Kongunadu College of Engineering and Technology
(Autonomous)
Affiliated to Anna University, Chennai
B.E. Biomedical Engineering
Regulations: R2024
Choice Based Credit System
I – VIII Semester
(Applicable for the Students Admitted from 2024 – 2025 onwards)

SEMESTER- I

S.No	Course Code	Course Title	Category	L	T	P	Credit
1.	24MC001	Induction Programme	MC	-	-	-	0
THEORY							
2.	24EN101	Communicative English	HSMC	3	0	0	3
3.	24MA101	Matrices and Calculus	BSC	3	1	0	4
4.	24PH101	Engineering Physics	BSC	3	0	2	4
5.	24CY101	Engineering Chemistry	BSC	3	0	2	4
6.	24GE102	Engineering Graphics	ESC	3	0	2	4
7.	24TA101	தமிழர் மரபு/Heritage of Tamils	HSMC	1	0	0	1
PRACTICALS							
8.	24GE104L	Engineering Practices Laboratory	ESC	0	0	4	2
9.	24EEC101L	Interpersonal Communication Laboratory	EEC	0	0	2	1
			TOTAL	**16**	**1**	**12**	**23**

SEMESTER-II

S.No	Course Code	Course Title	Category	L	T	P	Credit
THEORY							
1.	24EN201	Technical English	HSMC	3	0	0	3
2.	24MA202	Vector Calculus and Numerical Analysis	BSC	3	1	0	4
3.	24MC002	Universal Human Values – 2 Understanding Harmony	MC	3	0	0	3
4.	24CY201	Environmental Sciences	BSC	3	0	0	3
5.	24GE101	Computer Fundamentals and C Programming	ESC	3	0	0	3
6.	24BM201	Biosciences for Biomedical Engineering	PCC	3	0	0	3
7.	24TA201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	1	0	0	1
PRACTICALS							
8.	24GE103L	C Programming Laboratory	ESC	0	0	3	1.5
9.	24BM202L	Biosciences Laboratory	PCC	0	0	3	1.5
10.	24EEC201L	Professional Communication Laboratory	EEC	0	0	2	1
			TOTAL	**19**	**1**	**8**	**24**

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SEMESTER-III

S.No	Course Code	Course Title	Category	L	T	P	Credit
THEORY							
1.	24MA303	Transforms and Partial Differential Equations	BSC	3	1	0	4
2.	24BM301	Human Anatomy and Physiology	PCC	3	0	0	3
3.	24BM302	Medical Physics	PCC	3	0	0	3
4.	24EC201	Electric Circuits and Electron Devices	ESC	3	0	0	3
5.	24BM303	Electrical Engineering for Biomedical	PCC	3	0	0	3
6.	24AD201	Python Programming	ESC	3	0	0	3
PRACTICALS							
7.	24BM304L	Human Physiology Laboratory	PCC	0	0	2	1
8.	24EC202L	Circuits and Devices Laboratory	ESC	0	0	3	1.5
9.	24AD202L	Python Programming Laboratory	ESC	0	0	3	1.5
10.	24EEC301L	Soft Skills Development	EEC	0	0	2	1
			TOTAL	**18**	**1**	**9**	**24**

SEMESTER-IV

S.No	Course Code	Course Title	Category	L	T	P	Credit
THEORY							
1.	24MA403	Probability and Statistics	BSC	3	1	0	4
2.	24BM401	Biomedical Instrumentation	PCC	3	0	0	3
3.	24BM402	Sensors and Measurements	PCC	3	0	2	4
4.	24BM403	Biocontrol Systems	PCC	3	0	0	3
5.	24EC406	Analog and Digital Integrated Circuits	PCC	3	0	0	3
6.	24MC003	Constitution of India	PCC	2	0	0	0
PRACTICALS							
7.	24BM405L	Biomedical Instrumentation Laboratory	PCC	0	0	3	1
8.	24EC407L	Analog and Digital Integrated Circuits Laboratory	PCC	0	0	2	1
9.	24EEC401L	Life Skills and Personality Development	EEC	0	0	2	1
			TOTAL	**17**	**1**	**9**	**20**

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SEMESTER-V

S.No	Course Code	Course Name	Category	No. of Hours/ Week			Credit
				L	T	P	
THEORY							
1.	24BM501	Diagnostic and Therapeutic Equipment	PCC	3	0	0	3
2.	24BM502	Biomaterials	PCC	3	0	0	3
3.	24BM503	Bio-Signal Processing	PCC	3	0	2	4
4.	24BM504	Radiological Equipments	PCC	3	0	0	3
5.		Professional Elective I	PEC	3	0	0	3
6.		Open Elective I	OEC	3	0	0	3
PRACTICALS							
7.	24BM505L	Diagnostic and Therapeutic Equipment Laboratory	PCC	0	0	2	1
8.	24BM506L	Mini Project I	EEC	0	0	2	1
9.	24EEC501L	Professional Skills Development	EEC	0	0	2	1
			TOTAL	**18**	**0**	**8**	**22**

SEMESTER-VI

S.No	Course Code	Course Name	Category	No. of Hours/ Week			Credit
				L	T	P	
THEORY							
1.	24BM601	Medical Image Processing	PCC	3	0	2	4
2.	24EC401	Microprocessors and Microcontrollers	PCC	3	0	0	3
3.		Professional Elective II	PEC	3	0	0	3
4.		Professional Elective III	PEC	3	0	0	3
5.		Open Elective II	OEC	3	0	0	3
PRACTICALS							
6.	24EC404L	Microprocessors and Microcontrollers Laboratory	PCC	0	0	2	1
7.	24BM602L	Mini Project II	EEC	0	0	2	1
8.	24EEC601L	Employability Skills	EEC	0	0	2	1
			TOTAL	**15**	**0**	**8**	**19**

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SEMESTER-VII

S.No	Course Code	Course Name	Category	No. of Hours/ Week			Credit
				L	T	P	
THEORY							
1.	24BM701	Biomechanics	PCC	3	0	0	3
2.	24BM702	Embedded Systems and IoMT	PCC	3	0	0	3
3.	24ME705PE	Total Quality Management	HSMC	3	0	0	3
4.		Professional Elective IV	PEC	3	0	0	3
5.		Professional Elective V	PEC	3	0	0	3
PRACTICALS							
6.	24BM703L	Hospital Training	EEC	0	0	2	1
7.	24BM704L	Embedded Systems and IoMT Lab	PCC	0	0	2	1
			TOTAL	15	0	4	17

SEMESTER-VIII

S.No	Course Code	Course Name	Category	No. of Hours/ Week			Credit
				L	T	P	
THEORY							
1.		Professional Elective VI	PEC	3	0	0	3
2.		Professional Elective VII	PEC	3	0	0	3
PRACTICALS							
3.	24BM801L	Project Work	EEC	0	0	20	10
			TOTAL	6	0	20	16

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

S. No	Vertical 1 Bio Engineering	Vertical 2 Medical Device Innovation and Development	Vertical 3 Healthcare Management	Vertical 4 Mechanics in Healthcare	Vertical 5 Signal and Image Processing	Vertical 6 Wearable Communication	Vertical 7 Advanced Healthcare Devices
1.	24BM101PE Genetic Engineering	24BM201PE Foundation Skills in Integrated Product Development	24BM301PE Hospital Management	24BM401PE Biofluids and Dynamics	24BM501PE Artificial Organs and Implants	24BM601PE Virtual Reality and Augmented Reality	24BM701PE Human Assist Devices
2.	24BM102PE Biometric Systems	24BM202PE Healthcare Product Development	24BM302PE Medical Safety and Quality Assurance	24BM402PE Bio-Ergonomics	24BM502PE Telemedicine	24BM602PE Wearable Systems	24BM702PE Robotics in Medicine
3.	24BM103PE Neural Engineering	24ME305PE Rapid Manufacturing	24BM303PE Bio Statistics	24BM403PE Physiological Modeling	24BM503PE Pattern Recognition and Expert Systems in Medicine	24BM603PE Medical Informatics	24BM703PE Bio Nano Technology
4.	24BM104PE Biophotonics	24BM204PE Medical Device Quality Management System	24BM304PE Economics and Management for Engineers	24BM404PE Modeling and Designing of Bone and Dental Implants	24BM504PE Virtual Bioinstrumentation	24BM604PE Telehealth Technology	24BM704PE Biomedical LASER Instruments
5.	24BM105PE Medical Optics	24BM205PE Medical Innovation and Entrepreneurship	24BM305PE Forensic Science in Healthcare	24BM405PE Rehabilitation Engineering	24BM505PE Brain Computer Interface and its Applications	24BM605PE Body Area Networks	24BM705PE Critical Care Equipment
6.	24BM106PE Principles of Tissue Engineering	24BM206PE Machine Learning Techniques in Medicine	24BM306PE Clinical Engineering	24BM406PE Assistive Technology	24BM506PE Speech and Audio Signal Processing	24BM606PE Communication Systems	24BM706PE BioMEMS
7.	24BM107PE Physiology for Engineers	24BM207PE Embedded Medical Product Design	24BM307PE Enterprise Management	24BM407PE Physiological Control Systems	24BM507PE Deep Learning and Deployment of AI Models	24BM607PE Bio-Transport Processes	24BM707PE Advanced Diagnostic and Therapeutic Equipments
8	24BM108PE Bioinformatics: Algorithms and Applications	24BM208PE Microelectronics: Devices to Circuits	24BM308PE Organizational Behaviour	24BM408PE Introduction to Robotics	24BM508PE Exercise and Sports Biomechanics	24BM608PE Sensors and Actuators	24EC108PE Enclosure Design of Electronics Equipment

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: BIO ENGINEERING

Sl No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM101PE	Genetic Engineering	PEC	3	0	0	3
2	24BM102PE	Biometric Systems	PEC	3	0	0	3
3	24BM103PE	Neural Engineering	PEC	3	0	0	3
4	24BM104PE	Biophotonics	PEC	3	0	0	3
5	24BM105PE	Medical Optics	PEC	3	0	0	3
6	24BM106PE	Principles of Tissue Engineering	PEC	3	0	0	3
7	24BM107PE	Physiology for Engineers	PEC	3	0	0	3
8	24BM108PE	Bioinformatics: Algorithms and Applications	PEC	3	0	0	3

VERTICAL 2: MEDICAL DEVICE INNOVATION AND DEVELOPMENT

Sl No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM201PE	Foundation Skills in Integrated Product Development	PEC	3	0	0	3
2	24BM202PE	Healthcare Product Development	PEC	3	0	0	3
3	24ME305PE	Rapid Manufacturing	PEC	3	0	0	3
4	24BM204PE	Medical Device Quality Management System	PEC	3	0	0	3
5	24BM205PE	Medical Innovation and Entrepreneurship	PEC	3	0	0	3
6	24BM206PE	Machine Learning Techniques in Medicine	PEC	3	0	0	3
7	24BM207PE	Embedded Medical Product Design	PEC	3	0	0	3
8	24BM208PE	Microelectronics: Devices to Circuits	PEC	3	0	0	3

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VERTICAL 3: HEALTHCARE MANAGEMENT

Sl No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM301PE	Hospital Management	PEC	3	0	0	3
2	24BM302PE	Medical Safety and Quality Assurance	PEC	3	0	0	3
3	24BM303PE	Bio Statistics	PEC	3	0	0	3
4	24BM304PE	Economics and Management for Engineers	PEC	3	0	0	3
5	24BM305PE	Forensic Science in Healthcare	PEC	3	0	0	3
6	24BM306PE	Clinical Engineering	PEC	3	0	0	3
7	24BM307PE	Enterprise Management	PEC	3	0	0	3
8	24BM308PE	Organizational Behaviour	PEC	3	0	0	3

VERTICAL 4: MECHANICS IN HEALTHCARE

Sl No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM401PE	Biofluids and Dynamics	PEC	3	0	0	3
2	24BM402PE	Bio-Ergonomics	PEC	3	0	0	3
3	24BM403PE	Physiological Modeling	PEC	3	0	0	3
4	24BM404PE	Modeling and Designing of Bone and Dental Implants	PEC	3	0	0	3
5	24BM405PE	Rehabilitation Engineering	PEC	3	0	0	3
6	24BM406PE	Assistive Technology	PEC	3	0	0	3
7	24BM407PE	Physiological Control Systems	PEC	3	0	0	3
8	24BM408PE	Introduction to Robotics	PEC	3	0	0	3

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VERTICAL 5: SIGNAL AND IMAGE PROCESSING

Sl No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM501PE	Artificial Organs and Implants	PEC	3	0	0	3
2	24BM502PE	Telemedicine	PEC	3	0	0	3
3	24BM503PE	Pattern Recognition and Expert Systems in Medicine	PEC	3	0	0	3
4	24BM504PE	Virtual Bioinstrumentation	PEC	3	0	0	3
5	24BM505PE	Brain Computer Interface and Its Applications	PEC	3	0	0	3
6	24BM506PE	Speech and Audio Signal Processing	PEC	3	0	0	3
7	24BM507PE	Deep Learning and Deployment of AI Models	PEC	3	0	0	3
8	24BM508PE	Exercise and Sports Biomechanics	PEC	3	0	0	3

VERTICAL 6: WEARABLE COMMUNICATION

Sl No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM601PE	Virtual Reality and Augmented Reality In Healthcare	PEC	3	0	0	3
2	24BM602PE	Wearable Systems	PEC	3	0	0	3
3	24BM603PE	Medical Informatics	PEC	3	0	0	3
4	24BM604PE	Telehealth Technology	PEC	3	0	0	3
5	24BM605PE	Body Area Networks	PEC	3	0	0	3
6	24BM606PE	Communication Systems	PEC	3	0	0	3
7	24BM607PE	Bio-Transport Processes	PEC	3	0	0	3
8	24BM608PE	Sensors and Actuators	PEC	3	0	0	3

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VERTICAL 7: ADVANCED HEALTHCARE DEVICES

Sl No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM701PE	Human Assist Devices	PEC	3	0	0	3
2	24BM702PE	Robotics in Medicine	PEC	3	0	0	3
3	24BM703PE	Bio Nano Technology	PEC	3	0	0	3
4	24BM704PE	Biomedical LASER Instruments	PEC	3	0	0	3
5	24BM705PE	Critical Care Equipment	PEC	3	0	0	3
6	24BM706PE	BioMEMS	PEC	3	0	0	3
7	24BM707PE	Advanced Diagnostic and Therapeutic Equipments	PEC	3	0	0	3
8	24EC108PE	Enclosure Design of Electronics Equipment	PEC	3	0	0	3

