy and Human Physiology Laboratory	PCC	0	0	2	2	1	60	40	100
7.	24BMP34	Design Studio-I	PCC	0	0	2	2	1	60	40	100
8.	24BMT31	Sensors and Measurements	PCC	3	0	2	5	4	50	50	100
9.	24BMT32	Biomedical Instrumentation	PCC	3	0	2	5	4	50	50	100
10.	24BMT33	Analog and Digital Integrated Circuits	PCC	3	0	2	5	4	50	50	100
11.	24BMT34	Biosignal Processing	PCC	3	0	2	5	4	50	50	100
12.	24BMP41	Design Studio-II	PCC	0	0	2	2	1	60	40	100
13.	24BMT51	Hospital Management	PCC	3	0	0	3	3	40	60	100
14.	24BMT51	Medical Image Processing	PCC	3	0	2	5	4	50	50	100
15.	24BMT52	Diagnostic and Therapeutic Equipment	PCC	3	0	2	5	4	50	50	100
16.	24BMT53	Biocontrol Systems	PCC	3	0	2	5	4	50	50	100
17.	24BMP51	Medical Equipment Calibration Lab	PCC	1	0	2	3	2	100	-	100
18.	24BMT61	Radiological Equipment	PCC	3	0	0	3	3	40	60	100
19.	24BMT61	AI and ML for Biomedical Engineers	PCC	3	0	2	5	4	50	50	100
20.	24BMT62	Embedded systems and IoMT	PCC	3	0	2	5	4	50	50	100
TOTAL				48	0	30	78	63	2200		

PROFESSIONAL ELECTIVE COURSES(PEC): VERTICALS

<u>VERTICAL 1:</u> BIOENGINEERING	<u>VERTICAL 2:</u> MEDICAL DEVICE INNOVATION AND DEVELOPMENT	<u>VERTICAL 3:</u> MECHANICS	<u>VERTICAL 4:</u> COMMUNICATION ENGINEERING	<u>VERTICAL 5:</u> ADVANCED HEALTHCARE DEVICES	<u>VERTICAL 6:</u> MANAGEMENT (HEALTH CARE)
Biomaterials	Foundation Skills in integrated product Development	Biomechanics	Communication Systems	Bio MEMS	Clinical Engineering
Artificial Organs and Implants	Medical Device Design	Biofluids	Wearable devices	Critical Care Equipment	Hospital planning and Management
Biomedical Optics and Photonics	Patient safety, Standards and Ethics	Rehabilitation Engineering	Body Area Networks	Biomaterials and Human Assist Devices	Medical Waste Management
Advances in Drug Delivery	Medical Device Regulations	Sports Biomechanics	Virtual reality and Augmented Reality in Healthcare	Advancements in Healthcare Technology	Quality Management and Accreditations in Healthcare
Principles of Tissue Engineering	Medical Innovation and Entrepreneurship	Assistive Technology	Telehealth Technology	Analytical Instrumentation	Hospital Information System
Genetic Engineering	Medical Device Testing	Ergonomics	Medical Informatics	Nuclear Medicine	Human Behavior for Biomedical Engineers
Bioprinting	Rapid Prototyping	Haptics	Virtual Instrumentation and DAQ systems	Bio-inspired Technology	Biostatistics
Nanotechnology in Medicine	Healthcare Data Analytics	Implant Design and Development	VLSI for Medical Devices	Robotics in Medicine	Forensic science in Healthcare

S. No.	Course Code	Course Title	Category	Periods/ Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
VERTICAL1: BIOENGINEERING											
1	24BME01	Biomaterials	PEC	3	0	0	3	3	40	60	100
2	24BME02	Artificial Organs and Implants	PEC	3	0	0	3	3	40	60	100
3	24BME03	Biomedical Optics and photonics	PEC	3	0	0	3	3	40	60	100
4	24BME04	Advances in Drug Delivery	PEC	3	0	0	3	3	40	60	100
5	24BME05	Principles of Tissue Engineering	PEC	3	0	0	3	3	40	60	100
6	24BME06	Genetic Engineering	PEC	3	0	0	3	3	40	60	100
7	24BME07	Bioprinting	PEC	3	0	0	3	3	40	60	100
8	24BME08	Nanotechnology in Medicine	PEC	3	0	0	3	3	40	60	100
VERTICAL2: MEDICAL DEVICE INNOVATION AND DEVELOPMENT											
1	24BME09	Foundation Skills in integrated Product Development	PEC	3	0	0	3	3	40	60	100
2	24BME10	Medical Device Design	PEC	3	0	0	3	3	40	60	100
3	24BME11	Patient safety, Standards and Ethics	PEC	3	0	0	3	3	40	60	100
4	24BME12	Medical Device Regulations	PEC	3	0	0	3	3	40	60	100
5	24BME13	Medical Innovation and Entrepreneurship	PEC	3	0	0	3	3	40	60	100
6	24BME14	Medical Device Testing	PEC	3	0	0	3	3	40	60	100
7	24BME15	Rapid Prototyping	PEC	3	0	0	3	3	40	60	100
8	24BME16	Healthcare Data Analytics	PEC	3	0	0	3	3	40	60	100
VERTICAL3: MECHANICS											
1	24BME17	Biomechanics	PEC	3	0	0	3	3	40	60	100
2	24BME18	Biofluids	PEC	3	0	0	3	3	40	60	100
3	24BME19	Rehabilitation engineering	PEC	3	0	0	3	3	40	60	100
4	24BME20	Sports Biomechanics	PEC	3	0	0	3	3	40	60	100
5	24BME21	Assistive Technology Engineers	PEC	3	0	0	3	3	40	60	100
6	24BME22	Ergonomics	PEC	3	0	0	3	3	40	60	100
7	24BME23	Haptics	PEC	3	0	0	3	3	40	60	100
8	24BME24	Implant Design and Development	PEC	3	0	0	3	3	40	60	100
VERTICAL4: COMMUNICATION ENGINEERING											
1	24BME25	Communication Systems	PEC	3	0	0	3	3	40	60	100
2	24BME26	Wearable devices	PEC	3	0	0	3	3	40	60	100
3	24BME27	Body Area Networks	PEC	3	0	0	3	3	40	60	100
4	24BME28	Virtual reality and Augmented Reality in Healthcare	PEC	3	0	0	3	3	40	60	100
5	24BME29	Telehealth Technology	PEC	3	0	0	3	3	40	60	100
6	24BME30	Medical Informatics	PEC	3	0	0	3	3	40	60	100
7	24BME31	Virtual Instrumentation and DAQ systems	PEC	3	0	0	3	3	40	60	100
8	24BME32	VLSI for Medical Devices	PEC	3	0	0	3	3	40	60	100

S. No.	Course Code	Course Title	Category	Periods/ Week				Credit	Max. Marks		
				L	T	P	Tot		CA	ES	Tot
VERTICAL5: ADVANCED HEALTHCARE DEVICES											
1	24BME33	BioMEMS	PEC	3	0	0	3	3	40	60	100
2	24BME34	Critical Care Equipment	PEC	3	0	0	3	3	40	60	100
3	24BME35	Biomaterials and Human Assist Devices	PEC	3	0	0	3	3	40	60	100
4	24BME36	Advancements in Healthcare Technology	PEC	3	0	0	3	3	40	60	100
5	24BME37	Nuclear Medicine	PEC	3	0	0	3	3	40	60	100
6	24BME38	Analytical Instrumentation	PEC	3	0	0	3	3	40	60	100
7	24BME39	Bio-inspired Technology	PEC	3	0	0	3	3	40	60	100
8	24BME40	Robotics in Medicine	PEC	3	0	0	3	3	40	60	100
VERTICAL6: MANAGEMENT (HEALTHCARE)											
1	24BME41	Clinical Engineering	PEC	3	0	0	3	3	40	60	100
2	24BME42	Hospital planning and Management	PEC	3	0	0	3	3	40	60	100
3	24BME43	Medical Waste Management	PEC	3	0	0	3	3	40	60	100
4	24BME44	Quality Management and Accreditations in Healthcare	PEC	3	0	0	3	3	40	60	100
5	24BME45	Hospital Information System	PEC	3	0	0	3	3	40	60	100
6	24BME46	Human Behavior for Biomedical Engineers	PEC	3	0	0	3	3	40	60	100
7	24BME47	Biostatistics	PEC	3	0	0	3	3	40	60	100
8	24BME48	Forensic science in Healthcare	PEC	3	0	0	3	3	40	60	100
MANAGEMENT ELECTIVES											
1	24MGT71	Total Quality Management	HSMC	3	0	0	3	3	50	50	100
2	24MGT72	Principles of Management	HSMC	3	0	0	3	3	50	50	100
3	24MGT73	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3	50	50	100
4	24MGT74	Human Resource Management	HSMC	3	0	0	3	3	50	50	100
5	24MGT75	Industrial Management	HSMC	3	0	0	3	3	50	50	100
MANDATORY COURSE - I, II & III											
1	24MCP09	Yoga and Stress Management	MC	1	0	0	1	0	-	-	-
2	24MCT51	Constitution of India	MC	2	0	0	2	0	100	-	100
3	24MCT52	Environmental Sciences and Sustainability	MC	2	0	0	2	0	100	-	100
4	24MCT53	Engineering Economics	MC	2	0	0	2	0	100	-	100
5	24MCT54	Introduction to Gender Studies	MC	2	0	0	2	0	100	-	100
6	24MCT61	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0	100	-	100
7	24MCT62	Life Science for Engineers	MC	2	0	0	2	0	100	-	100
8	24MCT63	Disaster Management	MC	2	0	0	2	0	100	-	100
9	24MCT64	Industrial Maintenance and Safety Engineering	MC	2	0	0	2	0	100	-	100

S. No.	Course Code	Course Title	Category	Periods/ Week				Credit	Max.Marks		
				L	T	P	Tot		CA	ES	Tot
OPEN ELECTIVE COURSES OFFERED BY OTHER DEPARTMENT											
AUTOMOBILE ENGINEERING											
1.	24AUO01	Basics of Automobile Engineering	OEC	3	0	0	3	3	40	60	100
2.	24AUO02	Automotive Engine Technology	OEC	3	0	0	3	3	40	60	100
3.	24AUO03	Automotive Vehicle Technology	OEC	3	0	0	3	3	40	60	100
4.	24AUO04	Automotive Safety	OEC	3	0	0	3	3	40	60	100
5.	24AUO05	Hybrid Vehicles	OEC	3	0	0	3	3	40	60	100
6.	24AUO06	Off Highway Vehicles	OEC	3	0	0	3	3	40	60	100
7.	24AUO07	Modern and Intelligent Vehicle System	OEC	3	0	0	3	3	40	60	100
8.	24AUO08	Vehicle Maintenance	OEC	3	0	0	3	3	40	60	100
CIVIL ENGINEERING											
9.	24CEO01	Architecture Heritage of India	OEC	3	0	0	3	3	40	60	100
10.	24CEO02	Elementary Civil Engineering	OEC	3	0	0	3	3	40	60	100
11.	24CEO03	Modern Construction Materials	OEC	3	0	0	3	3	40	60	100
12.	24CEO04	Water and Air Pollution Management	OEC	3	0	0	3	3	40	60	100
13.	24CEO05	Water Harvesting and Management	OEC	3	0	0	3	3	40	60	100
COMPUTER SCIENCE AND DESIGN											
14.	24CDO01	Animation Basics	OEC	3	0	0	3	3	40	60	100
15.	24CDO02	Data Visualization Techniques	OEC	3	0	0	3	3	40	60	100
COMPUTER SCIENCE AND ENGINEERING											
16.	24CSO01	Programming in Java	OEC	3	0	0	3	3	40	60	100
17.	24CSO02	Fundamentals of Operating Systems	OEC	3	0	0	3	3	40	60	100
18.	24CSO03	Fundamentals of Database Systems	OEC	3	0	0	3	3	40	60	100
19.	24CSO04	Internet Programming	OEC	3	0	0	3	3	40	60	100
20.	24CSO05	Artificial Intelligence and Machine Learning	OEC	3	0	0	3	3	40	60	100