Open Electives
(Students shall choose the Open Elective Courses, such that the course contents are not similar to any other contents/title under other course categories)
Open Elective I & II (Semester- V)

S. No	Course Code	Course Title	Course Category	No of Hours/Week			Credit
				L	T	P	
1	24BM101OE	Medical Instruments	OEC	3	0	0	3
2	24BM102OE	Food, Nutrition and Health	OEC	3	0	0	3
3	24BM201OE	Traditional Indian Foods	OEC	3	0	0	3
4	24BM202OE	Fundamentals of Cell and Molecular Biology	OEC	3	0	0	3

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SUMMARY

S.No	Course Category	Credits As Per Semester								Total Credit	Percentage (%)	As Per AICTE
		I	II	III	IV	V	VI	VII	VIII			
1	HSMC	4	4	-	-	-	-	3	-	11	6.67	12
2	BSC	12	7	4	4	-	-	-	-	27	16.36	25
3	ESC	6	4.5	9	-	-	-	-	-	19.5	11.81	24
4	PCC	-	4.5	10	15	14	8	7	-	58.5	35.45	48
5	PEC	-	-	-	-	3	6	6	6	21	12.73	18
6	OEC	-	-	-	-	3	3	-	-	6	3.64	18
7	EEC	1	1	1	1	2	2	1	10	19	11.52	15
8	MC		3							3	1.82	-
Total		23	24	24	20	22	19	17	16	165	100	

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Open Elective Course (OEC)
Open Elective I (Semester-V)

S.No	Course Code	Course Name	Category	No. of Hours/ Week			Credit
				L	T	P	
THEORY							
1.	24AD101OE	Introduction to Artificial Intelligence	OEC	3	0	0	3
2.	24AD102OE	Introduction to Data Science	OEC	3	0	0	3
3.	24AG101OE	Basics of Agriculture Engineering	OEC	3	0	0	3
4.	24AG102OE	Farm Machinery	OEC	3	0	0	3
5.	24CE101OE	Industrial Waste Management	OEC	3	0	0	3
6.	24CE102OE	Ecological Engineering	OEC	3	0	0	3
7.	24CS101OE	Python Programming for Data Science	OEC	3	0	0	3
8.	24CS102OE	Programming and Data Structures	OEC	3	0	0	3
9.	24EC101OE	Principles of Signal Processing	OEC	3	0	0	3
10.	24EC102OE	Consumer Electronics	OEC	3	0	0	3
11.	24EE101OE	Power Generation Systems	OEC	3	0	0	3
12.	24EE102OE	Electrical Wiring and Lighting	OEC	3	0	0	3
13.	24ME101OE	Production Technology	OEC	3	0	0	3
14.	24ME102OE	Alternative Energy Fuels	OEC	3	0	0	3
15.	24IT101OE	Fundamentals of Software Engineering	OEC	3	0	0	3
16.	24IT102OE	Wireless Sensor Networks	OEC	3	0	0	3

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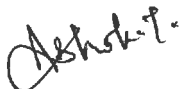
Open Elective Course (OEC)
Open Elective II (Semester-VI)

S.No	Course Code	Course Name	Category	No. of Hours/ Week			Credit
				L	T	P	
THEORY							
1.	24AD201OE	Basics of Visualization Toools	OEC	3	0	0	3
2.	24AD202OE	Foundations of Machine Learning	OEC	3	0	0	3
3.	24AG201OE	Introduction of Organic Farming	OEC	3	0	0	3
4.	24AG202OE	Introduction to Green House Technology	OEC	3	0	0	3
5.	24CE201OE	Global Warming and Climate Change	OEC	3	0	0	3
6.	24CE202OE	Building Services	OEC	3	0	0	3
7.	24CS201OE	Fundamentals of Operating Systems	OEC	3	0	0	3
8.	24CS202OE	Introduction to Database	OEC	3	0	0	3
9.	24EC201OE	Basics of Virtual Instrumentation	OEC	3	0	0	3
10.	24EC202OE	Telecommunications for Society	OEC	3	0	0	3
11.	24EE201OE	Energy Audit and Management	OEC	3	0	0	3
12.	24EE202OE	Electric Vehicles	OEC	3	0	0	3
13.	24ME201OE	Basics of Automotive Components	OEC	3	0	0	3
14.	24ME202OE	Unconventional Machining Processes	OEC	3	0	0	3
15.	24IT201OE	Introduction to WEB Development	OEC	3	0	0	3
16.	24IT202OE	Principles of Multimedia	OEC	3	0	0	3

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Annexure-IV
Vertical for Minor Degree
(In addition to all the verticals of other programmes)

Vertical I Fintech and Block Chain	Vertical II Entrepreneurship	Vertical III Public Administration	Vertical IV Business Data Analytics	Vertical V Environment and Sustainability
Financial Management	Foundations of Entrepreneurship	Principles of Public Administration	Statistics for Management	Sustainable Infrastructure Development
Fundamentals of Investment	Team Building and Leadership Management for Business	Elements of public Administration	Data Mining for Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity and Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Administrative Theories	Marketing and Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation and Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

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24MC001	**INDUCTION PROGRAMME**	**L T P C**
		- - - 0

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. " Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

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(iv) Literary Activity
Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules
This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People
Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area
A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations
They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities
About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science. Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References: Guide to Induction program from AICTE

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24EN101	COMMUNICATIVE ENGLISH	L T P C
	(Common to All Branches)	3 0 0 3

OBJECTIVES:
The students should be made to:
- Develop basic communication skills in English.
- Enhance the speaking skills for academic, professional and social purposes.
- Use of the electronic media such as internet and other online resources for their language development.
- Inculcate the habit of reading and writing for the purpose of effective communication
- Develop confidence in learners to communicate in English for all purposes

UNIT I   BASICS OF COMMUNICATION   9
Listening: Basics of listening-Intensive and Extensive Listening, Barriers to Effective Listening; Speaking: Speaking about Future plans- Giving instruction to use the product, Reading: Skimming and Scanning, Writing: Writing about one's leisure time   activities, hometown, everyday activities etc., Grammar: Parts of speech, Prepositions, Vocabulary: Word formation.

UNIT II   CREATIVE COMMUNICATION   9
Listening: Listening to short lectures /talks, Speaking: Telephonic interview, Reading: Reading Editorial and Opinion Blogs, Writing: Biographical writing - Writing a paragraph (Cause and Effect/Compare and Contrast/Narrative/Analytical) - Grammar: Gerund and Infinitive - Present Tense, Vocabulary: Abbreviations & Acronyms.

UNIT III   FUNCTIONAL COMMUNICATION   9
Listening: Listening to radio and TV and taking notes - Focused audio tracks, Speaking: Role Play - Group Interaction, Reading: Reading magazines, Writing: Letter (Informal /Formal – Industrial Visit, Internship, etc),Writing a set of instructions, Grammar: Past Tense -Subject - Verb Agreement, Vocabulary: Question Tags.

UNIT IV   ANALYTICAL SKILLS   9
Listening: Listening to · select talks by eminent personalities, speaking: Speaking in mock Interviews, Reading: Reading advertisements, Writing: Writing a set of recommendations, Interpreting Visual Materials (Line Graphs, Pie Charts etc.), Grammar: Sentence Pattern, Future Tense, Articles, Vocabulary: Single word substitutes.

UNIT V   PROFESSIONAL COMMUNICATION   9
Listening: Understanding different Accents,Listening to TED talks, Speaking: Giving impromptu talks- Making presentations, Reading: Reading and comprehending a passage, Writing: Letter to the editor- Check list, Grammar: Direct and Indirect Speech, Vocabulary: Phrasal Verbs.

TOTAL: 45 PERIODS

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OUTCOMES:

On successful completion of the course, the students will be able to,

- Use suitable vocabulary with confidence and express their ideas both in speech and writing.
- Write intelligibly avoiding grammatical errors, using a range of vocabulary, organizing their ideas logically on a topic.
- Speak confidently, with one or many listeners using appropriate communicative strategies.
- Read different genres of texts adopting various reading strategies.
- Understand different spoken discourses/excerpts in different accents.

TEXT BOOKS:
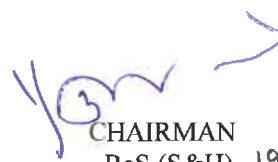
1. Kumar, Sanjay and Lata, Pushp, "Communication Skills", Oxford University Press. 2018.

REFERENCES:

1. DuttP. Kiranmai and Rajeevan Geeta, "Basic Communication Skills", Foundation Books, 2007.
2. Mohan, Krishna and Banerji Meera, "Developing Communication Skills", Macmillan Publishers India Ltd., Delhi: 2009.
3. Martin Hewings "Advanced English Grammar: A self study reference and Practice book for advanced South Asian students" Cambridge University Press, Delhi: 2016.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	2	-	-	2	-	1	2	3	-	2
CO2	-	-	2	-	2	-	-	2	3	1	-
CO3	-	-	2	-	2	1	2	3	3	2	2
CO4	-	-	-	2	2	1	2	3	3	2	2
CO5	2	3	-	2	3	-	2	-	3	1	2

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MATRICES AND CALCULUS
(Common to All Branches)

OBJECTIVES:
The students should be made to:
- Introduce the matrix techniques and to illustrate the nature of the matrix.
- Remember the basic concepts of solving algebraic and transcendental equations.
- Apply the formula for the curvature of a curve defined in Cartesian coordinates.
- Analyze the Partial differentiation, concept of total derivative, finding maxima and minima of function of two variables.
- Evaluate the techniques of integration in finding area and volume.

UNIT I   MATRICES   **9+3**
Eigenvalues and eigenvectors of a real matrix - Properties of eigenvalues and eigenvectors - Cayley-Hamilton theorem (Without proof) - Application of Cayley - Hamilton theorem (A^{-1}, A^n)- Nature of quadratic forms - Reduction of a quadratic form to canonical form by orthogonal transformation.

UNIT II   SYSTEM OF LINEAR EQUATIONS   **9+3**
Newton Raphson method- Bisection Method -Solution of linear system of equations by matrix method, Gauss-Jordan, Gauss- Jacobi and Gauss-Seidel methods- Eigen values of a matrix by Power method.

UNIT III   DIFFERENTIAL CALCULUS   **9+3**
Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normal.

UNIT IV   FUNCTIONS OF SEVERAL VARIABLES   **9+3**
Partial derivatives - Total derivative - Differentiation of implicit functions - Jacobians - Taylor's series for functions of two variables - Maxima and minima of functions of two variables.

UNIT-V   MULTIPLE INTEGRALS IN CARTESIAN COORDINATES   **9+3**
Double integration- Change of order of integration- Area between two curves- Triple integration- Volume as triple integrals.
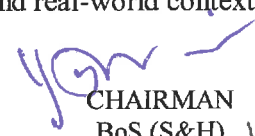
                                               TOTAL: (45+15) PERIODS

OUTCOMES:
On successful completion of the course, the students will be able to,
- Develop problem-solving skills using systems of equations and matrix transformations.
- Evaluate the efficiency of numerical methods based on the number of iterations required to achieve a desired level of accuracy.
- Compute the radius of curvature and interpret its significance for different types of curves.
- Expand a given function into a series and determine the maximum and minimum of multivariate functions.
- Apply the concepts of double and triple integrals in mathematical and real-world contexts.

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TEXT BOOKS:
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2018.

REFERENCES:
1. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2018.
2. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 4th Edition, New Delhi, 2021.
3. Ramana B V "Higher Engineering Mathematics", New Delhi Tata McGraw- Hill Education India Private Limited., 2021
4. Gerald. C.F., and Wheatley. P.O. "Applied Numerical Analysis" 7th Edition, Pearson Education India, 2017.

Mapping of COs with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	2	-	-	-	-	-	2
CO2	3	3	2	3	2	-	-	-	-	-	2
CO3	3	3	2	2	2	1	-	-	-	-	2
CO4	3	3	2	3	3	1	-	-	-	-	2
CO5	3	2	3	3	3	2	-	-	-	-	3

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24PH101	ENGINEERING PHYSICS	L T P C
	(Common to All Branches)	3 0 2 4

OBJECTIVES:
The students should be made to:
- Recall the mechanical properties of materials.
- Gain knowledge on electrical properties of materials.
- Understand the properties of magnetic and superconducting materials.
- Examine basic quantum mechanical concepts and their applications.
- Acquire the basic knowledge about nano phase materials and their properties.

UNIT I   MECHANICAL PROPERTIES OF SOLIDS   9
Elasticity and Plasticity - stress-strain diagram and its uses - Hooke's law - factors affecting elastic modulus - bending of beams - bending moment - cantilever: theory and experiment - uniform and non-uniform bending: theory and experiment – I shaped girders and its applications.

UNIT II   ELECTRICAL PROPERTIES OF MATERIALS   9
Classical free electron theory of metals - Electrical conductivity and thermal conductivity of metals - Wiedemann - Franz law - Failures of classical free electron theory - Success of Quantum free electron theory - Fermi distribution function and its variation with temperature - Density of energy states-carrier concentration of metals.

UNIT III   MAGNETIC AND SUPERCONDUCTING MATERIALS   9
Classification of magnetic materials - Domain theory of ferromagnetism - Hysteresis - Soft and Hard magnetic materials - Superconducting materials – Meissner effect - Isotopic effect - BCS theory of superconductors - Type I & Type II superconductors - Applications of superconductors.

UNIT IV   QUANTUM PHYSICS   9
Black body radiation - Planck's theory (derivation) - Deduction of Wien's displacement law and Rayleigh Jeans' Law from Planck's theory-de-Broglie wavelength - Properties of matter waves - Schrodinger's wave equations - Time independent and time dependent wave equations - Physical significance of wave function - Particle in a one dimensional potential box.

UNIT V   NEW ENGINEERING MATERIALS   9
Metallic glasses - Types - Preparation - Properties and applications - Shape Memory Alloys (SMA) - Characteristics and applications - Advantages and disadvantages of shape memory alloys - Synthesis of nanomaterials - Top down approaches (Ball Milling) and Bottom up approaches (CVD and PVD).

TOTAL: 45 PERIODS

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LIST OF THE EXPERIMENTS – PHYSICS LABORATORY

1. Determination of Young's modulus of the material by Non-uniform bending method.
2. Determination of Rigidity modulus of the wire using Torsion Pendulum.
3. Determination of band gap energy of a semiconductor.
4. Determination of thickness of the thin film/wire by forming the fringe using Air wedge method.
5. Determination of velocity of ultrasonic waves in a liquid and compressibility of liquid using ultrasonic Interferometer.

TOTAL: 30 PERIODS

OUTCOMES:
On successful completion of the course, the students will be able to,
- Identify the mechanical properties of materials and their significance in engineering applications.
- Interpret the electrical properties of materials and their role in various technological applications.
- Illustrate the magnetic and superconducting properties of materials and their practical implications.
- Apply fundamental quantum mechanical concepts to understand material behavior at the atomic level.
- Explore the properties and applications of smart materials in modern engineering solutions.

TEXT BOOKS:
1. M.N. Avadhanulu, P.G. Kshirsagar, TVS Arun Murthy "A Text book of Engineering Physics", S.Chand and Company Ltd, New Delhi, 11th Edition.2022.
2. Rajendran. V. "Materials Science", McGraw Hill Education (India) Private Limited, New Delhi, 2017.
3. S.O Pillai, "Solid State Physics" New Age International Publishers, New Delhi,10th Edition, 2022.

REFERENCES:
1. R. K. Gaur and S.L. Gupta, "Engineering Physics", Dhanpat Rai Publications, New Delhi, Reprint 2022.
2. Wahab. M.A, "Solid State Physics' Narosa Publishing House, New Delhi, 4th Edition. 2023.
3. D. Halliday, R. Resnick and J. Walker, Principles of Physics, Wiley (11th Edition), 2020.
4. Malik.K and Singh. A.K, "Engineering Physics" TMH, New Delhi 2nd Edition - 2020.

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LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

PHYSICS LABORATORY

S.No.	Name of Equipment	Quantity Required
1	Torsional pendulum with accessories	6 Nos.
2	Non - Uniform bending with accessories	6 Nos.
3	Ultrasonic interferometer.	6 Nos.
4	Air wedge with accessories	6 Nos.
5	Band gap kit	6 Nos.

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Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	1	1	-	-	-	-	-	1
CO2	3	2	2	3	2	-	-	-	-	-	2
CO3	3	3	2	3	2	1	-	-	-	-	-
CO4	3	2	2	3	3	-	-	-	-	-	2
CO5	2	2	2	2	2	2	-	-	-	-	3

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24CY101	ENGINEERING CHEMISTRY (Common to All Branches)	L T P C 3 0 2 4

OBJECTIVES:
The student should be made to:
- Gain knowledge on various sources of water and its industrial applications.
- Explore the essentials of electrochemistry, types of corrosion and its prevention.
- Examine the fundamentals of polymer, various engineering plastics and composites.
- Study the concept of Phase diagrams, different types of energy storage devices and emerging batteries.
- Assess the types of fuels and its quality estimation.

UNIT I   WATER TECHNOLOGY   9

Sources of water - Hard and soft water - Boiler feed water-requirements - disadvantages of using hard water in boilers (Scale, Sludge, Caustic Embrittlement, Priming and Foaming) - Municipal water treatment (screening, sedimentation, coagulation, filtration and disinfection - ozonolysis, UV treatment, chlorination). Internal conditioning (Phosphate, Calgon, Colloidal and Carbonate conditioning methods) - External conditioning - Zeolite and demineralization process - desalination by reverse osmosis.

UNIT II   ELECTROCHEMISTRY AND CORROSION SCIENCE   9

Electrochemistry - Nernst equation & its Applications - Electrochemical (EMF) series - Corrosion - Types - Chemical and Electrochemical corrosions - Galvanic corrosion - Differential aeration corrosion - Pitting corrosion - Corrosion control - material selection and design - sacrificial anodic method and impressed current cathodic protection method - Organic coatings - Paint and its constituents.

UNIT III   POLYMERS AND COMPOSITES   9

Introduction: Functionality - degree of polymerization. Classification of polymers (Source, Structure, Synthesis and Intermolecular forces) - Mechanism of free radical polymerization - Engineering Plastics: Polyamides, Polycarbonates and Polyurethanes.
Composites: Need, Composition of composites - Definition, examples and applications of Metal matrix composites (MMC), Ceramic matrix composites (CMC) and Polymer matrix composites (PMC)

UNIT IV   PHASE RULE AND ENERGY STORAGE DEVICES   9

Phase Rule - Terms involved - One Component system (water system) - Two component system (Lead-Silver system) - Storage devices - types - primary battery (dry cell), secondary battery (lead acid, lithium-ion battery) - Emerging batteries - Aluminum air battery, batteries for automobiles and satellites - Fuel cells - Hydrogen - Oxygen fuel cell.

UNIT V   FUELS AND COMBUSTION   9

Fuels – Introduction - Classification of fuels - coal - Analysis of coal (proximate and ultimate) - Carbonization - Manufacture of metallurgical coke (Otto Hoffmann method) - Petroleum - Manufacture of synthetic petrol (Bergius process) - Knocking - Anti knocking - Octane number - Cetane number - Gaseous fuels - LPG, CNG - Combustion: Calorific value - higher and lower calorific values - Theoretical calculation of calorific value - Flue gas analysis (ORSAT Method).

TOTAL: 45 PERIODS

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LIST OF THE EXPERIMENTS - CHEMISTRY LABORATORY

1. Estimation of HCl using Na_2CO_3 as primary standard and determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of Chloride content of water sample by Argentometric method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Estimation of Copper content by spectrophotometer.
6. Estimation of iron content of the given solution using potentiometer.
7. Conductometric titration of strong acid Vs strong base.

TOTAL: 30 PERIODS

OUTCOMES:
On successful completion of the course, the students will be able to,
- Understand the various water treatment methodologies and its applications.
- Recognize corrosion protection techniques and appropriate mitigation strategies.
- Assess different types of polymers, composites and their industrial applications.
- Illustrate the concept of phase diagram, working principles of batteries, emerging energy storage technologies and their applications.
- Analyze the various fuels and their properties.

TEXT BOOKS:
1. P. C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing, Company, New Delhi, 2015.
2. S. S. Dara, "A Text Book of Engineering Chemistry", ° Chand & Co. Ltd., New Delhi, 2013.

REFERENCES:
1. Shika Agarwal, "Engineering Chemistry", Cambridge University Press, Delhi, 2016.
2. B. Sivashankar, "Engineering Chemistry", Tata Mc. Graw–Hill Publishing Company, Ltd., Delhi, 2012.
3. G Palanna, "Engineering Chemistry", Tata Mc. Graw Hill Education Private Limited, Delhi, 2017.
4. Prasanta Rath,"Engineering Chemistry", Cengage Learning India Pvt. Ltd., Delhi, 2018.

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LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS
CHEMISTRY LABORATORY

S.No.	Name of Equipment	Quantity Required
1	pH Meter	10 Nos.
2	Digital Conductivity Meter	10 Nos.
3	Digital Potentiometer	10 Nos.
4	Electronic Balance	5 Nos.
5	Deionizer unit	1 No.
6	Spectrophotometer	5 Nos.

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Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2	-	2	3	2	-	-	-	-
CO2	3	2	-	-	2	3	2	-	-	-	-
CO3	3	-	2	2	3	2	-	-	-	-	-
CO4	3	2	1	-	3	2	-	-	-	-	2
CO5	3	3	1	-	2	3	2	-	-	-	2

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ENGINEERING GRAPHICS

(Common to All Branches)

L T P C

3 0 2 4

OBJECTIVES:

The student should be made to:

- Understand the various basic concepts like dimensioning, standards, curves and free hand sketching
- Develop the skills on projection of points, lines and plane surfaces
- Impart knowledge on projection of solids like prisms and pyramids
- Illustrate the section of solids and development of surfaces for various objects
- Acquire skills on viewing of solid objects in Isometric and Perspective projections

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)   2

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and geometric dimensioning

UNIT I   PLANE CURVES AND FREE HAND SKETCHING   9+6

Curves used in engineering practices: Conics - Construction of ellipse, Parabola and hyperbola by eccentricity method - Construction of cycloid and involutes of square and circle- Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles - Representation of Three Dimensional objects - Layout of views – Free hand sketching of multiple views from pictorial views of objects.

UNIT II   PROJECTION OF POINTS, LINES AND PLANE SURFACES   9+6

Projection of points - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true length and true inclination by rotating line method - Projection of planes inclined to both the principal planes by rotating object method.

UNIT III   PROJECTION OF SOLIDS   7+6

Projection of simple solids like prisms, pyramids, cylinder, cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV   PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT   9+6
               OF SURFACES

Sectioning of solids: prisms, pyramids, cylinder, cone in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other - obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids: prisms, pyramids, cylinder and cone.

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UNIT V   ISOMETRIC AND PERSPECTIVE PROJECTIONS   9+6

Principles of isometric projection - isometric scale - isometric projections of simple solids, truncated and frustum of solids: Prisms, pyramids, cylinder, cone - Perspective projection of simple solids: Prisms, pyramids and cylinder by visual ray method.

TOTAL: 75 (45+30) PERIODS

OUTCOMES:

On successful completion of this course, the students will be able to,

- Relate the engineering knowledge on dimensioning, standards, curves and free hand sketching objects
- Identify the various views on the projection of points, straight lines and plane surfaces
- Apply the knowledge on projection of solids like prisms and pyramids
- Analyze the section of solids and development of surfaces
- Develop the isometric views and perspective projection of simple solids

TEXT BOOKS:

1. Natarajan K V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2023.
2. Venugopal K and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2024.

REFERENCES:

1. Bhatt N D and Panchal V M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2023.
2. Basant Agarwal and Agarwal C M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2019.
3. Gopalakrishna K R., "Engineering Drawing" (Vol. I & II combined), Subhas Stores, Bangalore, 2017.

Special points applicable to End Semester Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use an appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2	-	-	-	-	-	3	-	2
CO2	3	2	2	-	-	-	-	-	3	-	2
CO3	3	2	2	-	-	-	-	-	3	-	2
CO4	3	2	2	-	-	-	-	-	3	-	2
CO5	3	2	2	-	-	-	-	-	3	-	2

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(BoS / MECH)

24TA101	HERITAGE OF TAMILS	L T P C
	(Common to All Branches)	1 0 0 1

OBJECTIVES:
The students should be made to:
- Learn the extensive literature of classical Tamil.
- Analyze rock art paintings to modern art.
- Understand folk and martial arts.
- Apply the concepts of Thinai in Tamils.
- Realize the contribution of Tamils in Indian freedom struggle.

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, Villu Pattu, Kaniyan Koothu, 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

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OUTCOMES:

On successful completion of the course, the students will be able to,
- Recognize the extensive literature Tamil and classical nature.
- Understand the heritage of sculpture, painting and musical instruments.
- Classify the folk and martial arts of Tamil people.
- Realization of Thinai concepts, trade and victory of Chozha dynasty.
- Interpret the contribution of Tamils in Indian freedom struggle, Self- esteem movement and siddha medicine.

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு:தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை -ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by : International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	2	1	2	-	1
CO2	-	-	-	-	-	-	2	1	2	-	1
CO3	-	-	-	-	-	-	2	1	2	-	1
CO4	-	-	-	-	-	-	2	1	2	-	1
CO5	-	-	-	-	-	-	2	1	2	-	1

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நோக்கங்கள்:

மாணவர்கள் கண்டிப்பாக அறிய வேண்டுவன:

- செம்மொழியான தமிழ் மொழியின் விரிவான இலக்கியத்தைப் பற்றி அறிதல்.
- பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை உள்ள கலைகளை பகுப்பாய்வு செய்தல்.
- நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகளைப் புரிந்துகொள்ளுதல்.
- தமிழர்களின் திணைக் கோட்பாடுகளைச் செயல்படுத்துதல்.
- இந்திய விடுதலைப் போராட்டத்திற்கும் பண்பாட்டிற்கும் தமிழர்களின் பங்களிப்பை உணருதல்

அலகு 1 மொழி மற்றும் இலக்கியம்   3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் –சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம்-திருக்குறளில் மேலாண்மைக் கருத்துக்கள்- தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த 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 – சிற்பக் கலை   3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் -குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை , வீணை , யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள்   3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள்

போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் –சங்ககால நகரங்களும் துறை முகங்களும் -சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL: 15 PERIODS

முடிவுகள்:

பாடத்தின் முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- தமிழ் மொழியின் செம்மொழி தன்மையையும் சங்க இலக்கியத்தின் முக்கியத்துவத்தையும் உணர்வார்கள்.
- தமிழர்களின் சிற்ப, ஓவிய, இசை மரபுகளை புரிந்துகொள்வார்கள்.
- நாட்டுப்புறக் கலைகளையும் வீர விளையாட்டுகளையும் வகைப்படுத்துவார்கள்.
- தமிழர்களின் திணைக் கோட்பாடுகளும் சங்ககால வர்த்தகமும் புரிந்துகொள்வார்கள்.
- இந்திய விடுதலைப் போராட்டம், சுயமரியாதை இயக்கம், சித்த மருத்துவம் ஆகியவற்றில் தமிழர்களின் பங்களிப்பை விளக்குவார்கள்.

உரை மற்றும் குறிப்பு புத்தகங்கள்:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு:தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை -ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by : International Institute of Tamil Studies.)

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9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	2	1	2	-	1
CO2	-	-	-	-	-	-	2	1	2	-	1
CO3	-	-	-	-	-	-	2	1	2	-	1
CO4	-	-	-	-	-	-	2	1	2	-	1
CO5	-	-	-	-	-	-	2	1	2	-	1

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24GE104L	ENGINEERING PRACTICES LABORATORY	L	T	P	C
	(Common to All Branches)	0	0	4	2

OBJECTIVES:
The student should be made to:
- Acquire knowledge in calculation of area and volume of various 2D and 3D shapes and gain practical exposure in pipeline connections and carpentry
- Develop the fundamental skills in welding, machining, sheet metal and foundry works
- Illustrate the basic working principles of air conditioner, industrial robot and washing machine
- Learn the domestic, industrial wiring circuits and measure the electrical parameters
- Demonstrate the basic electronic components in PCB, assemble of smart phone, computer and LED TV

GROUP A (CIVIL & MECHANICAL)

I. CIVIL ENGINEERING PRACTICES   15
Basic Measurements
1. Calculation of area and volume for various solid and hollow shapes, including cubical, spherical, cylindrical and conical models with different scale conversions.