COMPUTER SCIENCE AND ENGINEERING (IoT)											
21.	24IOO01	Internet of Thing and its Applications	OEC	3	0	0	3	3	40	60	100
22.	24IOO02	Sensors and Actuator Devices	OEC	3	0	0	3	3	40	60	100
23.	24IOO03	Mobile Application Development	OEC	3	0	0	3	3	40	60	100
COMPUTER SCIENCE AND ENGINEERING (Cyber Security)											
24.	24CBO01	Fundamentals of Cyber security	OEC	3	0	0	3	3	40	60	100
25.	24CBO02	Penetration and Vulnerability Testing Techniques	OEC	3	0	0	3	3	40	60	100
26.	24CBO03	Basics of Digital Forensics	OEC	3	0	0	3	3	40	60	100
27.	24CBO04	Introduction to Ethical Hacking	OEC	3	0	0	3	3	40	60	100
28.	24CBO05	Malware analysis	OEC	3	0	0	3	3	40	60	100
ELECTRICAL AND ELECTRONICS ENGINEERING											
29.	24EEO01	Electrical Drives and Control	OEC	3	0	0	3	3	40	60	100
30.	24EEO02	Electrical Power Generation Systems	OEC	3	0	0	3	3	40	60	100
31.	24EEO03	Industrial Automation	OEC	3	0	0	3	3	40	60	100
32.	24EEO04	Electrical Instruments and Measurements	OEC	3	0	0	3	3	40	60	100
33.	24EEO05	Energy Conservation and Management	OEC	3	0	0	3	3	40	60	100
34.	24EEO06	Electrical Wiring, Estimation and Costing	OEC	3	0	0	3	3	40	60	100
35.	24EEO07	Fundamentals of Electrical Machinery	OEC	3	0	0	3	3	40	60	100
36.	24EEO08	Fundamentals of Electric Vehicle	OEC	3	0	0	3	3	40	60	100
ELECTRONICS AND COMMUNICATION ENGINEERING											
37.	24ECO01	Consumer Electronics	OEC	3	0	0	3	3	40	60	100
38.	24ECO02	NANO Technology	OEC	3	0	0	3	3	40	60	100
39.	24ECO03	Fundamentals of Robotics	OEC	3	0	0	3	3	40	60	100
40.	24ECO04	Principles of Communication	OEC	3	0	0	3	3	40	60	100
41.	24ECO05	Electronics and Microprocessor	OEC	3	0	0	3	3	40	60	100
INFORMATION TECHNOLOGY											
42.	24ITO01	Block chain Technologies	OEC	3	0	0	3	3	40	60	100
43.	24ITO02	Cyber security Fundamentals	OEC	3	0	0	3	3	40	60	100

44.	24ITO03	Cloud computing Techniques	OEC	3	0	0	3	3	40	60	100
45.	24ITO04	Data Science using R	OEC	3	0	0	3	3	40	60	100
46.	24ITO05	Fundamentals of Business Intelligence	OEC	3	0	0	3	3	40	60	100
MECHANICAL ENGINEERING											
47.	24MEO01	Basic Mechanical Engineering	OEC	3	0	0	3	3	40	60	100
48.	24MEO02	Solar Energy Utilization	OEC	3	0	0	3	3	40	60	100
49.	24MEO03	Selection of Materials	OEC	3	0	0	3	3	40	60	100
50.	24MEO04	Fibre Reinforced Plastics	OEC	3	0	0	3	3	40	60	100
51.	24MEO05	Rapid Prototyping	OEC	3	0	0	3	3	40	60	100
SAFETY AND FIRE ENGINEERING											
52.	24SFO01	Occupational health and hygiene	OEC	3	0	0	3	3	40	60	100
53.	24SFO02	Construction safety	OEC	3	0	0	3	3	40	60	100
54.	24SFO03	Building fire safety	OEC	3	0	0	3	3	40	60	100
55.	24SFO04	Legal aspects of safety	OEC	3	0	0	3	3	40	60	100
56.	24SFO05	Safety measures for engineers	OEC	3	0	0	3	3	40	60	100
57.											
OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENT											
1.	24BMO01	Basics of Biomedical Instrumentation	OEC	3	0	0	3	3	40	60	100
2.	24BMO02	Imaging Equipments	OEC	3	0	0	3	3	40	60	100
3.	24BMO03	Biometric systems	OEC	3	0	0	3	3	40	60	100
4.	24BMO04	Human Assist Devices	OEC	3	0	0	3	3	40	60	100
5.	24BMO05	Medical Informatics	OEC	3	0	0	3	3	40	60	100
6.	24BMO06	Medical Innovation and Entrepreneurship	OEC	3	0	0	3	3	40	60	100

Summary										
Name of the Programme: B.E Biomedical Engineering										
CATEGORY	I	II	III	IV	V	VI	VII	VIII	TOTAL CREDITS	%
HSMC	4	2	-	3	-	-	6	-	15	9.1
BSC	8	8	4	4	-	-	-	-	24	14.5
ESC	10	4	4	-	-	-	-	-	18	10.9
PCC	-	5	13	17	17	11	-	-	63	38.2
PEC	-	-	-	-	6	3	9	-	18	10.9
OEC	-	-	-	-	3	6	-	-	9	5.5
EEC	1	1	1	1	1	2	3	8	18	10.9
MC	✓	-	-	-	✓	✓	-	-	-	-
Total	23	20	22	25	27	22	18	8	165	100%

24ENT19	PROFESSIONAL COMMUNICATION	Category	L	T	P	C
		HSMC	3	0	0	3
(Common to All Branches)						
PREREQUISITE: A comprehensive understanding of basic English grammar, vocabulary, and sentence structure with familiarity in Business Communication and Technical Writing are considered as pre-requisites for the course.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To enable learners to compare and contrast the ideas/products in a technical context • To make learners to critically evaluate the written text and write report and paragraphs • To facilitate learners' problem based writing and to enable them describe the process/product • To enable learners to interpret the graphical representation in order to prepare extensive descriptions • To prepare the learners to draft effective SOP/Resume for job/internships 						
UNIT - I	UNDERSTANDING COMPARISONS AND CONTRASTS					(9)
Reading- Reading brochures (technical context), telephone messages/ social media messages relevant to technical contexts and emails. Writing- Writing emails/letters introducing oneself, - Compare and Contrast Essay. Grammar –Present Tenses, - Question types: WH /Yes or No/and Tags. Vocabulary - Synonyms; One-word substitution; Abbreviations &Acronyms (as used in technical contexts).						
UNIT - II	WRITING REPORTS AND PARAGRAPHS					(9)
Reading- Reading longer technical texts, biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs, Writing- Paragraph writing, Short Report on an event (industrial visit) Grammar –Active-Passive Voice transformations, Infinitive and Gerunds, Past Tenses -Subject-Verb Agreement; Prepositions. Vocabulary -Word formations (Prefixes &Suffixes); portmanteau words and Antonyms.						
UNIT - III	DESCRIBING THE PROCESS/PRODUCT					(9)
Reading- Advertisements, gadget reviews; user manuals, case studies, excerpts from literary texts, newsreports etc. Writing – Definitions; Instructions; Product/Process description, Checklists, Problem solution essay/Argumentative Essay. Grammar –Future Tenses; If conditional clauses. Vocabulary – Nominal Compounds, Homonyms and Homophones, Discourse Markers (connectives &sequence words).						
UNIT - IV	TRANSCODING AND RECOMMENDATIONS					(9)
Reading –Newspaper articles, Journal reports–and Nonverbal Communication (tables, pie charts etc.); Writing – Recommendations, Note-making, Transcoding Grammar –Articles; Relative pronouns, Modals Vocabulary –Collocations and phrasal verbs.						
UNIT - V	SUMMATION AND DESCRIPTION					(9)
Reading –Reading editorials; and Opinion Blogs, Company profiles, Statement of Purpose (SOP); Writing –Essay Writing(Descriptive or Narrative), Job/Internship Application–Cover letter &Resume; Grammar –Numerical adjectives, Relative Clauses, Vocabulary -Cause &Effect Expressions–Content Vs Function words.						
TOTAL: 45 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the learners will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Compare and contrast products and ideas in technical texts.											Analyse	
CO2	Interpret and comprehend the given texts and writing reports/paragraphs											Understand	
CO3	Analyze problems in order to arrive at feasible solutions and describe the product/process effectively.											Analyse	
CO4	Report events based on the Graphical representation and provide recommendations											Analyse	
CO5	Draft effective resume's for job/internships											Apply	
TEXT BOOKS:													
1 English for Engineers & Technologists, First edition, Orient Blackswan Private Ltd. Department of English, Anna University, 2020.													
2 Dr.KN. Shoba, and Dr.Lourdes Jovani, English for Science & Technology Cambridge University Press, Francis Department of English, Anna University, 2021.													
REFERENCES:													
1 Meenakshi Raman, Sangeeta Sharm, Technical Communication– Principles and Practices, Oxford University .Press, New Delhi, 2016.													
2 Lakshminarayanan, A Course Book On Technical English, Scitech Publications (India)Pvt.Ltd, 2012.													
3 Aysha Viswamohan, English For Technical Communication, McGraw Hill Education, 2008.													
4 KulbhusanKumar, RSSalaria, Effective Communication Skill, Khanna Publishing House, 2018.													
5 Dr.V.Chellammal, Learning to Communicate–Allied Publishing House, New Delhi, 2003.													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	2	3	-	3	-	-
Avg.	-	-	-	-	-	-	-	2	3	-	3	-	-
1-Low, 2-Medium, 3-High													