Carpentry
2. Study of industrial trusses and joints in doors and windows using models.
3. Sawing and planing- Making joints: T-joint, Mortise joint, and Tenon joint.

Plumbing
4. Laying pipe connections for suction and delivery sides of the pumps and preparation of plumbing line sketches for water supply and sewage works.
5. Connecting various pipe fittings using different materials (metal, plastic, and flexible pipes) and other components which are commonly used in household appliances.

II. MECHANICAL ENGINEERING PRACTICES   15
Welding:
    a) Arc Welding
        i) Butt joint
        ii) Lap joint
    b) Gas welding practice

Basic Machining:
    a) Turning and Facing
    b) Drilling and tapping

Sheet Metal work:
    a) Making of a funnel
    b) Making of a tray

Foundry work:
    a) Making a mould using solid pattern
    b) Making a mould using split pattern

Study Experiments
    a) Study of components in Air conditioner
    b) Study of components in Industrial robot
    c) Study of components in Washing machine

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GROUP B (ELECTRICAL AND ELECTRONICS)

III. ELECTRICAL ENGINEERING   15
1. Residential house wiring using switches, fuse, indicator, circuit breaker, lamp and Energy meter
2. Stair case wiring
3. Industrial wiring using switches, fuse, indicator and Energy meter
4. Measurement of electrical quantities - voltage, current, power, power factor and energy in RLC circuit
5. Calculation of energy consumption for different lamps
6. Study of fan with regulator, Iron Box and Emergency Lamp

IV. ELECTRONICS ENGINEERING   15
1. Study and identification of electronic components -Resistors, Capacitors and Inductors
2. Assembling and testing electronic components in small PCB
3. Assembling and dismantling of Computer/Laptop
4. Assembling and dismantling of LED TV
5. Study of elements in smart phone

                                                              TOTAL: 60 PERIODS

OUTCOMES:
On successful completion of this course, the students will be able to,

- Interpret engineering knowledge on calculation of area and volume of different geometric shapes, connecting various household fittings and making carpentry joints
- Apply engineering skills to do welding, machining, sheet metal and foundry works
- Gain knowledge on Air conditioner, Industrial robot and washing machine
- Understand the domestic, industrial wiring circuits and measure the various electrical parameters
- Analyze the basic components of electronic circuits, computer, laptop, smart phone and LED TV

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2	-	2	2	-	2	-	-	2
CO2	3	2	2	-	2	2	-	2	-	-	2
CO3	3	2	1	-	2	2	-	2	-	-	2
CO4	3	2	1	-	2	2	-	2	-	-	2
CO5	3	2	2	-	2	2	-	2	-	-	2

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24GE104L ENGINEERING PRACTICES LABORATORY

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

GROUP A (CIVIL & MECHANICAL)

S. No	Name of Equipment	Quantity Required
	CIVIL ENGINEERING PRACTICES	
Basic Measurements		
1.	Sphere	03 Nos.
2.	Cylinder	03 Nos.
3.	Cone	03 Nos.
4.	Cube	03 Nos.
5.	Cuboid	03 Nos.
Carpentry		
6.	Industrial truss	03 Nos.
7.	Door Joint	03 Nos.
8.	Window Joint	03 Nos.
9.	Try Square	15 Nos.
10.	Hand Saw	15 Nos.
11.	Carpentry bench vice	15 Nos.
12.	Firmer Chisel	15 Nos.
13.	Motrin Chisel	15 Nos.
14.	Iron Jack	15 Nos.
15.	Mallet	15 Nos.
16.	Bench hold fastens (C Clamp)	15 Nos.
17.	Wood Cutting Machine	2 Nos.
18.	Planer machine	2 Nos.
19.	Hand drilling Machine	2 Nos.
20.	Jig Saw	2 Nos.
Plumbing		
21.	Pipe Vice	15 Nos.
22.	Die Holder with Die set	10 Nos.

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S. No	Name of Equipment	Quantity Required

MECHANICAL ENGINEERING PRACTICES

Welding

1.	Arc welding unit	5 Nos.
2.	Gas welding unit	2 Nos.

Basic Machining

3.	Lathe Machines	3 Nos.
4.	Drilling Machines	2 Nos.

Sheet Metal work

5.	Steel rule	5Nos.
6.	Bend snips	5 Nos.
7.	Straight snips	5 Nos.
8.	Scriber	5 Nos.
9.	Divider	5 Nos.
10.	Trammel	5 Nos.
11.	Prick Punches	5 Nos.
12.	Centre punches	5 Nos.
13.	Pliers	5 Nos.
14.	Ball peen hammer	5 Nos.
15.	Cross peen hammer	5 Nos.
16.	Bull wart hammer	5 Nos.
17.	Mallet	5 Nos.
18.	Anvil	3 Nos.
19.	Swage block	3 Nos.
20.	Wire gauges	2 Nos.

Foundry work

21.	Cope and Drag Box	5 Nos.
22.	Solid pattern	5 Nos.
23.	Split pattern	5 Nos.
24.	Runner	5 Nos.
25.	Riser	5 Nos.
26.	Sprue pin	5 Nos.
27.	Sand rammer	5 Nos.
28.	Trowel	5 Nos.

Study Experiments

29.	Air-conditioner unit	1 No.
30.	Industrial Robot	1 No.
31.	Washing Machine	1 No.

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24GE104L   **ENGINEERING PRACTICES LABORATORY (GROUP – B)**

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

S. No.	Description of Equipment	Quantity Required (Nos)
Part III: Electrical Engineering		
1.	Single phase house wiring setup	5
2.	Three phase house wiring setup	3
3.	Staircase wiring setup	3
4.	Fluorescent lamp and LED with wiring setup	Each 3
5.	Emergency lamp wiring setup	2
6.	Iron box wiring setup	2
7.	Fan with Regulator	2
8.	AC Voltmeter, Ammeter, Wattmeter and Energy Meter	Each 4
9.	R-Load	4
10.	Inductive and Capacitive Load	Each 1
Part IV: Electronics Engineering		
1.	Soldering Iron, Lead	10 Set
2.	Multi meter	10
3.	Continuity tester	10
4.	Used Laptop	3
5.	Used desktop computer	3
6.	Used LED TV	3
7.	Used Smart Phone	3
8.	DC Regulated power supply (0-30V)	2
9.	Resistors	200
10.	Capacitors	200
11.	Diodes	100
12.	Transistors	50

Brooks

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24EEC101L   INTERPERSONAL COMMUNICATION LABORATORY   L T P C
(Common to All Branches)   0 0 2 1

OBJECTIVES:
The students should be made to:
- Improve the communicative competence of learners
- Help learners use language effectively in academic/work contexts
- Develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- Build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- Use language efficiently in expressing their opinions via various media.

UNIT I   INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION   6
Listening for general information-specific details - conversation: Introduction to classmates (formal & informal); Telephone conversation; Speaking - Self Introduction-Introducing a friend; - politeness strategies - making polite requests, making polite offers, replying to polite requests and offers - understanding basic instructions (filling out a bank application for example).

UNIT II   NARRATION AND SUMMATION   6
Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events- Talking about current and temporary situations & permanent and regular situations - describing experiences and feelings engaging in small talk- describing requirements and abilities.

UNIT III   DESCRIPTION OF A PROCESS / PRODUCT   6
Listening - Listen to product and process descriptions, a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)- talking about precautions.

UNIT IV   FUNCTIONAL COMMUNICATION   6
Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation.

UNIT V   PROFESSIONAL SKILLS   6
Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –making predictions- talking about a given topic.

TOTAL: 30 PERIODS

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OUTCOMES:

On successful completion of the course, the students will be able to,

- Listen to and comprehend general as well as complex academic information.
- Listen to and understand different points of view in a discussion.
- Speak fluently and accurately in formal and informal communicative contexts.
- Describe products and processes and explain their uses and purposes clearly and accurately.
- Express their opinions effectively in both formal and informal discussions.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	-	2	3	-	2
CO2	-	-	-	-	-	-	2	2	3	-	2
CO3	-	-	2	-	3	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	2	3	-	2
CO5	-	-	-	-	-	3	2	2	3	-	-

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LIST OF EQUIPMENTS
Requirements for a batch of 30 students

Sl. No.	Description of Equipment/Software	Quantity required (Nos)
1	Computer	30
2	Headphones	30
3	**Software:** Globarena	30

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24EN201	TECHNICAL ENGLISH	L T P C
	(Common to All Branches)	3 0 0 3

OBJECTIVES:

The students should be made to:

- Improve understanding of commonly used English usage by cultivating listening skills through informal interactions.
- Enrich their speaking abilities through scenario-based conversations to understand how language functions in context.
- Develop their ability to read critically by analyzing newspaper articles.
- Use group discussion techniques to improve cooperative communication.
- Enhance your ability to write professionally by creating organized reports.

UNIT I   CONVERSATION   9

Listening: Listening to informal conversations, Speaking: Short conversations in varied situations in student life, Reading: Reading Short text and longer passages for comprehension at deeper levels, Writing: Writing reviews (book / film), Grammar: Compound Nouns - Numerical Expression, Vocabulary: Cause and Effect Expressions.

UNIT II   LANGUAGE IN USE   9

Listening: Listening to Situation based Dialogues, Speaking: Asking about Routine actions and giving directions, Reading: Reading a short story for appreciation and understanding, Writing: Writing Emails - Dialogue writing, Grammar: Purpose expressions - Adverbs, Vocabulary: Imperative sentences.

UNIT III   ENGLISH FOR SPECIFIC PURPOSE   9

Listening: Listening strategies for deeper understanding, Speaking: Using dictionary for learning pronunciation, stress and syllable divisions, Reading: an article from Newspaper - Critical reading, Writing: Note-Making / Note-Taking - Essay writing, Grammar: Definition, Degrees of Comparison, Vocabulary: Model verbs.

UNIT IV   ENGLISH FOR CAREER   9

Listening: Listening to the interviews of CEOs / entrepreneur, Speaking: Group Discussion skills, Reading: pre reading and post reading tasks, Writing - Job application - Cover letter & Resume, Grammar: Active and Passive voice, Relative Pronouns, Vocabulary: Synonyms and Antonyms.

UNIT V   REPORT WRITING   9

Listening: Listening and making notes, Speaking: Discussion on problems and solutions (case studies), Reading: Reading abstracts / Journal Articles, Writing: Minutes of meeting, Reports (Feasibility / Accident / Survey Report), Grammar: If Clause, Vocabulary: Idioms and their Meanings.

TOTAL: 45 PERIODS

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OUTCOMES:
On successful completion of the course, the students will be able to,
- Respond to informal conversations with effectiveness, exhibiting understanding.
- Appreciate and critically engage with short stories, articulating insights.
- Utilize dictionaries to comprehend syllable structures and pronounce words correctly.
- Engage in healthy group discussions by answering peers' questions and sharing ideas.
- Acquire constructive criticism in case study by describing issues.

TEXT BOOKS:
1. Bhatnagar, Nitin and Bhatnagar, Mamta, "Communicative English for Engineering and Professionals", Pearson Education India, 2010.

REFERENCES:
1. Raman, Meenakshi and Sharma, Sangeetha, "Technical Communication Principles and Practice", Oxford University Press, Delhi, 2019.
2. Andrea J, Rutherford. "Basic Communication Skills for Technology", Pearson Education, Inc., 2013.
3. Rizvi M, Ashraf. "Effective Technical Communication", Tata McGraw Hill Education Pvt.Ltd., Delhi,2017.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	1	-	-	2	3	-	2
CO2	-	-	1	-	-	2	2	-	3	-	2
CO3	-	-	-	-	2	-	2	-	3	-	-
CO4	-	-	-	2	-	-	2	3	3	-	-
CO5	-	2	-	2	-	2	2	2	3	-	-

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24MA202   **VECTOR CALCULUS AND NUMERICAL ANALYSIS**   **L T P C**
                      (Common to BME, EEE and ECE)   **3 1 0 4**

OBJECTIVES:
The Student should be made to:
- Grasp the fundamental ideas of vectors, vector fields, and scalar fields.
- Identify the field of engineering in ODE as an effective tool for resolving practical issues.
- Interpret the geometric implications of analytic functions in terms of conformal mapping.
- Differentiate the concepts of numerical differentiation and integration procedures, which have significant role in the field of engineering.
- Test the numerous approaches and strategies for resolving different kinds of ODEs.

UNIT I   VECTOR CALCULUS   **9+3**
Gradient of a Scalar point function – Divergence, Curl, Solenoidal and irrotational of a vector point function – Directional Derivative – Green's, Gauss divergence and Stoke's theorems (without proof)

UNIT II   ORDINARY DIFFERENTIAL EQUATIONS   **9+3**
Higher order linear differential equations with constant coefficients $(e^{ax}V, x^{n}V)$ – Method of variation of parameters – Cauchy's linear differential equations- Legendre's linear differential equations

UNIT III   ANALYTIC FUNCTIONS   **9+3**
Functions of a complex variable – Analytic functions: Necessary condition – Cauchy-Riemann equations and sufficient condition (excluding proofs) Harmonic and orthogonal properties of analytic function – Construction of analytic functions by Milne's method – Conformal mapping $(w = z + k, 1/z, kz)$ – Bilinear transformation.

UNIT IV   NUMERICAL DIFFERENTIATION AND INTEGRATION   **9+3**
Newton's forward and backward difference formulae – Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL
                  EQUATIONS   **9+3**
Single Step methods - Taylor's series method – Euler's method – Fourth order Runge-Kutta method for solving first order equations – Multi step methods – Milne's predictor corrector methods for solving first order equations.

TOTAL: (45+15) PERIODS

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OUTCOMES:
On successful completion of the course, the students will be able to,
- Understand the concepts of gradient, divergence, and curl in vector calculus.
- Interpret the suitable techniques for solving second and higher-order differential equations.
- Utilize conformal mapping and analytic functions to transform complex functions between different domains.
- Apply the different approaches and strategies for solving first- and second-order ordinary differential equations.
- Develop the multi-step methods for solving initial value problems.