24EET06	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	Category	L	T	P	C
		ESC	3	0	0	3
(Common to BM, CB, CD, CE, CS, IO, IT, ME, SF)						
PREREQUISITE: Knowledge of mathematics, particularly differential equations, trigonometry, and basic calculus are required. A solid foundation in physics, especially in areas like electromagnetism and mechanics, is also important. Basic problem-solving skills are essential, as it helps to analyze circuits and understand electronic components.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To understand the basic definitions and principles governing DC and AC circuits. • To gain knowledge of the construction, working principles, and applications of DC machines, induction motors, and transformers. • To recognize the classification of wiring systems, earthing techniques, and the functioning of UPS systems. • To realize the operation and characteristics of semiconductor devices and their applications. • To impart the fundamentals of digital logic circuits and Arduino components. 						
UNIT - I	DC AND AC CIRCUITS	(9)				
<p>DC circuits: Electrical quantities – Ohm's law – Kirchoff's current and voltage laws – Series and parallel resistors – Simple problems.</p> <p>AC circuits: Waveforms, average value, RMS value, form factor, peak factor, power and power factor – Pure R, L and C – Series RL and RC circuits.</p>						
UNIT - II	ELECTRICAL MACHINES	(9)				
DC machine: construction, working principle and applications – Single phase induction motor: Capacitor start capacitor run induction motor – Three phase induction motor: construction and working principle – Single phase transformer: construction and working principle.						
UNIT - III	ELECTRICAL INSTALLATIONS	(9)				
Classification of wiring system – Earthing – Types: pipe earthing, plate earthing, strip earthing – On-line and Off-line UPS – Lamps: Fluorescent tube, LED.						
UNIT - IV	ANALOG ELECTRONICS	(9)				
PN junction diode and Zener diode: Principle of operation and V-I characteristics – Half and full wave rectifier– Bipolar Junction Transistor: Construction and working.						
UNIT - V	DIGITAL ELECTRONICS	(9)				
Digital logic gates: NOT, AND, OR, NAND, NOR, EXOR – Digital circuits: half-adder, full-adder, JK and D flip flop – Introduction to Arduino components and IDE.						
TOTAL : 45 PERIODS						

COURSE OUTCOMES:														
At the end of the course, the students will be able to:														
COs	Course Outcome												Cognitive Level	
CO1	Interpret the fundamental concepts of electrical circuits to solve the DC and AC circuit problems.												Understand	
CO2	Elaborate the construction and working principles of DC machines, induction motors and transformers.												Understand	
CO3	Describe the wiring systems, earthing techniques and the functionality of UPS and lighting systems.												Understand	
CO4	Identify the operation and characteristics of PN junction, Zener diode and BJT.												Understand	
CO5	Illustrate the functionality of digital logic gates, adders, flip-flops and Arduino components.												Understand	
TEXT BOOKS:														
1. Kothari D.P and Nagrath I.J, “Basic Electrical and Electronics Engineering”, Second Edition, McGraw Hill, Uttar Pradesh, 2020.														
2. Bhattacharya S.K, “Basic Electrical and Electronics Engineering”, Pearson Education, Delhi, Second Edition, 2017.														
REFERENCES:														
1. Jain V.K, Amitabh Bajaj, “Design of Electrical installation”, University Science Press, New Delhi, 2016.														
2. Ramamoorthy M, Chandra Sekhar O, “Electrical Machines”, PHI Learning Pvt. Ltd, Delhi, 2018.														
3. Christopher Siu, “Electronic Devices, Circuits, and Applications”, Springer International Publishing, 2022.														
4. Kothari D.P, Dhillon J.S, “Digital Circuits & Design”, First Edition, Pearson, Delhi, 2015.														
Mapping of COs with POs and PSOs														
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	2	-	-
Avg.	3	3	2	-	-	-	-	-	-	-	-	2	-	-
1-Low, 2-Medium, 3-High														

24ITT16	PROGRAMMING FOR PROBLEM SOLVING	Category	L	T	P	C
		ESC	3	0	0	3
(Common to AUTO, BME, CSE, CS, CSD, IOT, IT, ECE, EEE. MECH)						
PREREQUISITE: Students must have basic computer literacy, including familiarity with operating systems, file management, and software usage. A Basic understanding of algorithms and flowcharts are required to design and visualize problem-solving strategies. Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.						
OBJECTIVES: <ul style="list-style-type: none"> • To acquire knowledge on hardware, software and computer languages. • To recall and implement the fundamentals concepts in C program. • To assimilate Arrays and Functions. • To get insight on Strings and Pointers. • To explore the importance of Structures and Files. 						
UNIT - I	INTRODUCTION TO COMPUTING AND C					(9)
Introduction to Computing: Organization of computer – hardware and software – number system and conversions – representation of an algorithm: pseudo code, flowchart with examples. Introduction to C – features of C – structure of C program – character set – C tokens – keywords – identifiers – constants – variables – data types – operators – precedence and associativity.						
UNIT - II	CONTROL STRUCTURES					(9)
Decision Making and Branching: Introduction – decision making with if statement – simple if statement – if-else statement – nested if-else statements – if-else-if ladder statement – switch statement – goto statement – conditional operator – decision making and looping: introduction – while statement – do-while statement – for statement.						
UNIT - III	FUNCTIONS AND ARRAY					(9)
Functions: Declaration and definition – function prototype – parameter and arguments – return type – passing argument by value and by reference – function scope and lifetime – function pointer – arrays: array declaration and initialization – one dimensional array and two dimensional array with example.						
UNIT - IV	POINTERS AND STRINGS					(9)
Pointers: Definition – initialization – pointers arithmetic – pointers to pointers – pointers and arrays. String: Declaring and initializing string variables – string handling functions and operations.						
UNIT - V	STRUCTURE, UNION AND FILE					(9)
Structures: Declaration – definition – structure Within structure – union – storage classes – preprocessor directives – Files: Defining and opening file – closing file – input/output operations on files – command line arguments.						
TOTAL: 45 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the learners will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Identify and describe the fundamental components of computer systems and programming in C.											Understand	
CO2	Infer the concepts of basic structures in control statements.											Understand	
CO3	Imbibe the concepts of arrays and functions to effectively manage and process data in programming.											Understand	
CO4	Utilize pointers to handle memory and work with strings to manage text in their programs.											Apply	
CO5	Infer structures and unions to group different types of data and perform file operations to save and load data.											Apply	
TEXT BOOKS:													
1. Herbert Schildt, C - The Complete Reference, Tata McGraw-Hill, New Delhi, Fourth Edition, 2017. 2. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, 2011.													
REFERENCES:													
1. Yashavant Kanetkar, "Let Us C: Authentic guide to C programming language", BPB Publication, 19th Edition, 2022. 2. Robert C. Seacord, "Effective C", No Starch Press, 2020. 3. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019. 4. Ashok N. Kamathane, 'Computer Programming, Pearson Education, India, Third Edition, 2015. 5. https://archive.nptel.ac.in/courses/106/105/106105171/													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	3	3	1	–	–	–	–	–	–	–
CO2	3	2	2	3	3	1	–	–	–	–	–	–	–
CO3	2	3	2	2	3	1	–	–	–	–	–	–	–
CO4	3	3	2	3	2	1	–	–	–	–	–	–	–
CO5	3	2	2	2	3	1	–	–	–	–	–	–	–
Avg.	3	3	2	3	3	1	–	–	–	–	–	–	–
1-Low, 2-Medium, 3-High													

24GET19	HERITAGE OF TAMILS	Category	L	T	P	C	
		HSMC	1	0	0	1	
(Common to all branches)							
UNIT - I	LANGUAGE AND LITERATURE						(3)
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.							
UNIT - II	HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE						(3)
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.							
UNIT - III	FOLK AND MARTIAL ARTS						(3)
Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.							
UNIT - IV	THINAI CONCEPT OF TAMILS						(3)
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.							
UNIT - V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE						(3)
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.							
TOTAL : 15 PERIODS							
COURSE OUTCOMES:						Cognitive Level	
At the end of the course, the students will be able to:							
CO1	Recognize the extensive literature of Tamil and its classical nature.					Understand	
CO2	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.					Understand	
CO3	Review on folk and martial arts of Tamil people.					Understand	
CO4	Insightthinai concepts, trade and victory of Chozha dynasty.					Understand	
CO5	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.					Understand	
TEXT BOOKS :							
1. Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)							
2. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)							
REFERENCES :							
1. Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).							
2. The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Published by International Institute of Tamil Studies).							
3. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)							
4. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)							

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-
1-Low, 2-Medium, 3-High													

24GET19	தமிழர் மரபு	Category	L	T	P	C
		HSMC	1	0	0	1
(அனைத்து துறைகளுக்கும் பொதுவானது)						
அலகு - I	மொழி மற்றும் இலக்கியம்					(03)
இந்திய மொழிக் குடும்பங்கள் - திராவிடமொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலயக்கிகியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்காப்பியங்கள், தமிழகத்தில் சமணபௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.						
அலகு - II	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை					(03)
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண்சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனியில் திருவள்ளுவர் சிலை - இசைக்ருவிகள் - மிருதங்கம், பறை. வீணை. யாழ். நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.						
அலகு - III	நாட்டுப் புறக்கலைகள் மற்றும் வீரவிளையாட்டுக்கள்					(03)
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஓயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.						
அலகு - IV	தமிழர்களின் திணைக் கோட்பாடுகள்					(03)
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்கஇலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள்-தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்கக்காலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.						
அலகு - V	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு					(03)
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிற்பகுதிகளில் தமிழ்பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு கல்வெட்டுகள் கையெழுத்துப்படிசுள் - தமிழ்ப் புத்தகங்கள்களின் அச்சுவரலாறு.						
Total : 15 Periods						
பாடம் கற்றத்தின் விளைவுகள் : பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு மாணவர்களால் முடியும் விளைவுகள்						அறிவாற்றல் நிலை
CO1	தமிழ் மொழியின் செந்தன்மை மற்றும் இலக்கியம் குறித்த தெரிதல்					புரிதல்
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு					புரிதல்
CO3	தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீர விளையாட்டுகள் குறித்த தெளிவு					புரிதல்
CO4	தமிழர்களின் திணைக்கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.					புரிதல்
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்தமருத்தவம் பற்றிய புரிதல்.					புரிதல்
Text Books :						
1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே.பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்), <u>உலகத் தமிழாராய்ச்சி நிறுவனம்</u> , சென்னை, 2002						
2. கணினித்தமிழ் - முனைவர் இல.சுந்தரம், விகடன் பிரசுரம், 2016						
Reference Books :						
1. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்லியல் துறை வெளியீடு)						
2. பொருளை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)						
3. Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL - (in print)						
4. Social Life of the Tamils - The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).						

24MAI19	MATRICES AND CALCULUS	Category	L	T	P	C
		BSC	2	1	2	4
(Common to All Branches)						
PREREQUISITE: The students must have the knowledge on the basic concepts of Matrices and its applications, differential equations, differentiation, integration, partial derivatives and vector algebra and basic computer knowledge.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To understand the concepts of eigen values, eigenvectors and quadratic forms. • To familiarize students how to solve the higher-order linear differential equations. • To develop the skill on the geometric properties of curves using differential calculus. • To equip students to analyze and optimize the functions of several variables. • To apply vector calculus and its principles to evaluate vector fields. 						
UNIT - I	LINEAR ALGEBRA	(9)				
Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (Excluding proof) – Cayley Hamilton theorem (excluding proof) – Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.						
UNIT - II	ORDINARY DIFFERENTIAL EQUATIONS	(9)				
Linear differential equations of second and higher order with constant coefficients – Differential equations with variable coefficients – Cauchy’s and Legendre’s linear equations – Method of variation of parameters.						
UNIT - III	DIFFERENTIAL CALCULUS	(9)				
Curvature - Radius of curvature (Cartesian co-ordinates only) – Centre of curvature and Circle of curvature – Involutives and Evolutes (Parabola, Ellipse, Hyperbola and Rectangular hyperbola).						
UNIT - IV	FUNCTIONS OF SEVERAL VARIABLES	(9)				
Partial derivatives – Euler’s theorem for homogenous functions – Taylor’s series expansion - Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.						
UNIT - V	VECTOR CALCULUS	(9)				
Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Green’s theorem in plane, Gauss divergence theorem and Stoke’s theorem (Cube, Cuboid and Rectangular Parallelepiped only).						
LIST OF EXERCISE/EXPERIMENTS(MATLAB):						
<ol style="list-style-type: none"> 1. Calculate the characteristic equation and eigen values 2. Find the eigenvector and diagonalization of a given matrix. 3. Solving ODE with constant coefficients 4. Detect the solution of ODE with variable coefficients 5. Identify the radius of curvature 6. Establish the evolutes of curve. 7. Reckon the Taylor’s series for functions of two variables. 8. Compute the maxima and minima. 9. Estimate the directional derivative, divergence and curl. 10. Determine line integral, surface integral and volume integral. 						
LECTURE: 45 LABORATORY: 30 TOTAL: 75 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the students will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Assimilate the eigen values and eigen vectors in reduction of quadratic form into canonical form.											Apply	
CO2	Solve higher-order linear differential equations with constant and variable coefficients.											Understand	
CO3	Analyse the center of curvature, circle of curvature and develop the evolutes.											Understand	
CO4	Expand the Taylor series and calculate the extremum value for function of several variables.											Apply	
CO5	Apply the divergence and curl in vector integral theorems of vector fields.											Apply	
TEXT BOOKS:													
1. Ravish R Singh and Mukul Bhatt, "Engineering Mathematics – I", Mc-Graw Hill Publications, New Delhi, 2 nd Edition, 2020.													
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40 th Edition, 2020.													
REFERENCES:													
1. Bali N. P and Manish Goyal, "Engineering Mathematics", Laxmi Publications Pvt Ltd., 7 th Edition, 2020.													
2. Dass H.K, "Advance Engineering Mathematics", S. Chand and company, 11 th Edition, 2014.													
3. Jain R.K. and Iyengar S.R.K," Advanced Engineering Mathematics", NarosaPublications, 8 th Edition, 2012.													
4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, New Delhi, 10 th Edition 2016.													
5. https://archive.nptel.ac.in/courses/111/108/111108157/													
6. https://archive.nptel.ac.in/courses/111/105/111105122/													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO111	PSO1	PSO2
CO1	3	3	3	3	2	1	-	-	-	-	1	-	-
CO2	3	3	3	3	2	1	-	-	-	-	1	-	-
CO3	3	3	3	3	2	1	-	-	-	-	1	-	-
CO4	3	3	3	3	2	1	-	-	-	-	1	-	-
CO5	3	3	3	3	2	1	-	-	-	-	1	-	-
Avg.	3	3	3	3	2	1	-	-	-	-	1	-	-
1-Low, 2-Medium, 3-High													

24PHI07	ENGINEERING PHYSICS	Category	L	T	P	C
		BSC	3	0	2	4
(Common to BME, CSE, CSD, CSE(IoT), CS, ECE, EEE & IT)						
PREREQUISITE: The students must have knowledge about basic concepts of light sources, dual nature of radiation, conductivity of metals and semiconducting materials, different types of magnetic materials, superconducting materials and their applications.						
OBJECTIVES: <ul style="list-style-type: none"> • To enrich with widen knowledge on laser and fibre technology. • To explore the basic concepts of quantum mechanics. • To emphasis the properties of conducting materials. • To comprehend the fundamental concepts of semiconducting material to impart it for device fabrication. • To formalize the different types of magnetic material and its applications in the field of engineering. 						
UNIT – I	LASER AND FIBRE OPTICS	(9)				
<p>Lasers: Principles of spontaneous emission and stimulated emission - Einstein's co-efficients A & B – population inversion – molecular beam laser (CO₂) – homo – junction & hetero – junction semiconductor lasers (qualitative analysis only)– applications.</p> <p>Fibre Optics: propagation of light in optical fibre– numerical aperture and acceptance angle – types of optical fibre (materials, refractive index profile, and modes of propagation) – applications - fibre optic sensors: pressure and displacement sensors.</p>						
UNIT – II	QUANTUM MECHANICS	(9)				
Introduction – black body radiation– Planck's theory (derivation) – deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory, Compton effect– de-Broglie's concept of matter waves – physical significance of a wave function – Schrödinger wave equations (Time dependent & time independent) – particle in a box (one dimensional).						
UNIT – III	CONDUCTING MATERIALS	(9)				
Classical free electron theory – expression for electrical conductivity – thermal conductivity – Wiedemann-Franz law – drawbacks of classical free electron theory – quantum theory – Fermi energy – Fermi -Dirac distribution function – density of states and carrier concentration of metals.						
UNIT – IV	SEMICONDUCTING MATERIALS	(9)				
Introduction – Intrinsic semiconductor: carrier concentration in an intrinsic semiconductor– Fermi level of an intrinsic semiconductor– variation of Fermi energy level with temperature – Extrinsic semiconductors: carrier concentration in n– type and p-type semiconductors – Fermi level of extrinsic semiconductors– variation of Fermi energy level with temperature in an extrinsic semiconductor– Hall effect.– determination of Hall co-efficient for n– and p– type semiconductors– applications.						
UNIT – V	MAGNETIC AND SUPERCONDUCTING MATERIALS	(9)				
<p>Magnetic Materials: Introduction – origin of magnetic moment – dia, para and ferromagnetic materials– domain theory of ferro-magnetism – Hysteresis – soft and hard magnetic materials.</p> <p>Superconducting Materials: Introduction to superconductivity – properties and types of superconductor – application of superconductors: magnetic levitation– SQUIDS– cryotron.</p>						

LIST OF EXERCISES/EXPERIMENTS:

1. By forming interference fringes, determine the width of one fringe and hence calculate the thickness of the given thin paper.
2. For a given optical fibre determine the acceptance angle and numerical aperture.
3. Evaluate the wave length of semiconductor laser.
4. Using semiconductor laser find the particle size of the lycopodium powder
5. Construct Carey Foster's bridge to measure the resistivity of an unknown wire.
6. Enumerate the thermal conductivity of a bad conductor by Lee's disc method.
7. Compute the band gap of an intrinsic semiconductor.
8. Draw the V-I characteristics of a solar cell and calculate its power.
9. By forming B-H curve calculate Hysteresis loss of magnetic materials.
10. Employing semiconductor laser compute the width of the groove of CD.

LECTURE: 45 LABORATORY:30 TOTAL: 75 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive level
CO1	Categorize the types of laser and optical fibre to utilize it for specific application based on their desirable requisite.	Analyze
CO2	Enumerate the preambles of quantum mechanics and implement its concepts to tackle the cumbersome engineering problems.	Apply
CO3	Comprehend the basics of conducting materials based on classical and quantum theories.	Understand
CO4	Apply the perceived preambles of semiconductor to fabricate it for the potential applications	Analyze
CO5	Imbibe the concepts of magnetic and superconducting phenomenon that can be applied for possible technological and engineering applications.	Apply

TEXT BOOKS :

- 1 M.N. Avadhanulu and P.G. Kshirsagar, "A text book of Engineering Physics", S. Chand and Company, New Delhi, 11th Edition, 2018.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics", Dhanpat Rai Publication, New Delhi, 7th Edition, 2014.

REFERENCES:

1. V. Rajendran, "Engineering Physics", Tata McGraw-Hill, New Delhi, 1st edition, 2011.
2. R. Murugesan and KiruthigaSivaprasath, "Modern Physics", S. Chand & Company, New Delhi, 7th Edition, 2014.
3. Charles Kittel, "Introduction to Solid State Physics", John Wiley & Sons, India, 7th Edition, 2008.
4. ArthurBeiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw- Hill, New Delhi, 7th Edition, 2015.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	1	-	-	-	-	1	-	-
CO2	3	3	3	3	2	1	-	-	-	-	1	-	-
CO3	3	3	3	3	2	1	-	-	-	-	1	-	-
CO4	3	3	3	3	2	1	-	-	-	-	1	-	-
CO5	3	3	3	3	2	1	-	-	-	-	1	-	-
Avg.	3	3	3	3	2	1	-	-	-	-	1	-	-

1-Low, 2-Medium, 3-High

24ITP16	PROGRAMMING FOR PROBLEM SOLVING LABORATORY	Category	L	T	P	C
		ESC	0	0	2	1
(Common to AUTO, BME, CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE, MECH)						
PREREQUISITE: Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.						
OBJECTIVES: <ul style="list-style-type: none"> • To learn the basic of MS word, Excel, Power Point presentation and MS Access. • To articulate how to develop a program with a desired runtime execution flow. • To develop computer programs using C basics concepts. • To get familiarity on functions, strings and pointers. • To acquire and apply the file manipulation 						
LIST OF EXPERIMENTS: <ol style="list-style-type: none"> 1. Prepare a Bio-data using MS Word with appropriate page, text and table formatting options and send the same to too many recipients using mail merge. 2. Prepare a mark sheet with five subjects for five students in MS Excel File using Formulas, Functions and charts. 3. i) Prepare a Power Point presentation for your organization with varying animation effects using timer. ii) Prepare a Student Database in MS Access, manipulate the data and generate report. 4. Programs using I/O statements and expressions. 5. Design an algorithm and flowchart with example. 6. Programs using decision-making constructs: if-else, goto, switch-case, break-continue. 7. Loops: for, while, do-while. 8. Arrays: 1D and 2D 9. Strings: operations 10. Functions: passing parameters by (value, reference), Recursion 11. Pointers and structures 12. File operations. 						
TOTAL: 30 PERIODS						
COURSE OUTCOMES: At the end of the course, the students will be able to:						
COs	Course Outcome					Cognitive Level
CO1	Interpret the basic concept of MS word, Excel, Power Point presentation and MS Access and C programming.					Apply
CO2	Develop the program using the concept of control statements.					Apply
CO3	Demonstrate the use of functions and arrays in Programming.					Apply
CO4	Apply the concepts of pointers and structures.					Apply
CO5	Develop the program using the file and string operations.					Apply

REFERENCES:

1. Jeff Szuha, "Learn C Programming", Packt Publishing, United Kingdom, Second Edition, 2022.
2. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	3	3	1	–	–	–	–	–	–	–
CO2	3	3	2	3	3	1	–	–	–	–	–	–	–
CO3	3	3	2	2	3	1	–	–	–	–	–	–	–
CO4	3	3	2	3	3	1	–	–	–	–	–	–	–
CO5	3	3	2	2	3	1	–	–	–	–	–	–	–
Avg.	3	3	2	3	3	1	–	–	–	–	–	–	–