TEXT BOOKS:
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2018.

REFERENCES:
1. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2018.
2. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7th Edition New Delhi, 2013.
3. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pt.Ltd, 4th Edition, New Delhi, 2021.
4. Gerald. C.F., and Wheatley. P.O. "Applied Numerical Analysis" 7th Edition, Pearson Education India, 2017.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	1	-	-	-	-	-	2
CO2	3	3	3	3	2	2	-	-	-	-	2
CO3	3	3	3	-	3	-	-	-	-	-	1
CO4	3	3	2	2	2	1	-	-	-	-	2
CO5	3	3	2	3	2	-	-	-	-	-	2

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24MC002   **UNIVERSAL HUMAN VALUES 2 - UNDERSTANDING**   **L T P C**
                                        HARMONY   **2 1 0 3**
                            (Common to All Branches)

OBJECTIVES:
The students should be made to:
- Demonstrate an understanding of ethical principles and human values
- Apply critical thinking to analyze ethical dilemmas and conflicts
- Communicate effectively about ethical issues and human values
- Appreciate the importance of harmony in personal, social, and environmental contexts
- Engage in practices that promote ethical behavior and societal harmony

UNIT 1   INTRODUCTION TO VALUE EDUCATION   6+3
Value Education – need and process, Self-Exploration – process, Basic Human Aspirations - Continuous Happiness and Prosperity, Basic requirement for fulfilment of Human Aspirants, Understanding Happiness and Prosperity – Continuity of Happiness from Physical Facility.

UNIT II   HARMONY IN THE HUMAN BEING   6+3
Human being as a co-existence of the self and the Body - The needs of Self and Body, Body as an Instrument - The Self as the Seer- Doer-Enjoyer, Harmony in the self, Harmony of the Self with the Body –Programme for Self – regulation and health.

UNIT III   HARMONY IN THE FAMILY AND SOCIETY   6+3
Family as the basic unit of human interaction , Understanding Relationship, Trust as the foundational value, Respect as the Right Evaluation, Harmony in the society – Understanding Human Goal, Harmony from Family Order to World Family Order – Universal Human Order - Scope.

UNIT IV   HARMONY IN THE NATURE AND EXISTENCE   6+3
Nature - as Collections of Units, Classification of Units into Four Orders, Interconnectedness, and mutual fulfilment among the four orders of nature, self-regulation in Nature, Understanding Existence as Units in Space, Existence as Co-existence.

UNIT V   IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF
                 HARMONY ON PROFESSIONAL ETHICS   6+3
Natural Acceptance of Human Values - Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Constitution, Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production System and Management Models – Typical case, Strategies for Transition towards value based life and profession.

                                        TOTAL: (30+15) PERIODS
OUTCOMES:
On successful completion of the course, the students will be able to,
- Understand the significance of value education and distinguish between values and skills
- Understand the concept of harmony within the self and how it relates to human values
- Analyze the role of family and society in fostering harmony
- Evaluate the relationship between human values and harmony in nature
- Develop skills to resolve conflicts and promote harmony in personal and professional life

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TEXT BOOKS:
1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics, Excel Books, New Delhi, 2nd Revised Edition, 2019.

REFERENCES:
1. Tripathi A N, "Human Values", New Age Intl. Publishers, New Delhi, 2009.
2. Govindarajan M, Natrajan S and Senthilkumar V S, "Engineering Ethics (Including HumanValues)" Eastern Economy, PHI, 12th Edition, 2011.
3. Govindarajan M and Natrajan S, "Professional Ethics and Human Values", PHI, 2011.
4. Banerjee B P, "Foundation of Ethics and Management", Excel Publication, 2005.
5. Bajpai B L, "Indian Ethos and Modern Management", New Royal Book Co, Lucknow,Reprinted 2008.
6. Seebauer and Robert L Berry, "Fundamentals of Ethics for Scientist and Engineers", OxfordUniversity Press, 2000.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	3	3	-	-	-	3
CO2	-	-	-	-	-	3	3	-	-	-	3
CO3	-	-	-	-	-	3	3	-	2	-	3
CO4	-	-	-	-	-	3	3	-	2	-	3
CO5	-	-	-	-	-	3	3	-	2	-	3

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24CY201 **ENVIRONMENTAL SCIENCES** **L T P C**
(Common to All Branches) **3 0 0 3**

OBJECTIVES:
The students should be made to:
- Understand the structure and function of different ecosystems and concepts of biodiversity.
- Recognize the causes and effects of environmental pollutants and disaster management.
- Explore the natural resources and their sustainability.
- Examine the principles of sustainable development and Green Chemistry.
- Analyze the impacts of population on environment and human health.

UNIT I   ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY   9
Definition, scope and importance of environment - concept of an ecosystem - structure and function of an ecosystem - ecological succession - food chain - food web - structure and function of the (a) forest ecosystem (b) desert ecosystem (c) aquatic ecosystem - (pond and ocean) - Biodiversity: Hot spots of biodiversity - threats to biodiversity - values of biodiversity - endangered and endemic species - conservation of biodiversity: In-situ and ex-situ conservation methods.

UNIT II   ENVIRONMENTAL POLLUTION AND NATURAL CALAMITIES   9
Definition - causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Marine pollution (d) Noise pollution (e) Nuclear hazards - solid waste and E-waste Management: role of an individual in prevention of pollution-disaster management: flood, earthquake, cyclone and landslides.

UNIT III   NATURAL RESOURCES   9
Forest resources: deforestation, mining, dam and their effects on forest and tribal people - Water resources: Use and over - utilization of surface and ground water - dams-benefits and problems - Food resources: World food problems - effects of modern agriculture - fertilizer - pesticide problems, water logging, salinity - Energy resources: renewable energy sources - Solar energy, Tidal energy, Wind energy sources. Land resource: land degradation, Soil erosion and desertification - role of an individual in conservation of natural resources.

UNIT IV SOCIAL ISSUES AND SUSTAINABILITY   9
Water conservation - rain water harvesting- resettlement and rehabilitation of people; its problems and concerns - environmental ethics - acid rain, ozone layer depletion - waste land reclamation - Air (Prevention and Control of Pollution) act - Water (Prevention and control of Pollution) act - Wildlife protection act – Forest conservation act. Sustainable development- Green Chemistry: Principles of green chemistry - Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transportation.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT   9
Population growth, variation among nations - population explosion - family welfare programme - environment and human health - value education - HIV / AIDS - threatening of communicable diseases for human population and its prevention - women and child welfare - role of information technology in environment and human health.

TOTAL: 45 PERIODS

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OUTCOMES:
On successful completion of the course, the students will be able to,
- Articulate the significance of ecosystems and biodiversity.
- Evaluate the preventive measures of pollution and calamities.
- Identify the strategies for the conservation of natural resources.
- Retrieve the measures of green chemistry to real-world scenarios.
- Evaluate the issues of overpopulation and communicable diseases on the environment.

TEXT BOOKS:
1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, Delhi, 2nd Edition, 2018.
2. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 3rd Edition, 2016.

REFERENCES:
1. G. Tyler Miller, St. Andrews Preshyterian, "Introduction to Environmental Science", Cengage Learning India Pvt., Ltd., 2010.
2. Dharmendra S. Sengar, "Environmental Law", Prentice hall of India Pvt. Ltd, Delhi, 2007.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	-	-	-	3	2	-	-	-	-
CO2	2	2	-	-	-	3	3	-	-	-	-
CO3	-	1	3	-	2	3	-	-	-	-	-
CO4	2	-	3	-	3	-	3	-	-	-	-
CO5	1	2	-	-	-	2	-	-	2	-	-

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24GE101 COMPUTER FUNDAMENTALS AND C PROGRAMMING

(Common to All Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

The Student should be made to:

- Learn the fundamentals of Computer and Programming.
- Understand the basics of C programming and decision making statements.
- Learn how to construct programs using array and pointer.
- Understand the concept of string and function.
- Study the concept of structure, union and files.

UNIT I FUNDAMENTALS OF COMPUTER AND PROGRAMMING 9

Computer System - Components of Computer Hardware - Data Representation - Number System and Conversion - Program Development Life Cycle - Algorithm - Control Structures - Flowchart – Pseudo code - Programming Paradigms.

UNIT II BASICS OF C PROGRAMMING 9

Overview of C - C Character Set - Identifiers and Keywords - Variable Declaration - Data types - Type Qualifiers and Type Modifiers - Structure of a C Program - Executing a C Program - Operators and Expressions - Decision-Making and Looping Statements.

UNIT III ARRAYS AND POINTERS 9

Introduction to Arrays - Types of Array - Pointers - void Pointer - Null Pointer - Arrays of Pointers - Pointer to a Pointer - Pointer to an Array - Pointer Arithmetic.

UNIT IV STRINGS AND FUNCTIONS 9

Strings - Reading String Input - String Library Functions - Command Line Arguments - Functions: Types - Declaration - Definition - Function Call - Pass by Value - Pass by Reference - Passing arrays to functions - Recursion.

UNIT V STRUCTURE, UNION AND FILES 9

Structures - Pointers to Structures - Array of Structures - Structures within a Structure - Functions and Structures - Unions - Storage Classes - Files: Streams - File type - File operations.

TOTAL: 45 PERIODS

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OUTCOMES:

On successful completion of this course, the students will be able to,

- Explain the fundamentals of computer and programming.
- Choose appropriate data types, variables and statements for solving simple problems.
- Construct programs using arrays and pointers for a given scenario.
- Build programs using strings and functions in C language.
- Develop programs using structure, union and files for a given scenario.

TEXT BOOKS:

1. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Pearson India Education Services Pvt. Ltd., 2016.

REFERENCES:

1. Ajay Mital, "Programming in C - A Practical Approach", Pearson Education, 2015.
2. Dromey R G, "How to Solve it by Computer", Pearson Education, Fifteenth Impression, 2014.
3. Herbert Schildt, "C - The Complete Reference", Tata McGraw-Hill, 2013.
4. Ashok N Kamthane, "Computer Programming", Pearson Education, Second Edition, 2012.
5. Juneja B L and Anita Seth, "Programming in C", Cengage Learning India Pvt. Ltd., 2011.

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	-	2	-	-	-	-	-	-	-
CO2	3	2	2	2	-	-	-	-	2	2	-
CO3	3	2	2	2	-	-	-	-	2	2	1
CO4	3	2	2	2	2	-	-	-	2	2	1
CO5	3	2	2	2	2	-	-	-	2	2	1

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24BM201 BIOSCIENCES FOR BIOMEDICAL ENGINEERING

L T P C
3 0 0 3

OBJECTIVES:
The student should be made to

- Apply biochemical principles to understand their roles in biological and clinical systems
- Utilize Carbohydrate and Lipid principles to understand their structure, function, and metabolic activities
- Integrate Amino acids, Proteins, and Nucleic acid concepts to understand their structure, functions, and significance.
- Implement the concepts of Cell injury, Repair, and Neoplasia to understand the factors influencing disease progression
- Utilize Microscopy, Microbiology, and Immunology concepts to assess Microbes, Viruses, and Immune responses.

UNIT I   FUNDAMENTALS OF BIOCHEMISTRY   9
Introduction to Biochemistry, water as a biological solvent, weak acid and bases, pH, buffers, Maintenance of Blood pH,Handerson - Hassel Balch equation, Energy in living organism, Properties of water and their applications in biological systems .Osmosis: Definition, measurement of Osmotic pressure , Biological membrane, Clinical application of Electrolytes and radioisotopes.

UNIT II   CARBOHYDRATES AND LIPIDS   9
Carbohydrates: Classification of carbohydrates – monosaccharide's-Glucose, oligo and polysaccharides. Structure and properties of carbohydrates- Functions of carbohydrates. Lipids: Classification of lipids-Functions. Fatty acids- Nomenclature of Fatty acids-Phospholipids-Glycolipids-Lipoproteins-Amphipathic Lipids and their biological significance.

UNIT III AMINO ACIDS AND PROTEINS   9
Amino acids: Classification – Based on structure and chemical nature, nutrition and solubility properties of amino acids, Functions of amino acids. Proteins: Classification- Structure-primary, secondary and tertiary. Properties of proteins, Nucleotides and Nuclei acids: Structural aspects – Functions – DNA- Watson-Crick model of DNA structure- RNA- Types- m-RNA t-RNA.

UNIT IV CELL DEGENERATION, REPAIR AND NEOPLASIA   9
Cell injury: Reversible cell injury-Mechanism of cell injury , Cell death- Necrosis, Apoptosis, Hypoxia and Ischemia-Intracellular accumulations, Pathological calcification- Dystrophic and Metastatic, Cellular ageing.Repair:Cell regeneration, Factors influencing tissue repair, Wound healing. Neoplasia: Benign and Malignant tumors, genetic and epigenetic of carcinogenesis, Carcinogenic agents and their cellular interactions.

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UNIT V FUNDAMENTALS OF MICROBIOLOGY AND IMMUNOPATHOLOGY   9

Microscopes: Light microscope, Electron microscope-TEM & SEM. Bacteria: Morphology, Pathogenicity, Epidemiology and Laboratory Diagnosis. Virus: Morphology, Classification-DNA and RNA virus, Viral Multiplication. Immunity: Types- Innate and Acquired immunity- Antigen and Antibodies - Antigen-Antibody Reactions-Immune Response- Production of antibodies, Hypersensitivity, Immunodeficiency diseases.

TOTAL: 45 PERIODS

OUTCOMES:

On successful completion of this course, the students will be able to

- Demonstrate the ability to analyze and solve biochemical problems in biological applications
- Analyze the properties, functions, and clinical relevance of carbohydrates and lipids in energy storage, structure, and signaling.
- Assess the classification, structure, and roles of Amino acids, Proteins, and Ncleic acids in genetics.
- Illustrate the processes of cell damage, regeneration, wound healing, and tumor development
- Evaluate microbial structures, viral replication, and immune functions in disease diagnosis

TEXT BOOKS:

1. RAFI MD "Textbook of biochemistry for Medical Student" 4th Edition, Universities Press,Orient Black swan Private Limited - New Delhi 2021.
2. U. Satyanarayana & U. Chakrapani "Biochemistry" 5th Edition , Elsevier, 2019.
3. Ramzi S Cotran, Vinay Kumar & Stanley L Robbins, "Pathologic Basis of Diseases",10th edition: South Asia Edition Elsevier India, 2020.
4. Ananthanarayanan & Panicker, "Microbiology" Orient black swan, 10th edition, 2017.