1-Low, 2-Medium, 3-High

24MEP16	ENGINEERING GRAPHICS LABORATORY					Category	L	T	P	C				
						ESC	1	0	2	2				
(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE)														
PREREQUISITE: Engineering Graphics Laboratory requires a good understanding of geometry and algebra. This includes knowledge of shapes, angles, dimensions, and spatial reasoning. Knowing the conventions and standards used in engineering drawings, such as line types, symbols, and dimensions, is important. Experience with freehand sketching and understanding of drawing tools and techniques can be advantageous. The ability to visualize and interpret three-dimensional objects from two-dimensional drawings is crucial.														
OBJECTIVES: <ul style="list-style-type: none"> • To study the drawing tools, commands and draw the two dimensional drawings in the CAD software. • To perceive the orthographic views and draw the projections in the CAD software. • To acquire the knowledge to observe the sectional views and develop the lateral surfaces of the simple solids. • To sketch the isometric projections of simple solids. • To avail the drafts of the 3D models using drafting tools. 														
LIST OF EXERCISE/EXPERIMENTS: <ol style="list-style-type: none"> 1. Study of drawing tools, commands and coordinate systems in 2D software. 2. Cycloid and Conic curves. 3. Orthographic projections of pictorial views. 4. Orthographic views of straight lines. 5. Orthographic views of planes. 6. Orthographic views of simple solids. 7. The sectional view and the true shape of simple solids. 8. Development of lateral surfaces of simple solids. 9. Isometric projection of simple solids. 10. Drafting the 2D multi-view drawings from 3D model. 														
TOTAL: 30 PERIODS														
COURSE OUTCOMES: At the end of the course, the students will be able to:														
COs	Course Outcome										Cognitive Level			
CO1	Recall the drawing tools and commands and produce two dimensional objects in CAD software.										Remember			
CO2	Obtain the orthographic views using CAD software.										Understand			
CO3	Attain sectional views and develop the lateral surfaces of simple solids.										Understand			
CO4	Portray the isometric projection of simple solids.										Understand			
CO5	Acquire drafts of 3D model.										Apply			
REFERENCES: <ol style="list-style-type: none"> 1. Bhatt. N. D., Engineering Drawing, Charotar Publishing House, Fifty Third Edition, 2014. 2. Basant Agarwal and Agarwal. C. M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, 2018. 														
Mapping of COs with POs and PSOs														
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	-	2	-	1	-	-
CO2	3	-	-	-	3	-	-	-	-	2	-	1	-	-
CO3	3	-	-	-	3	-	-	-	-	2	-	1	-	-
CO4	3	-	-	-	3	-	-	-	-	2	-	1	-	-
CO5	3	-	-	-	3	-	-	-	-	2	-	1	-	-
Avg.	3	-	-	-	3	-	-	-	-	2	-	1	-	-
1-Low, 2-Medium, 3-High														

24GEP16	ENGINEERING EXPERIENCE LABORATORY	Category	L	T	P	C
		ESC	0	0	2	1
(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), ECE, EEE, IT)						
<p>PREREQUISITE: Students must have a basic knowledge of electrical components like switches, wires, fuses, and light bulbs along with different wire types and their purposes. A basic understanding of engineering principles, such as physics, electrical and mechanical engineering, is also essential.</p>						
<p>OBJECTIVES:</p> <ul style="list-style-type: none"> • To gain practical experience in wiring circuits, including the installation of switches, outlets, lighting fixtures, and other electrical components. • To acquire the relationship between voltage, current, power, and energy in single-phase systems. • To demonstrate the application of Internet of Things (IoT) concepts by integrating sensors, actuators, and communication modules to create connected systems and devices. • To explicate the function and operation of different types of sensors and how they interface with the Arduino to collect and process data for controlling circuits. • To acquire the fundamental components and functions of plumbing systems, including pipes, valves, fittings, and fixtures, and how they are integrated into engineering practices and applications. 						
LIST OF EXPERIMENTS:						
GROUP - A (ELECTRICAL)						
<ol style="list-style-type: none"> 1. Fluorescent lamp wiring. 2. Stair-case wiring. 3. Residential house wiring using switches, fuse, indicator and lamp. 4. Measurement of Energy in single phase system. 						
GROUP - B (ELECTRONICS)						
<ol style="list-style-type: none"> 1. Study of Electronic Components, Instruments, Internet of Things (IOT) and Arduino IDE. 2. Controlling the Light Emitting Diode (LED) with a push button Using Arduino. 3. Interfacing of a Sensor (Ultrasonic, Rain, Voltage, Current & PIR) with Arduino Uno. 4. Controlling of LED through Wi-Fi using ESP8266. 						
GROUP - C (MECHANICAL)						
<ol style="list-style-type: none"> 1. Study of plumbing line sketches for water supply and carpentry tools. 2. Study of welding tools and centrifugal pump. 						
TOTAL: 30 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the students will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Construct different types of wiring used in residential houses.											Apply	
CO2	Measure the energy in a single-phase system.											Apply	
CO3	Demonstrate different electronic components, instruments, IoT and Arduino IDE.											Apply	
CO4	Construct the control circuit with the help of Arduino and sensors.											Apply	
CO5	Describe the plumbing, carpentry, welding components and centrifugal pump works for engineering practices and applications.											Understand	
REFERENCES:													
<ol style="list-style-type: none"> Gupta J.P., "A Course in Electrical Installation Estimating and Costing", S.K. Kataria and Sons, Delhi, Reprint 2013 Edition, 2013. Mike Cheich, "Arduino Book for Beginners", Programming Electronics Academy, 2021. 													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	2	2	3	2	-	3	-	-
CO2	3	3	2	-	-	2	2	3	2	-	3	-	-
CO3	3	3	3	3	-	-	2	3	2	-	3	-	-
CO4	3	3	3	3	-	-	2	3	2	-	3	-	-
CO5	3	3	3	-	-	-	2	3	2	-	3	-	-
Avg.	3	3	3	1	-	1	2	3	2	-	3	-	-
1 - Low, 2 - Medium, 3 – High													

24SSP19	APTITUDE AND CODING SKILLS – I	Category	L	T	P	C
		EEC	0	0	2	1
(Common to All Branches)						
OBJECTIVES:						
<ul style="list-style-type: none"> • To introduce the students about Aptitude • To expose to the Needs of Aptitude and its importance • To develop proficiency in verbal reasoning for improved problem-solving ideas. • To develop a strong foundation in English grammar. • To introduce advanced topics including pointers, user-defined data types, and memory management. 						
UNIT - I	BASIC OF NUMBER SYSTEMS & FOUNDATION					(6)
Introduction to Number System and its Classification - Divisibility Rules and Problems –Place Value & Face Value - HCF & LCM and its properties.						
UNIT - II	BASICS OF SHARE BASED CONCEPTS					(6)
Introduction to Average –Basics of Ratio and proportion – Basics of Partnership–Introduction to Percentage						
UNIT - III	LOGICAL REASONING					(4)
Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Direction and distance						
UNIT - IV	VERBAL ABILITY					(7)
Introduction to Grammar – Tenses – Parts of Speech – Preposition – Articles – Modal Verbs						
UNIT - V	C PROGRAMMING					(7)
C Basics-Control Statements Decision making – Functions – Arrays & Strings – Pointers - User Defined Data Types - Storage Classes - Memory Management - Preprocessor.						
TOTAL: 30 PERIODS						
COURSE OUTCOMES:						
At the end of the course, the students will be able to:						
COs	Course Outcome					Cognitive Level
CO1	Develop problem-solving skills and identify optimal solutions efficiently.					Understanding
CO2	Solve problems on quantitative aptitude					Applying
CO3	Resolve problems with logical reasoning					Applying
CO4	Develop proficiency in verbal and communication for improved and effective articulation of ideas.					Applying
CO5	Implement C coding with appropriate data structures and pointers.					Applying
TEXT BOOKS:						
<ol style="list-style-type: none"> 1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations. 2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning 3. Wren & Martin, High School English Grammar & Composition 4. Brian W. Kernighan and Dennis Ritchie, The C Programming Language 2e, Pearson Education, 2015. 5. Yashavant Kanetkar, The C Programming Language 2e, BPB publications,15th Edition, 2016 						

REFERENCES:

1. <https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm>
2. Stephen G. Kochana, Programming in C, 3rd Edition.
3. K. N. King, C Programming: A Modern Approach, 2e, 2008.
4. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education India, 1990.
5. Robert L. Kruse and Bruce P. Leung, Data Structures and Program Design in C, Pearson Education 2007.
6. <https://www.geeksforgeeks.org/c-programming-language/>
7. <https://www.geeksforgeeks.org/data-structures/>

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	-	3	3	-	3	1	-	3	-	-
CO2	3	3	3	-	3	3	-	3	1	-	3	-	-
CO3	3	3	3	-	3	3	-	3	3	-	3	-	-
CO4	-	-	-	-	3	3	-	3	3	-	3	-	-
CO5	3	3	3	-	3	3	-	3	2	-	3	-	-
Avg.	2.4	2.4	2.4	-	3	3	-	3	2	-	3	-	-

1 - Low, 2 - Medium, 3 – High

24CST29	PYTHON PROGRAMMING	Category	L	T	P	C
		ESC	3	0	0	3
(Common to All Branches)						
PREREQUISITE:						
A basic understanding of programming principles such as variables and loops, paired with good problem-solving abilities, is required. Logical thinking and analytical skills are critical for effective programming.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To introduce the fundamental concepts of Python programming, including variables, control structures and functions. • To teach string manipulation, data structures, and exception handling in Python. • To establish a solid understanding of object-oriented programming in Python, covering inheritance, polymorphism, and operator overloading. • To enable students to perform file operations and manage databases using Python. • To introduce web programming and GUI development in Python using Django and Tkinter frameworks. 						
UNIT – I	FUNDAMENTALS OF PYTHON					(9)
Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – Indentation– I/O function –Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.						
UNIT – II	HANDLING STRINGS AND EXCEPTIONS					(9)
Strings – List – Tuples – Dictionaries– Sets – Exception Handling: Built-in Exceptions – User-defined exception– Modules and Packages.						
UNIT – III	OBJECT ORIENTED PROGRAMMING CONCEPTS					(9)
Object Oriented Programming basics –Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling –Duck Typing – Relationships.						
UNIT–IV	FILES AND DATA BASES					(9)
File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using MySQL.						
UNIT – V	WEBPROGRAMINGAND GUI USING PYTHON					(9)
Frameworks: Introduction to Django – Django CRUD– Socket Programming– Sending email –UI design: Tkinter – Events– CGI: Introduction to CGI Programming, GET and POST Methods.						
TOTAL: 45 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the students will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Infer Python syntax to write code, using data types, operators, loops and conditionals.											Understand	
CO2	Interpret string manipulation, data structures and exception handling to build robust applications.											Understand	
CO3	Implement object-oriented programming principles, such as inheritance and polymorphism, to design effective solutions.											Apply	
CO4	Make use of file I/O operations and database management techniques to manage and manipulate data efficiently.											Apply	
CO5	Develop web applications and graphical user interfaces using Python frameworks and libraries											Apply	
TEXT BOOKS:													
1.YashwantKanetkar, Aditya Kanetkar, “Let Us Python”, BPB Publications, 5th Edition ,2023													
2. Wesley J.Chun, “Core Python Programming”, Pearson Education, 2nd Edition, 2017													
REFERENCES:													
1. Robert Oliver, “Python Quick Start Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications”, Clyde Bank Media LLC,1st Edition, 2023													
2. Allen B. Downey, “Think Python”, O'Reilly Media, 2nd Edition, 2016.													
3. David Beazley, Brian K. Jones, “Python Cookbook”, O'Reilly Media, 3rd Edition, 2013													
4. Mark Lutz, “Python Pocket Reference”, O'Reilly Media,5th Edition, 2014													
5. www.python.org													
6. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	1	-	-	1	-	-	3	-	-
CO2	3	3	3	2	2	-	-	1	-	-	3	-	-
CO3	3	3	3	2	2	-	-	1	-	-	3	-	-
CO4	3	3	3	3	2	-	-	1	-	-	2	-	-
CO5	3	3	3	3	2	-	-	1	-	-	2	-	-
Avg.	3	3	3	2	2	-	-	1	-	-	3	-	-
1-Low, 2-Medium, 3-High													

24ECT21	DESIGN THINKING	Category	L	T	P	C
		PCC	2	0	0	2
PRE-REQUISITE: Students are expected to have an empathetic mindset to help them understand users, a curious mindset to explore and questions assumptions, a collaborative mindset for interdisciplinary teamwork, an iterative approach for refining ideas and creativity to generate innovative solutions						
OBJECTIVES: <ul style="list-style-type: none"> • Learn Design Thinking concepts and principles • Understand the importance of the Design Mind • Use Design Thinking methods in every stage of problem solving • Learn the different phases of Design Thinking • Learn and apply various Design Thinking tools 						
UNIT - I	FUNDAMENTALS OF DESIGN THINKING	(6)				
What is Design Thinking? - When to use Design Thinking? - How to do it? - Who are involved in this? – Design The Thinking™ – Personal Visualization, The Wheel of Life & Balancing Priorities – Appreciating ‘Design’ – The 3 Laws of Design Thinking						
UNIT - II	STEP 1: THE ‘FEEL’ STAGE	(6)				
What is this stage about? – What role does a Design Thinker play in this stage? Tools – What is the purpose in this stage? – Persona – Journey Mapping – Stakeholder Mapping & CATWOE Analysis - Cartographic Perspective (L0) – Empathy Map – Case Study: Understanding the Stakeholders						
UNIT - III	STEP 2: THE ‘DEFINE’ STAGE	(6)				
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Five-Whys – Anti-Pattern – Paraphrasing the Problem – Challenge Mapping – LORD: Definitive skill set for a Design Thinker – Case Study: Relooking at the Problem						
UNIT - IV	STEP 3: THE ‘DIVERGENCE’ & ‘CONVERGENCE’ STAGE	(6)				
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Brainstorming – Metaphor – Random Association Technique – End-State Visualization - 10gm-100gm-1000gm – Prototyping – Wire framing for digital products – Case Study: Prototyping and Communicating for Effective Outcome						
UNIT - V	STEP 5: THE ‘COMMUNICATION’ STAGE	(6)				
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – The 4Cs Framework – Naming – Packaging – Story boarding – Presentation – Distribution						
TOTAL: 30 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the students will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Demonstrate an understanding of Design Thinking concepts and principles by explaining their relevance in real-world contexts.											Understanding	
CO2	Articulate the significance of a Design Mindset and its impact on creative problem-solving.											Understanding	
CO3	Apply Design Thinking methods effectively at each stage of the problem-solving process.											Applying	
CO4	Identify and implement the phases of Design Thinking to address complex challenges systematically.											Applying	
CO5	Use a variety of Design Thinking tools to develop innovative solutions and refine ideas through iteration.											Applying	
TEXT BOOKS:													
<ol style="list-style-type: none"> 1. UnMukt – The Science & Art of Design Thinking, Arun Jain 2. Don Norman ,The Design of Everyday Things, MIT Press, 2013 3. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and inspires innovation, Harper Collins Publishers Ltd, New York, First Edition, 2009. 													
REFERENCES:													
<ol style="list-style-type: none"> 1. Chrisitan Mueller-Roterberg, Handbook of Design Thinking – Tips & Tools for how to design thinking, kindle Direct Publishing, First Edition, 2018. 2. Johnny Schneider, Understanding Design Thinking, Lean and Agile, O’Reilly Media, California, First Edition, 2017 3. Roger Martin, The Design of Business, Why Design Thinking is the next competitive advantage, Harvard Business Press, United States, First Edition, 2009. 4. Idris Mootee, Design Thinking for Strategic Innovation, John Wiley & Sons Inc, New Jersey, First Edition,2013. 													
Mapping of COs with POs and PSOs													
COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	2	2	2	3	2	3	3	-	-
CO2	3	3	2	2	2	2	2	3	2	3	3	-	-
CO3	3	3	3	3	3	2	2	3	2	3	3	-	-
CO4	3	3	3	3	3	2	2	3	2	3	3	-	-
CO5	3	3	3	3	3	2	2	3	2	3	3	-	-
Avg.	3	3	3	2.6	2.6	2	2	3	2	3	3	-	-
1-Low, 2-Medium, 3-High													

24BMT21	MEDICAL PHYSICS	Category	L	T	P	C
		PCC	3	0	0	3
<p>PREREQUISITE: Students must have a fundamental understanding of physics, chemistry and mathematics. A basic understanding of the human body and radiation's biological effects will be beneficial.</p>						
<p>OBJECTIVES:</p> <ul style="list-style-type: none"> To provide an understanding of atomic physics and accentuate the clinical applications of ionizing and non-ionizing radiations To inculcate the principles behind the senses of vision and audition. To explore the effects of radiation in matter and how isotopes and nuclides are produced. To enunciate the interaction of radiation with matter and its clinical significance. To gain more insights about radiation detection and measuring methods. 						
UNIT - I	ATOMIC PHYSICS AND IONIZING AND NON-IONIZING RADIATION	(9)				
Atomic Physics: Electronic Structure of atom, Structure of the Nucleus, Nuclear Binding energy; Ionizing radiation: Absorption, scattering and attenuation of gamma-rays, Biological effects and protection from them; Non-Ionizing radiation: Tissue as a leaky dielectric, overview of non-ionizing radiation effects, Low Frequency Effects- Higher frequency effects, Ultraviolet.						
UNIT - II	PHYSICS OF SENSES	(9)				
Introduction and objectives, Cutaneous sensation- Mechanoreceptors, Thermoreceptors, Nociceptors; Chemical senses- Gustation(taste), Olfaction(smell); Audition- Physics of sound, Normal sound levels, Anatomy and physiology of the ear, Theories of hearing, Measurement of hearing; Vision- Physics of light, Anatomy and physiology of the eye, Intensity of light, Limits of vision, Colour vision; Psychophysics- Weber and Fechner laws, Power law.						
UNIT - III	PRINCIPLES OF RADIONUCLEIDES	(9)				
Radioactive Decay: Spontaneous Emission, Isometric Transition, Gamma ray emission, alpha, beta, Positron decay, electron capture; Production of Radioisotopes: Naturally occurring radioactivity, Man-made background radiation, Induced background radiation, Neutron reactions and man-made radioisotopes, Units of activity, Isotope generators, Medical applications; Production of radionuclides: Cyclotron produced Radionuclide; Reactor produced Radionuclide-fission and neutron capture reaction, radionuclide Generator- Technetium generator.						
UNIT - IV	INTERACTION OF RADIATION WITH MATTER	(9)				
Interaction of charged particles with matter –Specific ionization, Linear energy transfer, range, Bremsstrahlung, Annihilation; Interaction of Gamma radiation with matter- Photoelectric effect, Compton Scattering , Pair production, Attenuation of Gamma Radiation; Interaction of neutron with matter and their clinical significance (Radiation Dosimetry).						
UNIT - V	PRINCIPLES OF RADIATION DETECTION AND DOSIMETERS	(9)				
Principles of Radiation Detection: Gas filled detectors, Ionization Chambers, Geiger-Muller Counters; Dose and exposure measurement, Maximum permissible levels, Measurement methods: Ionization chambers, G-Mcounters, Scintillation counters, Film dosimeters, Thermoluminescent dosimetry(TLD).						
TOTAL: 45 PERIODS						

COURSE OUTCOMES:**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Interpret the basics of atomic Physics, ionizing and non-ionizing radiations.	Understand
CO2	Classify the types of senses, vision and audition.	Understand
CO3	Apply the basic concepts of radioactivity and radionuclides in medical applications	Apply
CO4	Examine the interaction of radiation with matter and its clinical significance.	Apply
CO5	Identify the radiation exposure, dosage effects and prevention measures.	Understand

TEXT BOOKS:

1. B.H. Brown, R.H. Smallwood, D.C. Barber, P.V. Lawford, D.R. Hose, —Medical Physics and Biomedical Engineering, Institute of physics publishing, Bristol and Philadelphia, 1999.
2. Gopal B. Saha —Physics and Radiobiology of Nuclear Medicine, Fourth edition Springer, 2006.

REFERENCES:

1. W.J. Meredith and J.B. Massey “Fundamental Physics of Radiology” Varghese Publishing house, Third Edition, 2013.
2. Steve Webb, The Physics of Medical Imaging, Taylor & Francis, Newyork, Second Edition, 2012.
3. R.S. Khandpur, “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi, 2003.
4. Ervin B. Podgorsak, “Radiation Physics for Medical Physicists”, Springer International Publishing, 2018.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	1	-	1	-	-
CO3	3	3	2	-	-	-	-	-	-	1	-	1	-	-
CO4	3	3	2	-	-	-	-	-	-	1	-	1	-	-
CO5	3	3	2	-	-	-	-	-	-	1	-	1	-	-
Avg.	3	2.6	1.2	-	-	-	-	-	-	1	-	1	-	-

1-Low, 2-Medium, 3-High

24GET29	TAMILS AND TECHNOLOGY	Category	L	T	P	C
		HSMC	1	0	0	1
(Common to All Branches)						
UNIT - I	WEAVING AND CERAMIC TECHNOLOGY	(3)				
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.						
UNIT - II	DESIGN AND CONSTRUCTION TECHNOLOGY	(3)				
Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram– Sculptures and Temples of Mamallapuram– Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple) –ThirumalaiNayakar Mahal –Chetti Nadu Houses, Indo –Saracenic architecture at Madras during British Period.						
UNIT - III	MANUFACTURING TECHNOLOGY	(3)				
Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel – Copper and gold – Coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads – Terracotta beads –Shell beads/ bone beats – Archeological evidences – Gem stone types described in Silappathikaram.						
UNIT - IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	(3)				
Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.						
UNIT - V	SCIENTIFIC TAMIL & TAMIL COMPUTING	(3)				
Development of Scientific Tamil – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.						
TOTAL : 15 PERIODS						
COURSE OUTCOMES : At the end of the course, the students will be able to:						Cognitive Level
CO1	Understand the weaving and ceramic technology of ancient Tamil People nature.					Understand
CO2	Comprehend the construction technology, building materials in sangam Period and case studies.					Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence					Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.					Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.					Apply
TEXT BOOKS :						
<ol style="list-style-type: none"> Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print) Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies). 						
REFERENCES:						
<ol style="list-style-type: none"> Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies) The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished by International Institute of Tamil Studies). Keeladi – ‘Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology &Tamilnadu Text Book and Educational Services Corporation, Tamilnadu) Studies in the History of India with Special Reference to Tamilnadu (dr.K.K.Pillay) (Published by : The Author) 						

Mapping of COs with POs and PSOs														
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-	-
1-Low, 2-Medium, 3-High														