REFERENCES:

1. Keith Wilson & John Walker, "Practical Biochemistry -Principles & Techniques", Oxford University Press, 2009.
2. Dubey R C and Maheswari DK. "A Text Book of Microbiology" S Chand & Company Ltd, 2007.
3. Prescott , Harley and Klein, "Microbiology", 10th edition, Mc Graw Hill, 2017

COURSEOUTCOME Versus PO&PSO MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

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

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| 24TA201 | TAMILS AND TECHNOLOGY | L T P C |
| | (Common to All Branches) | 1 0 0 1 |

OBJECTIVES:
Students should be made to:
- Gain knowledge about weaving and ceramic Technology
- Creating a design and construction Technology
- Analyzing manufacturing Technology
- Applying agriculture and irrigation Technology
- Remembering scientific and scientific Tamil and Tamil computing

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)- Thirumalai Nayakar 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 Kumizhi Thoompu 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
OUTCOMES:
On successful completion of the course, the students will be able to,
- Understand weaving under ceramic Technology.
- Develop new design and construction Technology.
- Identify the manufacturing Technology.
- Understand agriculture and irrigation.
- Knowledge of scientific Tamil and Tamil computing.

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TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் – கே. கே. பிள்ளை– (வெளியீடு:தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை -ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by : International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) -- Reference Book.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	2	1	-	-	1
CO2	-	-	-	-	-	-	2	1	-	-	1
CO3	-	-	-	-	-	-	2	1	-	-	1
CO4	-	-	-	-	-	-	2	1	-	-	1
CO5	-	-	-	-	-	-	2	1	-	-	1

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தமிழரும் தொழில்நுட்பமும்
(அனைத்து துறைகளுக்கும் பொதுவானது)

நோக்கம்:

மாணவர்கள் கண்டிப்பாக அறிய வேண்டுவன:

- நெசவு மற்றும் பீங்கான் தொழில்நுட்பம் பற்றிய அறிவைப் பெறுதல்.
- வடிவமைப்பு மற்றும் கட்டுமான தொழில் நுட்பத்தை உருவாக்குதல்.
- உற்பத்தி தொழில் நுட்பத்தை பகுப்பாய்வு செய்தல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத் தொழில் நுட்பத்தைப் பயன்படுத்துதல்.
- அறிவியல் மற்றும் அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறி தொடர்பான அறிவை நினைவில் கொள்ளுதல்.

அலகு 1   நெசவு மற்றும் பானை தொழில் நுட்பம   3

சங்க காலத்தில் நெசவுத்தொழில் - பானை தொழில் நுட்பம் - கருப்பு, சிவப்பு பாண்டங்கள் - பாண்டுகளில் கீறல் குறியீடுகள்.

அலகு 2   வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்   3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் &சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுக்கல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்து பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் நாயக்கர் கால கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை.

அலகு 3   உற்பத்தித் தொழில்நுட்பம்   3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்பு தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடிகள் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்பு துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4   வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம்   3

அணை, குளங்கள், மதகு - சோழர்கால குழுளி தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்து குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

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அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ்

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

TOTAL: 15 PERIODS

முடிவுகள்:

பாடத்தின் முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- பீங்கான் மற்றும் நெசவு தொழில்நுட்பத்தைப் புரிந்து கொள்ளுதல்.
- புதிய வடிவமைப்பு மற்றும் கட்டுமான தொழில் நுட்பத்தை உருவாக்குதல்.
- உற்பத்தித் தொழில் நுட்பத்தை அடையாளம் காணுதல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத்தைப் புரிந்து கொள்ளுதல்.
- அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறி தொடர்பான அறிவை பெறுதல்.

உரை மற்றும் குறிப்பு புத்தகங்கள்:

1. தமிழகவரலாறு - மக்களும்பண்பாடும் – கே. கே. பிள்ளை– (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை -ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by : International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	2	1	-	-	1
CO2	-	-	-	-	-	-	2	1	-	-	1
CO3	-	-	-	-	-	-	2	1	-	-	1
CO4	-	-	-	-	-	-	2	1	-	-	1
CO5	-	-	-	-	-	-	2	1	-	-	1

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C PROGRAMMING LABORATORY			**L**	**T**	**P**	**C**

24GE103L   **C PROGRAMMING LABORATORY**   **L T P C**
                (Common to All Branches)   **0 0 3 1.5**

OBJECTIVES:
The Student should be made to:
- Learn how to develop C programs using conditional and looping statements
- Understand the concept of functions, arrays and strings
- Learn how to access memory using pointers
- Group different kinds of data related to a single entity
- Understand the manipulation of data in permanent storage

LIST OF EXPERIMENTS:
1. Programs using decision making statements.
2. Programs using looping statements.
3. Programs using user defined functions and recursive functions.
4. Programs using one dimensional and two dimensional arrays.
5. Solving problems using string functions.
6. Programs using pointers and dynamic memory allocation.
7. Programs using structures and unions.
8. Programs using pointers to structures and other data types.
9. Programs using text files.
10. Programs using binary files.

TOTAL: 45 PERIODS

OUTCOMES:
On successful completion of this course, the students will be able to,
- Implement C programs using control statements.
- Write C programs using functions, arrays and strings.
- Write C programs to access data in memory using pointers.
- Develop C programs using structures and other user defined data structures to manipulate heterogeneous data.
- Build C programs to manipulate data stored on permanent storage.

List of Equipment for a Batch of 30 Students:
- Standalone desktops with C compiler or Server with C compiler for 30 Nos.

Mapping of COs with POs :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	2	-	-	-	2	3	-	-
CO2	3	2	3	2	-	-	-	2	3	-	-
CO3	3	2	3	2	-	-	-	2	3	-	2
CO4	3	2	3	2	2	-	-	2	3	-	2
CO5	3	2	3	2	2	-	-	2	3	-	2

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BoS (IT)   27/11

24BM202L	BIOSCIENCES LABORATORY	L T P C
		0 0 3 1.5

OBJECTIVES:
The students should be made to:

- Experiment with various laboratory solution, buffers and emulsions and standardize by using spectroscopy
- Identify the presence of Carbohydrates, Proteins, and Lipids in the given samples
- Demonstrate blood collection and preparation of Serum and Plasma
- Analyze biochemical parameters in the blood and Urine for clinical assessment
- Apply staining techniques to analyze Microorganisms and Pathological samples

LIST OF EXPERIMENTS:

1. Preparation of solutions: a) percentage solutions, b) molar solutions, c) normal solutions
2. Standardization of pH meter, preparation of buffers, emulsions.
3. Spectroscopy: Determination of absorption maxima (λ_{max}) of a given solution
4. General tests for carbohydrates, proteins and lipids.
5. Identification of blood sample Collection and Preparation of serum and plasma from blood.
6. Estimation of Glucose, Creatinine, Urea and Uric acid
7. Urine physical and chemical examination (protein, reducing substances, ketones, bilirubin and blood)
8. Study of Staining Techniques
    a) Simple staining.
    b) Gram Staining.
    c) AFB Staining
9. Study of Histopathological slides of benign and malignant tumors and Haematology slides of anemia and leukemia.
10. Antigen – Antibody reaction immune electrophoresis.

TOTAL: 45 PERIODS

COURSE OUTCOMES
On successful completion of this course, the students will be able to

- Develop solution for testing, standardize based on pH values and use Spectroscopy effectively for analysis
- Detect and differentiate between Carbohydrates, Proteins, and Lipids from the biological samples
- Differentiate and process Serum and Plasma effectively
- Perform tests for determining the values of complete Glucose, Creatinine, Urea, Uric Acid, and Urine components
- Evaluate histopathological and hematology slides for disease identification

Text Books:
1. Textbook of Medical Laboratory Technology, Ramnik Sood, 6thEdition, Jaypee Brothers Medical Publishers, 2009

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COURSE OUTCOME Versus PO&PSO MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

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

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24EEC201L   **PROFESSIONAL COMMUNICATION LABORATORY**   **L T P C**
                    (Common to All Branches)   **0 0 2 1**

OBJECTIVES:
The students should be made to:
- Establish effective time management techniques and professional grooming routines.
- Make progress on their own presentations by utilizing visual aids and interacting with the audience.
- Obtain the ability to participate in group conversations effectively and comprehend group dynamics.
- Recognize the protocol required for different types of interviews.
- Develop strategies for stress management, time management, and professional networking.

UNIT I   SOFT SKILLS DEVELOPMENT   6
Introduction to Soft Skills - Hard skills & soft skills - Employability and Career Skills - Grooming as a professional with values - Time Management - General awareness of Current Affairs.

UNIT II   DEVELOPING SELF ESTEEM   6
Self-Introduction-organizing the material - Introducing oneself to the audience - introducing the topic - answering questions - individual presentation practice - presenting the visuals effectively - Five minutes presentation

UNIT III   PROFESSIONAL SKILLS   6
Introduction to Group Discussion - Participating in group discussions - understanding group dynamics - brainstorming the topic - questioning and clarifying - GD strategies - activities to improve GD skills

UNIT IV   COMMUNICATION ETIQUETTES   6
Interview etiquette - dress code - body language - attending job interviews - telephonic interview - one to one interview & panel interview - FAQs related to job interviews

UNIT V   MANAGEMENT SKILLS   6
Recognizing the differences between groups and teams - managing time - managing stress- networking professionally- respecting social protocols - understanding career management-developing a long- term career plan-making career changes.

                                                            TOTAL: 30 PERIODS

OUTCOMES:
On successful completion of the course, the students will be able to,
- Develop employability skills such as communication, teamwork, adaptability, and problem-solving.
- Enhance confidence and competence in answering questions effectively during presentations and discussions.
- Apply group discussion techniques and real-world exercises to improve debating abilities.
- Prepare for various job interviews, including panel, one-on-one, and telephone interviews.
- Formulate a comprehensive career plan, focusing on networking and career progression.

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Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	-	3	3	-	3
CO2	-	-	-	-	-	-	-	3	2	-	3
CO3	-	-	-	-	-	-	-	2	3	-	3
CO4	-	-	-	-	-	-	-	3	3	-	3
CO5	-	-	-	-	-	-	-	3	2	-	2

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LIST OF EQUIPMENTS
Requirements for a batch of 30 students

Sl. No.	Description of Equipment/Software	Quantity required (Nos)
1	Computer	30
2	Headphones	30
3	**Software:** Globarena	30

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24MA303   TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS   L T P C
(Common to BME, CIVIL, EEE, ECE and MECH)   3 1 0 4

OBJECTIVES:
The Student should be made to:
- Understand the basic concepts of PDE for solving standard partial differential equations
- Remember the concepts of fourier series for solving problems in engineering disciplines
- Applying the standard techniques for solving boundary value problem
- Analyze Fourier transform techniques used in wide variety of situations
- Evaluate the Z transform techniques for discrete time systems

UNIT I   PARTIAL DIFFERENTIAL EQUATIONS   9+3
Formation of partial differential equations(single functions only) - Singular integrals -Solutions of standard types of first order partial differential equations(four types) - Lagrange's linear equation - Linear partial differential equations of second order with constant coefficients of homogeneous Equations.

UNIT II   FOURIER SERIES   9+3
Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine series - Half range cosine series - Complex form of Fourier series - Parseval's identity - Harmonic analysis.

UNIT III   FOURIER TRANSFORMS   9+3
Fourier transform pair - Fourier sine and cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

UNIT IV   APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS   9+3
Classification of PDE - Method of separation of variables - Fourier Series Solutions of one dimensional wave equation - One dimensional equation of heat conduction - Steady state solution of two dimensional equation of heat conduction.

UNIT V   Z -TRANSFORMS AND DIFFERENCE EQUATIONS   9+3
Z-transforms - Elementary properties - Inverse Z-transform - Partial fraction - Convolution theorem (Statement and Examples) - Initial and final value theorems - Formation of difference equations - Solution of difference equations using Z-transform.

TOTAL: (45+15) PERIODS

OUTCOMES:
On successful completion of the course, the students will be able to,
- Understand suitable concepts in solving first order and second order partial differential equations with constant coefficients
- Identify the Fourier series for standard periodic waveforms
- Apply the solutions of wave and heat equations using Fourier series
- Analyze the properties and techniques of Fourier transforms
- Evaluate the necessary Z transform techniques to solve the difference equations

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TEXT BOOKS:
1. Veerarajan T., "Transforms and Partial Differential Equations", 3rd Edition, Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2017.
2. Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, Delhi, 2017.

REFERENCES:
1. Bali N.P and Manish Goyal, "A Text Book of Engineering Mathematics", Laxmi Publications(P) Ltd., 9th Edition, 2016.
2. Ramana B V, "Higher Engineering Mathematics", New Delhi Tata McGraw- Hill Education India Private Limited., 2018.
3. Glyn James, "Advanced Modern Engineering Mathematics", 4th Edition, Pearson Education, 2011.
4. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2011.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	-	-	2	-	2	-	-	2
CO2	3	2	2	-	-	2	-	2	-	-	2
CO3	3	3	3	2	-	2	-	2	-	-	2
CO4	3	2	2	-	-	1	-	2	-	-	2
CO5	3	2	3	2	-	1	-	2	-	-	2

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24BM301   HUMAN ANATOMY AND PHYSIOLOGY   **L T P C**
                                                                3 0 0 3

OBJECTIVES:

The student should be made to:

- Integrate the individual functions of all the cells, tissues and organs into a functional whole human body.
- Identify the Bones, Joints and Functions and Muscular Movements.
- Emphasize the constituents of Blood, cardiovascular and respiratory system and its functions
- Outline the importance of digestion, absorption and mechanism of Urinary system
- Identify and classify the functions of nervous and various sensory organs of the human body

UNIT I   BASIC ELEMENTS OF HUMAN BODY   **9**

Cell – Cell Structure – Functions of components of cell. Cell membrane – Fluid mosaic model-transport across cell membrane – Action potential – Homeostasis - Cell Division -Tissue: Types, functions.