24GET29	தமிழரும் தொழில் நுட்பமும்	Category	L	T	P	C
		HSMC	1	0	0	1
(அனைத்து துறைகளுக்கும் பொதுவானது)						
அலகு - I	நெசவு மற்றும் பாணைத் தொழில்நுட்பம்					(03)
சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில் நுட்பம் கருப்பு சிவப்பு பாண்டங்கள்- பாண்டங்களில் கீறல் குறியீடுகள்						
அலகு - II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில் நுட்பம்					(03)
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்ககாலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும்- சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும்-சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் - நாயக்கர் காலக் கோயில்கள்-மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டி நாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னை இந்தோ-சாரோ செனிக் கட்டிடக் கலை.						
அலகு - III	உற்பத்தித் தொழில் நுட்பம்					(03)
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு-வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல்-மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள் - கண்ணாடி மணிகள் - சுடு மண்மணிகள்-சங்குமணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள்-சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.						
அலகு - IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்					(03)
அணை, ஏரி, குளங்கள், மதகு - சோழர் கால குமிழித்தாம்பின் முக்கியத்துவம்-கால் நடைபராமரிப்பு - கால் நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்-வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல் சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.						
அலகு - V	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்					(03)
அறிவியல் தமிழின் வளர்ச்சி - கணினித் தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின் பதிப்பு செய்தல் -தமிழ் மென் பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம்-இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.						
Total : 15 Periods						
பாடம் கற்றத்தின் விளைவுகள் : பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்						அறிவாற்றல் நிலை
CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பாணை வளைதல் தொழில் நுட்பம் குறித்து கற்றுணர்ந்தல்					புரிதல்
CO2	சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமான பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து அறிவு					புரிதல்
CO3	சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு					புரிதல்
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு					புரிதல்
CO5	நவீன அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் குறித்த புரிந்து கொள்ளலும் மற்றும் பயன்படுத்தலும்					பகுப்பாய்வு
TEXT BOOKS :						
1	தமிழக வரலாறு- மக்களும் பண்பாடும்- கே.கே.பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)					
2	கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)					

REFERENCES:

- 1 கீழடி – வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.
(தொல்லியல் துறை வெளியீடு)
- 2 பொருதை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- 3 Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by :
The Author)
- 4 Porunai Civilization (Jointly Published by: Department of Archaeology &Tamil Nadu Textbook and
Educational Services Corporation, Tamil Nadu)

24MAI29	PROBABILITY AND STATISTICS	Category	L	T	P	C
		BSC	2	1	2	4
(Common to All Branches)						
PREREQUISITE:						
The students should know the fundamental knowledge on probability, integration, measures of central tendency and dispersion, graphical representation of given data and basic computer knowledge.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To understand the basic concepts of probability and random variables. • To provide the skills on the two dimensional random variables in solving engineering problems. • To develop the skills of testing of hypothesis for small and large samples. • To introduce the basic concepts of classifications of design of experiments. • To acquire the knowledge on statistical quality control. 						
UNIT - I	ONE DIMENSIONAL RANDOM VARIABLES					(9)
One dimensional Random Variable - Discrete and continuous random Variables -Expectations - Moment generating functions and their properties - Binomial, Poisson, Uniform and Normal distributions.						
UNIT - II	TWO - DIMENSIONAL RANDOM VARIABLES					(9)
Joint distributions – Marginal and conditional distributions – Covariance – Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Regression Analysis.						
UNIT - III	TESTING OF HYPOTHESIS					(9)
One sample and two sample test for means of large samples (Z- test), One sample and two sample test for means of small samples (t-test), Chi-square - Independent of Attributes - F test for equality of variances.						
UNIT - IV	DESIGN OF EXPERIMENTS					(9)
Analysis of variance - One way and two way classifications - Completely Randomized Design - Randomized Block Design - Latin Square Design.						
UNIT - V	STATISTICAL QUALITY CONTROL					(9)
Control charts for measurements (\bar{X} and R charts) – Control charts for C and P charts – Acceptance sampling for construction of an OC curve.						
LIST OF EXERCISE/EXPERIMENTS (R SOFTWARE):						
<ol style="list-style-type: none"> 1. Determine the probability by using binomial distribution. 2. Find the probability with the help of normal distribution. 3. Determine the correlation co-efficient between X and Y. 4. Calculate and plot the regression lines. 5. Test the significance of difference between experimental and theoretical values of the data by using chi-square test. 6. Examine the small samples using F distribution. 7. Analyze the data using Randomized Block Design (RBD). 8. Inspect the data using Latin Square Design (LSD). 9. Find the \bar{X} and R charts. 10. Compute c and p charts. 						
LECTURE:45 LABORATORY:30 TOTAL: 75 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the students will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Illustrate the fundamental concepts of probability and standard distributions in real life phenomenon.											Understand	
CO2	Solve engineering problems by applying the concepts of two-dimensional random variables.											Understand	
CO3	Apply the concept of testing of hypothesis for small and large samples in mean and variance.											Apply	
CO4	Analyze the various statistical methods in Analysis of Variance.											Analyze	
CO5	Apply the quality control methods to design control charts.											Apply	
TEXT BOOKS:													
1. S.P. Gupta, “Statistical Methods”, Sulthan Chand & Sons, 46 th Edition ,2021.													
2. Milton. J. S. and Arnold. J.C., “Introduction to Probability and Statistics”, Tata McGraw Hill, 4 th edition, 2007.													
REFERENCES:													
1. Devore. J.L., “Probability and Statistics for Engineering and the Sciences”, Cengage Learning,New Delhi, 8 th Edition, 2014.													
2. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., “Schaum’s Outline of Theory and Problems of Probability and Statistics”, Tata McGraw Hill Edition, 2004.													
3. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., “Probability and Statistics for Engineers and Scientists”, Pearson Education, Asia, 9 th Edition, 2010.													
4. R.C.Gupta, “Statistical Quality Controls”, Khanna Publishers, Delhi, 8 th Edition , 2008.													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	1	-	1	-	-
CO2	3	3	3	3	2	-	-	-	1	-	1	-	-
CO3	3	3	3	3	2	-	-	-	1	-	1	-	-
CO4	3	3	3	3	2	-	-	-	1	-	1	-	-
CO5	3	3	3	3	2	-	-	-	1	-	1	-	-
Avg.	3	3	3	3	2	-	-	-	1	-	1	-	-
1-Low, 2-Medium, 3-High													

24CHI06	CHEMISTRY FOR ENGINEERS	Category	L	T	P	C
		BSC	3	0	2	4
(Common to BME, CSD, CSE, CSE(CS), CSE(IoT), ECE, EEE and IT)						
PREREQUISITE						
The students must have knowledge about basic concepts of atoms, molecules, periodical properties, chemical bonding, molecular structure, shapes of the orbitals, electro chemistry, thermodynamics, chemical kinetics, organic reactions and their applications.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To gain indepth knowledge on the water treatment methods and its industrial applications. • To acquaint the basic concepts of corrosion mechanism and its control. • To assimilate the principles and functioning of batteries, fuel cell and solar cell. • To get a deeper insight conversant with basic concepts and applications of polymers. • To impart knowledge on manufacture, properties, uses of nano materials and Composites. 						
UNIT - I	WATER TREATMENT					(9)
Hardness – types, units – estimation of hardness by EDTA method; Boiler feed water – requirements, disadvantages of using hard water in boilers – scale and sludge – priming and foaming – caustic embrittlement – boiler corrosion. Softening methods – internal conditioning – calgon, phosphate – external conditioning – zeolite process and ion exchange process; Desalination – reverse osmosis. Domestic water treatment (Sterilisation process Only).						
UNIT - II	ELECTROCHEMISTRY AND CORROSION					(9)
Introduction – electrode potential – Nernst equation – EMF series and its significance; E – Vehicles - Need - Types – Advantages and Disadvantages; Corrosion – causes, consequences – classification – chemical corrosion – electro chemical corrosion – mechanism; Galvanic & differential aeration corrosion – factors influencing corrosion – corrosion control (Sacrificial anode and Impressed Current Cathodic protection method).						
UNIT - III	ENERGY STORAGE DEVICES					(9)
Batteries – primary battery – Dry cell, secondary batteries – lead-acid and lithium-ion batteries. Fuel cells – H ₂ -O ₂ fuel cell, solar cells – principle, applications and advantages; Nuclear energy: Light water Nuclear power plant - breeder reactor.						
UNIT - IV	POLYMER CHEMISTRY					(9)
Polymer – definition – degree of polymerization – functionality. Polymerization – addition, condensation and co-polymerization – free radical mechanism of addition polymerization; Preparation properties & uses of PVC, Nylon – 6,6 & Teflon. Plastics – classification – thermosetting and thermoplastics. Fabrication of polymers – compression and Injection moulding.						
UNIT - V	NANO CHEMISTRY AND COMPOSITES					(9)
Introduction – basics of nanochemistry – distinction between nanoparticles, molecules and bulk materials - synthesis of nanomaterials [CVD, laser evaporation, pyrolysis] - applications of nanomaterials. Composite – Introduction: Definition and need for composite – Types of composite: Properties and application of FRP and MMC.						
LIST OF EXERCISE/EXPERIMENTS:						
<ol style="list-style-type: none"> 1. Estimation of total, permanent and temporary hardness of water sample By EDTA method 2. Estimation of chloride content in water by Argentometric method [Mohr's Method] 3. Conductometric titration of strong acid with strong base (HCl Vs NaOH) 4. Determination of rate of corrosion of mild steel by weight loss method 5. Estimation of dissolved oxygen in water (Winkler's Method) 6. Conductometric titration of mixture of acids (HCl & CH₃COOH) with strong base 7. Estimation of Fe²⁺ ion by potentiometric titration 8. Estimation of HCl by p^H- Metry 9. Conductometric precipitation titration using BaCl₂-Na₂SO₄ 10. Preparation of ZnO nanocrystal by precipitation method. 						
LECTURE:45 LABORATORY:30 TOTAL: 75 PERIODS						

COURSE OUTCOMES:													
At the end of the course, the students will be able to:													
COs	Course Outcome											Cognitive Level	
CO1	Assess the quality of water from quality water parameters											Understand	
CO2	Recognize the concept of corrosion and its control.											Understand	
CO3	Make use of batteries, fuel cell and solar cell for the production of electricity.											Apply	
CO4	Apply the basics concepts of polymer chemistry in designing the materials for engineering and technology.											Apply	
CO5	Identify the nano materials and composites for engineering and technology.											Apply	
TEXT BOOKS:													
1. S S. Dara and S. S. Umare, "A Text book of Engineering Chemistry", S.Chand & Co.Ltd., 12 th Edition, 2015.													
2. P.C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub. Co., 16 th Edition, 2013.													
3. Wiley, "Engineering Chemistry", Wiley India Pvt. Ltd., 2 nd Edition, 2013.													
REFERENCES:													
1. Dr. A. Ravikrishnan, "Engineering Chemistry", Srikrishna Hi-tech Publishing Company Pvt. Ltd., 21 st Edition, 2022.													
2. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, "Vogel's Text book of Quantitative Chemical Analysis", Pearson Education Pvt., Ltd., 6 th Edition, 2019.													
3. Shashi Chala, "A Text book of Engineering Chemistry", Dhanpat Rai Pub. Co., 2015.													
4. S. K. Bhasin and Sudha Rani, "Laboratory Manual of Engineering Chemistry", Dhanpat Rai Publishing Company Private Limited, 3 rd Edition, 2012.													
NPTEL LINKS:													
1. https://nptel.ac.in/courses/113101098													
2. https://nptel.ac.in/courses/113105102													
3. https://archive.nptel.ac.in/courses/104/105/104105039													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	1	-	3	1	-	-	2	-	-
CO2	3	2	2	-	1	-	3	1	-	-	2	-	-
CO3	3	2	2	-	1	-	2	1	-	-	2	-	-
CO4	3	2	2	-	1	-	2	1	-	-	2	-	-
CO5	3	2	2	-	1	-	2	1	-	-	2	-	-
Avg.	3	2	2	-	1	-	2	1	-	-	2	-	-
1-Low, 2-Medium, 3-High													