UNIT II   SKELETAL AND MUSCULAR SYSTEM   **9**

Skeletal: Types of Bone and function –Structure of long bone- Physiology of Bone formation – Division of Skeleton -Types of joints and function – Joint disorders - Types of cartilage and function. Muscular: Types of muscles –Functions- Muscle movements - Muscle contraction-Neuromuscular junction.

UNIT III   CARDIOVASCULAR AND RESPIRATORY SYSTEM   **9**

Blood: Components and Functions – Hematopoiesis - Haemostasis – Blood groups. Cardiovascular System: Structure of heart – Conduction System of heart – Cardiac Cycle and heart sounds. Lymphatic System: Lymphatic vessels - Lymph node - lymphoid organs - Respiratory system: Organs of respiratory system – Mechanism of breathing – Lung volumes and capacities – Gaseous exchange.
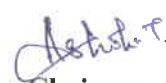
UNIT IV   DIGESTIVE AND EXCRETORY SYSTEMS   **9**

Digestive system: Organs of digestive system – digestion and absorption – Nutrition and metabolism – Krebs cycle. Urinary System: structure of kidney - nephron - mechanism of urine formation - Micturition- Maintaining water and electrolyte balance of blood.

UNIT V   NERVOUS AND SENSORY SYSTEM   **9**

Nervous tissue: Structure and function of cells of nervous system - Nerve conduction and synapse Brain - spinal cord – Reflex action – Somatic and Autonomic Nervous system. Eye: Structure - Physiology of Vision. Ear: structure - Physiology of Hearing. Integumentary – Structure of skin-Appendages of the skin.

                                                TOTAL: 45 PERIODS

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OUTCOMES:
On Successful completion of this course, students will be able to,
- Appreciate the functional importance of Cells, Tissues and Organs of Human Body
- Classify the types of Bones, Joints and Muscle characteristics
- Interpret the functions of the Blood, Heart, Lymphatic and Respiratory systems
- Extend the knowledge of digestion and urinary system to built artificial organs
- Translate the brain functions and sensory organs into appropriate wave patterns through appropriate instruments

TEXT BOOKS:
1. Elaine N Marieb," Essential of Human Anatomy and Physiology" Tenth Edition, Pearson Education, 2013.

REFERENCES:
1. Guyton & Hall, "Text book of Medical Physiology", 13th Edition, Saunders, 2015.
2. Ranganathan T S, "Text book of Human Anatomy", S.Chand& Co. Ltd., New Delhi, 2012.
3. SaradaSubramanyam, K MadhavanKutty, Singh H D, "Textbook of Human Physiology", 0S. Chand and Company Ltd, New Delhi, 2012.

Mapping of COs with POs and PSOs

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

Chairman
BoS/BME

24BM302   **MEDICAL PHYSICS**   **L T P C**
                                                                     3 0 0 3

OBJECTIVES:
The student should be made to:
- Illustrate the principles, effects of ionizing and non-ionizing
- Interpret the physics of radiation sound, ultrasound interaction and its clinical applications
- Develop an understanding of the principles of radionuclides and its uses in medicine
- Organize the interaction of particles, X and Gamma radiation with matter
- Demonstrate the significance of dose measurement, detectors and counters

UNIT I   IONIZING AND NON-IONIZING RADIATION   9
Electromagnetic spectrum - Generation of ionizing radiation – Production of X-rays - Linear accelerator - Tele-isotope - Absorption, Scattering and Attenuation of Gamma-rays –Biological effects and Protection. Non ionizing radiation: Physics of light - Intensity of light - Tissue as a leaky dielectric - Low Frequency Effects- Higher frequency effects.

UNIT II   SOUND IN MEDICINE   9
Physics of sound - Normal sound levels - Ultrasound fundamentals - Generation of ultrasound (Ultrasound Transducer), Interaction of Ultrasound with matter- Cavitations, Reflection, Transmission, Scanning methods, Artifacts, Ultrasound- Doppler effect, Clinical Applications

UNIT III PRINCIPLES OF RADIOACTIVE NUCLIDES   9
Radioactive Decay: Spontaneous Emission – Isometric Transition – Gamma ray emission, alpha, beta, Positron decay, electron capture. - Radionuclide used in Medicine - Decay series: Half-life and Mean life - Decay equation. Production of radionuclides: Cyclotron - Reactor produced - 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 X and Gamma radiation with matter- Photoelectric effect, Compton Scattering, Pair production, Attenuation of Gamma Radiation, Interaction of neutron with matter and their clinical significance

UNIT V RADIATION DOSE AND DETECTORS   9
Dose and Exposure measurements – Units (SI), Inverse square law, Maximum permissible exposure, relationship between the dosimetric quantities. Measurement Methods: Principles of Gas-Filled Detectors - Ionization chambers - Geiger–Müller Counters - Scintillation counters - Film dosimeters - Thermo luminescent dosimetry(TLD). Scintillation Detectors: Solid Scintillation Counters - Gamma-Ray Spectrometry - Liquid Scintillation Counters - Gamma Well Counters-Thyroid Probe.

                                                      TOTAL: 45 PERIODS

                                                      Chairman
                                                      BoS/BME 19/08/25

OUTCOMES:
On Successful completion of this course, students will be able to,
- Interpret the properties of electromagnetic radiations and its effect on human.
- Demonstrate the knowledge on the properties of sound and its application in medicine.
- Apply the principles and understand the production of radioactive nuclides.
- Explain the interaction of radiation with matter.
- Identify and analyze the radiation quantities and methods of measuring

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.

Mapping of COs with POs and PSOs

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

Chairman
BoS/BME

24EC201 ELECTRIC CIRCUITS AND ELECTRON DEVICES   L   T   P   C
(Common to ECE and BME)   3   0   0   3

OBJECTIVES:

Student should be made to

- Understand the basic electrical quantities, circuit elements, and fundamental laws governing electrical circuits.
- Able to simplify electrical circuits using various network theorems and two-port parameter concepts.
- Learn the behavior of RL, RC, and RLC circuits under transient conditions using Laplace transform techniques.
- Provide insights into semiconductor diodes, their characteristics, and applications in electronic circuits.
- Explore the working principles of BJTs, JFETs, and MOSFETs, along with their role in amplification and switching circuits

UNIT I   BASIC CIRCUIT ANALYSIS   9
Electrical Quantities -Basic Circuit Elements -Independent Voltage and Current Sources - Ohm's Law- Kirchhoff's Laws -Voltage and Current Division, Source Transformation Star Delta Conversion- Mesh analysis and Nodal analysis for DC Circuits - Fundamentals of AC Circuits.

UNIT II   NETWORK THEOREMS AND TWO PORT NETWORKS   9
Network Theorems for DC Circuits: Thevenin's Theorem Norton's Theorem- Superposition Theorem Maximum Power Transfer Theorem Two Port Networks: Z Parameters – Y Parameters - h Parameters - Relationships between Network Parameters (Z, Y, h).

UNIT III   TRANSIENT RESPONSE ANALYSIS   9
Introduction to Laplace transform for step, impulse and periodic functions-Transient Response of RL, RC and RLC Circuits using Laplace transform for DC input and AC sinusoidal input.
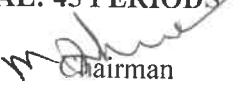
UNIT IV   SEMICONDUCTOR DIODES AND DEVICES   9
Classification of Semiconductors – PN Junction Diode -Structure, Operation and V-I characteristics -Diode Current equation -Transition and Diffusion Capacitances Zener Diode LED-Photodiode-Solar Cell -UJT-SCR.

UNIT V   TRANSISTORS   9
Bipolar Junction Transistor: Construction of BJT-Operation of NPN and PNP transistor - Input and Output characteristics of CB, CE, CC configuration- Field Effect transistor: JFET P Channel JFET and N Channel JFET Construction, Operation, Drain and Transfer characteristics MOSFET Depletion MOSFET and Enhancement MOSFET - Construction, Operation and characteristics.

TOTAL: 45 PERIODS

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BoS(ECE) 22/08/25

OUTCOMES:

On successful completion of this course, the students will be able to,

- Recognize fundamental circuit laws and theorems to solve DC electrical circuits.
- Illustrate the use of Thevenin's, Norton's, and Superposition theorems for circuit simplifications.
- Interpret the behavior of RL, RC, and RLC circuits under DC and AC inputs using Laplace Transform techniques.
- Examine the characteristics and functions of diodes, Zener diodes, LEDs, photodiodes, solar cells, and thyristors.
- Categorize the working principles, characteristics, and applications of BJTs, JFETs, and MOSFETs in different circuit configurations.

TEXT BOOKS:

1. S. Salivahanan, "Circuit Theory Analysis and Synthesis", Pearson Education,1 st Edition,2021.
2. S. Salivahanan, "Electronic Devices", Tata McGraw Hill, 1st Reprint Edition, 2014.

REFERENCES:

1. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Sathesis", 5 thEdition, McGraw Hill, 2015.
2. Chakrabarti A, "Circuit Theory (Analysis and synthesis), Revised Edition, Dhanpath Rai & Sons, New Delhi, 2017.
3. Balbir Kumar, Shail. B. Jain, "Electronic devices and circuits", 2nd Edition PHI learning private limited, 2014.
4. David A. Bell, "Electronic devices and circuits", 5th Edition, Oxford University Higher education, 2008.
5. Sedra and Smith, "Microelectronic circuits", 7th Edition, Oxford University Press, 2017
6. Thomas L. Floyd, "Electronic devices" Conventional current version, 10th Edition, Pearson prentice hall, 2017.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	2	1	1	-	-	-	2
CO2	3	3	2	2	2	1	1	-	-	-	2
CO3	3	3	2	2	2	1	1	-	-	-	2
CO4	3	2	1	1	-	1	1	-	-	-	2
CO5	3	2	1	1	-	1	1	-	-	-	2

Chairman
BoS(ECE)

24BM303   ELECTRICAL ENGINEERING FOR BIOMEDICAL   L T P C
                                                                              3 0 0 3
OBJECTIVES:

The student should be made to:

- Apply the principles of magnetic circuits and transformer operation to analyze the electromagnetic behaviour.
- Illustrate the constructional and operational principles of DC machines to determine their performance.
- Assess the principles of AC and special electrical machines to determine their effectiveness in control and instrumentation systems
- Employ electrical safety standards and protective device principles to design safe and reliable hospital electrical systems.
- Implement power system fundamentals and safety protocols to ensure reliable power delivery and patient protection in a clinical setting.

UNIT I   MAGNETIC CIRCUITS AND TRANSFORMERS   9
Ampere's law - Magnetic quantities- Series and parallel magnetic circuits - Magnetic materials and B-H relationship - Electromagnetic induction - Self and mutual induction- Losses in magnetic circuits. Transformer: Construction and operation of single-phase transformer - Ideal transformer- Autotransformer.

UNIT II   DC MACHINES   9
DC Machines: Construction, Principle of operation, armature windings, EMF equation, Torque equation, Operation of a DC machine as a generator and motor - Characteristics of DC generators and motors.

UNIT III   AC MACHINES AND SPECIAL MACHINES   9
Three phase induction motor: Construction, principle of operation. Single phase induction motor: Construction, working principle and types. Synchronous Generator: Construction, Principle of operation, Synchronous motor: principle and operation. Servomotor- Stepper Motor.

UNIT IV   ELECTRICAL SAFETY DEVICES FOR HOSPITALS   9

Two-way and three-way control, Elementary discussion on circuit protective devices - Fuse and Miniature Circuit Breaker (MCB's), Electric shock, precautions against shock, Objectives for neutral and earthing, Types of earthing - Pipe and Plate earthing, Residual current circuit breaker.

UNIT V   ELECTRICAL POWER SYSTEM AND PATIENT SAFETY   9

Introduction - Power generation, Distribution and Transmission, Power tariffs, Power supply circuits with SMPS, UPS, Electric Shock Hazards, Leakage Currents, Electrical Safety Analyser, Testing of biomedical equipment, Transducers for body temperature measurements.

                                                              TOTAL: 45 PERIODS

                                                        Chairman
                                                        BoS/BME 19/08/25

OUTCOMES:

At the end of this course, the students will be able to:
- Demonstrate the application of magnetic circuit analysis, and transformer principles to assess electromagnetic induction and its functionality
- Analyze the construction, equations, and operational characteristics of DC generators and motors to evaluate their suitability for varied load conditions
- Solve application-based problems involving induction motors and synchronous machines by applying their functional principles.
- Recommend appropriate protective devices and earthing practices to ensure electrical safety and prevent shock hazards in healthcare.
- Interpret power systems, safety mechanisms and biomedical equipment testing procedures to enhance patient safety in hospital settings.

TEXT BOOKS:

1. Kothari D P and Nagarath I J, "Basic Electrical and Electronics Engineering", 3rd Reprint, McGraw Hill Education (India) Private Limited, 2016.
2. Gupta J B, "A course in Power Systems", S K Kataria and Sons, 2016.

REFERENCES:

1. B.L.Theraja, "A Textbook of Electrical Technology", S Chand and Company- Reprint Edition, 2014.
2. V.K Mehata, Rohit Mehta, "Principles Electrical Engineering and Electronics", 2nd edition, S Chand and Company, 2015.
3. R. S. Khandpur, "Handbook of Biomedical Instrumentation", 3rd edition, McGraw Hill Education (India) Private Limited, 2023.

Mapping of COs with POs and PSOs

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

Chairman
BoS/BME

24AD201	PYTHON PROGRAMMING	L	T	P	C
	(Common to ADS, CSE, IT and BME)	3	0	0	3

OBJECTIVES:

The Student should be made to:
- Acquire knowledge about the fundamentals of Python language
- Learn to solve problems using Python conditionals , loops and use functions to solve problems
- Apply Python data structures - lists, tuples and dictionaries to represent complex data
- Enhance the knowledge in GUI Programming
- Build application that handles files and exceptions

UNIT I   INTRODUCTION TO PYTHON   9

Programming Languages - Python History - Getting Started with Python - Writing a Simple program - Reading input from console - Identifiers - Variables - Simultaneous Assignments - Constants - Data Types and Operators - Operator Precedence - Evaluating expressions - Augmented Assignment operators - Type conversion - Common Python Functions - Strings and Characters - Formatting Numbers and Strings.