24ENP29	PROFESSIONAL COMMUNICATION LABORATORY	Category	L	T	P	C
		HSMC	0	0	2	1
(Common to All Branches)						
PREREQUISITE: Students having prior knowledge from the Professional Communication course with a solid base of LSRW skills are the prerequisites for the course.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To provide self-paced learning to consolidate their understanding of advanced grammar and vocabulary Methods • To equip the students with the required LSRW skills to handle advanced communication situations in English • To make learners to speak in simple sentences without any hesitation • To facilitate learners to draft basic formal written communication • To provide audio and video support to ensure meaningful skill acquisition 						
UNIT - I	GRAMMAR					(6)
Types of Sentences – Tenses & Voice- Concord – Auxiliary-Infinitive – Article-preposition – Comparative and Superlative adjective. Discourse Markers –Linkers: sequential – past time (later) Connecting words expressing cause and effect, contrast. Markers to structure informal spoken discourse Verb forms WH- and Yes/No Questions in present / past Complex question tags Broader range of intensifiers; So, such, too, enough, connecting words expressing cause and effect, contrast.						
UNIT – II	LISTENING					(6)
Short conversations / monologues: numbers and spelling (dates, prices, percentages, figures, etc.) and locate specific information, longer monologue and note taking – gap filling, Understanding the gist and extracting main idea. Conversation between two employees – Description of gadgets – Enquiring about orders and deliveries – Chasing an order: Telephone Conversations – Radio Interview – Voicemail messages and phone conversations – Welcome speech at a conference – Statistical information.						
UNIT – III	SPEAKING					(6)
Talking about oneself, agreeing and disagreeing, expressing preferences-mini-presentation on a business theme (Oral) - Giving information and expressing opinions- discussion on business-related topics - Helping students in achieving clarity and fluency; manipulating paralinguistic features of speaking (voice modulation, pitch, tone stress, effective pauses) Conducting Task oriented interpersonal, informal and semiformal Speaking / Classroom Presentation - Teaching strategies for Group Discussion - Teaching Cohesion and Coherence - Teaching effective communication & strategies for handling criticism and adverse remarks - Teaching strategies of Turn- taking, effective intervention, and courtesies, Role Play, Mock & HR Interview.						
UNIT - IV	READING					(6)
Short texts and understand the main message (signs, messages, postcards, notes, emails, labels) – Read and find specific information- Interpreting visual information-Comprehend detailed factual information—gather the gist- understand grammar and structure of the given passage- transferring information – Radio Commentary, Technical Texts and Case Studies – Guiding students for Intensive & Extensive Reading – Reading notices, messages, adverts, leaflets, contents pages, graphs, charts, tables, business letters, product descriptions, reports, minutes, newspaper or magazine articles, memos.						
UNIT – V	WRITING					(6)
Internal written communication - short messages to colleagues - note, message, memo, email- External communication - letter, email, notice-set phrases for letters and e-mails-Cohesive devices - All varieties of Technical Report, Business Letters and Job Application - Punctuation & Spelling, Semantics of Connectives, Modifiers and Modals, variety of sentences and paragraphs - Organizational Communication: Memo, Notice, Circular, Agenda / Minutes						
TOTAL = 30 PERIODS						

COURSE OUTCOMES:

At the end of the course, the learners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Understand and apply the basic grammar and learn the range of vocabulary	Understand
CO2	Listen enthusiastically and consolidate the messages and information of monologues and dialogues	Remember
CO3	Convey the views and opinions clearly in simple sentences	Apply
CO4	Read and comprehend the statistics and texts with clear understanding	Analyse
CO5	Write the contexts relevant to the topics efficiently.	Understand

TEXT BOOKS:

- Whitby Norman, Business Benchmark Pre-Intermediate to Intermediate Student's Book CUP Publications, 3rd Edition, 2018
- Wood Ian, Williams Anne, Cowper Anna, Pass BEC Preliminary, Cengage Learning, 2ⁿ Edition, 2015.

REFERENCES:

- BEC Preliminary – Cambridge Handbook for Language Teachers, 2nd Edition, CUP 2000.
- Hewings Martin – Advanced grammar in use- Upper-Intermediate Proficiency, CUP, 3rd Edition, 2013.

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	2	3	-	-	-	-
CO2	2	-	-	-	-	-	-	2	3	-	-	-	-
CO3	2	-	-	-	-	-	1	2	3	-	-	-	-
CO4	2	-	-	-	-	-	1	-	3	-	-	-	-
CO5	2	-	-	-	-	-	1	-	3	-	-	-	-
Avg.	2	-	-	-	-	-	1	1	3	-	-	-	-

1-Low, 2-Medium, 3-High

24CSP29	PYTHON PROGRAMMING LABORATORY	Category	L	T	P	C
		ESC	0	0	2	1
(Common to All Branches)						
PREREQUISITE:						
Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.						
OBJECTIVES:						
<ul style="list-style-type: none"> • To perform operations like reversing, palindrome checking, and character replacement. • To utilize functions for computing mathematical calculations and solve specific problems. • To impart knowledge on conditionals and loops to address various problem-solving scenarios. • To explore sets and dictionaries for sorting, searching, and removing duplicates in data. • To acquire knowledge in polymorphism, exception handling, GUI design, and web development. 						
LIST OF EXERCISE/EXPERIMENTS:						
<ol style="list-style-type: none"> 1. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters) 2. Implementing programs using Functions (GCD of two numbers, Factorial) 3. Scientific problems using conditional statements and loops. (Largest among three numbers, Number series, Number Patterns) 4. Implementing real-time applications using Sets, Dictionaries (Sorting, Searching, Remove Duplicates) 5. Implementing real-time/technical applications using Lists, Tuples. (Swapping two elements, Reversing a List / Sorting Tuples) 6. Create a Python program to demonstrate polymorphism with inheritance. (Single, Multilevel Inheritance, Hierarchical) 7. Implement a simple calendar in python program without using the calendar module using string array or list. 8. Write a program to demonstrate the user-defined exception handling mechanism in Python. 9. Design and implement a graphical user interface to perform any arithmetic operation. 10. Implementing a web application with MySQL database integration for CRUD operations (Flask / Django Framework) 						
TOTAL: 30 PERIODS						

COURSE OUTCOMES:														
At the end of the course, the students will be able to:														
COs	Course Outcome												Cognitive Level	
CO1	Design simple programs using conditional statements and loops.												Apply	
CO2	Demonstrate the functions to perform mathematical calculations and solve specific problems.												Apply	
CO3	Apply conditional and looping statements to solve problems.												Apply	
CO4	Apply sets and dictionaries for sorting, searching, and removing duplicates.												Apply	
CO5	Implement polymorphism, manage exceptions, develop GUIs, and build web applications with MySQL.												Apply	
REFERENCES:														
<ol style="list-style-type: none"> 1. Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, 5th Edition, 2023. 2. Wesley J.Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2017. 														
Mapping of COs with POs and PSOs														
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	3	2	2	2	-	-	1	-	-	1	-	-
CO2	3	3	3	2	2	3	-	-	1	-	-	1	-	-
CO3	3	3	3	2	2	3	-	-	1	-	-	1	-	-
CO4	3	3	3	1	3	3	-	-	1	-	-	1	-	-
CO5	3	3	3	1	3	3	-	-	1	-	-	1	-	-
Avg.	3	3	3	2	2	3	-	-	1	-	-	1	-	-
1-Low, 2-Medium, 3-High														

24SSP29	APTITUDE AND CODING SKILLS –II	Category	L	T	P	C
		EEC	0	0	2	1
(Common to All Branches)						
OBJECTIVES:						
The Course will enable the learners :						
<ul style="list-style-type: none"> • To expose to various concept of Aptitude problem solving • To solve the problem and to improve analytical skill based on company specific skill • To develop proficiency in verbal reasoning for improved critical thinking. • To build and enrich the communication skills • To Apply fundamental Python programming concepts, including variables, data types, control structures, and functions, to solve basic computational problems effectively 						
UNIT - I	NUMBERS AND SHARE BASED CONCEPTS	(6)				
Problems on Numbers – Unit Digits – Squares and Cubes – Remainder Theorem – Averages - Ratio Proportions and Partnership – Percentage – Profit and Loss						
UNIT - II	BASICS OF WORK BASED CONCEPTS	(6)				
Introduction to time and work –Introduction to Time, Speed and Distance, Problems on Trains						
UNIT - III	LOGICAL REASONING	(4)				
Blood Relations – Ranking and Ordering – Inequalities – Cause and Effect						
UNIT - IV	VERBAL ABILITY	(7)				
Yes or No and “WH” Questions – Conjunctions – Count / Uncounted Nouns – Direct and Indirect Speech – Active and Passive Voice						
UNIT - V	PYTHON PROGRAMMING FUNDAMENTALS	(7)				
Introduction-Features-Environment setup; Basic syntax: variable-data types-operators-control statements-if-if-else- loop-break-continue, etc. List- operations on list; String operations- access; Tuple: operations on tuple; Dictionaries: Accessing dictionaries, working with dictionaries; Functions-Exception Handling-Input & Output-Modules-OOPs concepts-Numerical Programming.						
TOTAL: 30 PERIODS						
COURSE OUTCOMES:						
At the end of the course, the students will be able to:						
COs	Course Outcome	Cognitive Level				
CO1	Develop problem-solving skills and identify optimal solutions efficiently.	Understanding				
CO2	Solve problems on quantitative aptitude	Applying				
CO3	Resolve problems with logical reasoning	Applying				
CO4	Develop proficiency in verbal and communication for improved and effective articulation of ideas.	Applying				
CO5	Implement Python coding by utilizing appropriate data structures.	Applying				

REFERENCES:

1. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Education, 1st Edition, 2021.
2. Martin C. Brown, Python: The Complete Reference, 4th Edition, Mc-Graw Hill, 2018.
3. <https://www.python.org/>

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	-	3	3	-	3	1	-	3	-	-
CO2	3	3	3	-	3	3	-	3	1	-	3	-	-
CO3	3	3	3	-	3	3	-	3	3	-	3	-	-
CO4	-	-	-	-	3	3	-	3	3	-	3	-	-
CO5	3	3	3	-	3	3	-	3	2	-	3	-	-
Avg.	2.4	2.4	2.4	-	3	3	-	3	2	-	3	-	-

1-Low, 2-Medium, 3-High