UNIT II   CONTROL STATEMENTS AND FUNCTIONS   9

Selections: if - Two way if-else - Nested if and multi-way if-elif-else Statements - Loops: while - for - Nested Loops - break and continue - Function: Definition - Calling and Returning values - Positional and keyword arguments - Passing arguments by reference values - Scope of variables - Default Arguments - Recursion.

UNIT III   DATA STRUCTURES IN PYTHON   9

List Basics - List Methods - Passing List to Functions - Returning a List from function - Tuples - Sets - Comparing Sets and Lists - Dictionaries.

UNIT IV   GUI PROGRAMMING USING PYTHON   9

Introduction - Getting started with TKinter - Processing Events - The widget Classes - Canvas - The Geometry Managers. Combo Boxes - Menus - Pop-up menus - Mouse, key, Events and Bindings. Case Study: Bouncing Balls - Scrollbars - Standard Dialog Boxes.

UNIT V   FILES AND EXCEPTION HANDLING   9

Introduction - Text Input and Output - File Dialogs - Retrieving Data from the Web - Exception Handling - Raising Exceptions - Processing Exception using Exception Objects.

TOTAL: 45 PERIODS

OUTCOMES:

On successful completion of this course, the students will be able to,
- Understand the basics of python programming languages
- Apply basic Python programs that solve issues by utilizing loops and conditionals
- Demonstrate compound data using Python lists, tuples and dictionaries etc
- Implement solutions using GUI Programming in Python
- Develop programs by using files and exception handling for the given scenario

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BoS (AD)   26/11

TEXT BOOKS:

1. Y.Daniel Liang, "Introduction to Python Programming and Data Structures", 3rd Edition Pearson Education, 2023.

REFERENCES:

1. Timothy A. Budd, "Exploring Python", McGraw Hill Education (India) Private Ltd, 2017.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff / O'Reilly Publishers, 2016. (http://greenteapress.com/wp/think-python/)
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
4. Mark Lutz, "Learning python", O'Reilly Publication, 5th Edition, 2013.
5. Guido Van Rossum and Fred L. Drake Jr, "An Introduction to Python", Revised and Updated for Python 3.2, Network Theory Ltd., 2011.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	2	-	-	-	2	-	-	3
CO2	3	3	3	3	3	-	-	-	-	2	-
CO3	3	2	3	-	-	-	-	2	-	-	2
CO4	3	2	3	-	2	-	-	2	-	-	3
CO5	3	2	3	-	-	-	-	2	-	-	2

CHAIRMAN
BoS (AD)

24BM304L   **HUMAN PHYSIOLOGY LABORATORY**   L T P C
                                                          0 0 2 1

OBJECTIVES:
The student should be made to:
- Identify and understand the various parts of a compound microscope.
- Comprehend the principles behind blood grouping and Rh factor
- Estimate the coagulation pathways and the role of various factors in the clotting proce
- Classify the constituents of blood and measure the quantity
- Analyze the visual and hearing levels of a human

LIST OF EXPERIMENTS:
1. Study of compound microscope.
2. Identification of Blood groups (Forward and Reverse)
3. Measurement of Bleeding and Clotting time of blood.
4. Prothrombin time Activated partial thromboplastin time and Fibrinogen time.
5. Estimation of Hemoglobin
6. Calculation of total RBC & WBC count.
7. Differential count of Blood cells
8. Estimation of ESR, PCV, MCH, MCV, MCHC
9. Testing the Hearing levels using Tuning fork.
10. Visual Activity – Snellen's Chart and Jaeger's Chart

TOTAL: 30 PERIODS

OUTCOMES:
On successful completion of this course, the students will be able to,
- Demonstrate various parts of a compound microscope and know how to operate
- Identify the types of blood group, Rh type and its significance
- Examine the bleeding time & clotting time of blood
- Identify the RBC, WBC along with its quantity and compare it with nominal value
- Infer the efficiency of visualization and hearing sensory organs

Mapping of COs with POs and PSOs

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

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BoS/BME 19/08/25

| 24EC202L | CIRCUITS AND DEVICES LABORATORY | L P T C |
| | (Common to ECE and BME) | 0 0 3 1.5 |

OBJECTIVES:

The student should be made to:
- Learn and verify the voltage and current in the electrical circuit using Kirchhoff's laws.
- Apply circuit analysis concepts using network theorems.
- Analyze the operation of RLC circuits in series and parallel models.
- Evaluate the characteristics, behavior under varying conditions, and practical applications of diodes and transistors in electronic circuits and devices.
- Create a project using electronic components.

LIST OF EXPERIMENTS:

1. Verification of KVL and KCL

2. Verification of Thevinin's and Norton's Theorem

3. Verification of Super Position Theorem

4. Verification of Maximum Power Transfer Theorem

5. Simulation and Verification of Reciprocity Theorem

6. Determination of Resonance Frequency of Series and Parallel RLC Circuits

7. Characteristics of PN Junction Diode and Zener Diode

8. Input-Output Characteristics of CE Configuration

9. Simulation of LED Characteristics

10. Characteristics of FET

11 Characteristics of SCR

12 Mini Project

TOTAL: 45 PERIODS

Chairman
BoS(ECE) 22/08/25

OUTCOMES:

On successful completion of this course, the students will be able to,

- Contrast Kirchhoff's laws to verify the voltage and current
- Determine the network theorems allows for the efficient solution of voltage, current or resistance in complex circuits.
- Illustrate the operation of RLC circuits in series and parallel models enables the analysis of resistive, inductive and capacitive components
- Implement the characteristics of semiconductor diodes and transistors
- Demonstrates the ability to design, assemble, and troubleshoot electronic circuits, showcasing problem-solving skills and practical application of electronic principles.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	1	1	-	2	-	2	2	-	1
CO2	3	3	2	1	2	2	-	2	2	-	1
CO3	2	2	3	2	-	2	-	2	2	1	1
CO4	2	2	3	2	2	2	-	2	2	1	1
CO5	2	1	2	1	-	2	-	2	2	2	1

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BoS(ECE)

Lab Requirements for a Batch of 30 Students

1.	BC 107, BC 148, BFW10	25 Each
2.	1N4007, SCR, Zener diodes	25 Each
3.	Resistors, Capacitors, Inductors	Adequate Quantities
4.	Digital Multimeter	10 Nos
5.	Bread Boards	15 Nos
6.	Voltmeter (0-15)V, (0-10)V	10 Nos
7.	Ammeter (0-20) mA, (0-250) μA	10 Nos
8.	CRO (30 MHz)	10 Nos
9.	Function Generators (3 MHz)	10 Nos
10.	Regulated Power Supplies (0-30) V	15 Nos
11.	Standalone desktops PCs with Multisim Software (Equivalent to any open source Software)	15 Nos

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BoS (ECE) 22/08/28

24AD202L   **PYTHON PROGRAMMING LABORATORY**   **L   T   P   C**
                          (Common to ADS, CSE, IT and BME)   **0   0   3   1.5**

OBJECTIVES:
The Student should be made to:
- Use control statements and operators in Python programs
- Create python programs using functions and strings
- Represent compound data using Python lists, dictionary and set
- Build python GUI Application with Tkinter
- Design python applications to handles files and exceptions

LIST OF EXPERIMENTS:
1. Python Program to constructs conditional statements.
2. Python Program to implement operators and built in functions.
3. Python Program to performing string operations.
4. Python Program to find the factorial of a number by using functions.
5. Python Program to manipulating the elements on list.
6. Python Program to develop a fundamental data structures in programming using dictionary and set.
7. Python program to Controlling Layout with Geometry Managers.
8. Python Program to display the calendar of the year with GUI using Tkinter.
9. Python Program to perform count the number of words in a file.
10. Python Program to implement exception handling.

TOTAL: 45 PERIODS

OUTCOMES:
On successful completion of this course, the students will be able to,
- Solve the problems using control statements and operators in python
- Construct python program using strings and functions
- Design Python lists, dictionary and set to represent compound data
- Apply Tkinter to develop GUI Application
- Develop python programs using file and exception handling

List of Equipment for a Batch of 30 Students:
Standalone desktops with Python 3 interpreter for Windows/Linux 30 Nos.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	2	2	-	-	2	-	-	-
CO2	3	3	3	2	-	-	-	2	-	-	-
CO3	3	2	2	-	-	-	-	2	-	-	-
CO4	3	3	3	-	2	-	-	2	-	-	2
CO5	3	3	3	-	2	-	-	2	-	-	2

CHAIRMAN
BoS (AD) 26/11

24EEC301L   **SOFT SKILLS DEVELOPMENT**   **L T P C**
                          (Common to All Branches)   **0 0 2 1**

OBJECTIVES:
The students should be made to:
- Enhance the development of students by focusing on soft skills
- Develop skills of the students through individual and group activities
- Shape students' attitude and behaviour through activities
- Analyze the characteristics of the students for self-development
- Prepare themselves for the recruitment processes

UNIT I   SOFT SKILLS ARE IMPORTANT FOR SUCCESS   6
Importance of Soft Skills - Types - Industrial needs - Development of skills — Employees' expectation - Success of employees.

UNIT II   CORPORATE COMMUNICATION   6
Needs and Development of Communication - Customers Relationship - Improving informal communication - Formation of presentations - Public Speaking - Telephone and Email Etiquettes.

UNIT III   DISCUSSIONS   6
Introduction to Discussion - Importance and types of discussion - Spontaneous conversation - Plan for discussions - Panel discussions - Visual Aid discussions - Debate.

UNIT IV   SELF ANALYSIS   6
Who am I - Identifying or searching one's own Strength, Weakness - Opportunities and Threats (SWOT Analysis) - Benefits of SWOT Analysis - Importance of Self Confidence, Self Esteem, Self Development and Self Introspection.

UNIT V   CREATIVITY AND GOAL SETTING   6
Thinking out of the box - Lateral thinking - Positive thinking - Results of smart work - Application of creativities - Short Term and Long Term Goals - Lifetime goals.

                                                    TOTAL: 30 PERIODS

OUTCOMES:
On successful completion of this course, the students will be able to,
- Learners will recognize the importance of Soft skills in Professional life.
- Improve oral and Listening Skills.
- Enhance students' ability in GDs, Presentations and interviews.
- Develop one's strength in setting of goals and developing creative.
- Become a good team worker in the society.

CHAIRMAN
BoS (S&H) 14/10

TEXT BOOKS:
1. "SOFT SKILLS", Career Development Centre, Green Pearl Publications, 2015.

REFERENCES:
1. Covey Sean, "Seven Habits of Highly Effective Teens", New York, Fireside Publishers, 1998.
2. Carnegie Dale, "How to win Friends and Influence People", New York: Simon & Schuster, 1998.
3. Jeff Butterfield, "Soft Skills for Everyone", Cengage Learning, 2011.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	2	2	-	2	2	-	-
CO2	-	3	-	3	2	-	3	2	2	2	2
CO3	2	-	-	-	3	-	2	3	2	2	2
CO4	2	-	2	-	-	2	-	3	2	3	-
CO5	-	3	2	1	-	2	2	3	2	-	-

CHAIRMAN 14/10
BoS (S&H)

24MA403   **PROBABILITY AND STATISTICS**   **L T P C**
                      (Common to ADS, BME and IT)   **3 1 0 4**

OBJECTIVES:
The Student should be made to:
- Introducing the basic concepts of probability and random variables
- Understand discrete and continuous random variables and their probability distributions
- Apply the testing of hypothesis for small and large samples which plays an important role in real life problems
- Evaluating the basic concepts of classifications of design of experiments
- Creating the statistical tools and statistical quality control in engineering problems

UNIT I   PROBABILITY AND RANDOM VARIABLES   9+3
Introduction to probability: Axioms of probability - Conditional probability - Total probability - Baye's theorem - Simple problems on Baye's theorem.
Random variables: Discrete and continuous random variables - Distribution function of random variable - Properties, probability mass function - Probability density function - Mathematical expectation - Properties- Moments - Moment generating functions and their properties.

UNIT II   PROBABILITY DISTRIBUTIONS   9+3
Discrete distributions: Binomial - Poisson - Geometric distribution and their properties.
Continuous distributions: Uniform - Exponential - Gamma - Normal distributions and their properties.

UNIT III   TESTING OF HYPOTHESIS   9+3
Sampling distributions - Estimation of parameters - Statistical hypothesis - large sample test based on normal distribution for single mean and difference of means -small sample tests: t-test for mean - F- test Chi-square test for Goodness of fit and Independence of attributes.

UNIT IV   DESIGN OF EXPERIMENTS   9+3
One way and two-way classifications - Completely Randomized Design - Randomized Block Design -Latin Square Design-22 factorial design.

UNIT V   STATISTICAL QUALITY CONTROL   9+3
Control charts for measurements(X and R charts) - Control charts for attributes (p, c and np charts) - Tolerance limit-Acceptance sampling.

TOTAL: (45+15) PERIODS

CHAIRMAN
BoS (S&H) 14/10

OUTCOMES:
On successful completion of the course, the students will be able to,
- Relate real life problems with concept of Probability and Random variables
- Apply the concept of probability distributions in solving engineering problems
- Applying the concept of testing of hypothesis for small and large samples in real life problems
- Analyzing the basic concepts of classifications of design of experiments
- Creating the notion of sampling distributions and in the field of statistical quality control used in engineering and management problems

TEXT BOOKS:
1. Johnson R.A., Miller, I and Freund J, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2. Richard A. Johnson., "Probability and Statistics for Engineers", Pearson Education, 8th Edition, 2019.

REFERENCES:
1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2021.
2. S.C.Gupta, and V.K.Kapoor, "Fundamental of Mathematical Statistics ", S Chand Publications Reprint, 2013.
3. Spiegel Schiller "Probability and Statistics" Tata McGraw-Hill Publishing Company Limited, New Delhi. 3rd Edition, 2018.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	3	1	-	-	-	-	1	-	-	2
CO2	2	3	1	-	-	-	-	1	-	-	2
CO3	2	3	1	2	1	-	-	1	-	3	3
CO4	2	3	1	2	1	-	-	1	-	3	3
CO5	2	3	1	2	1	-	-	1	-	3	3

CHAIRMAN
BoS (S&H) 14/10

24BM401   **BIOMEDICAL INSTRUMENTATION**   **L T P C**
                                                        3 0 0 3

OBJECTIVES:
The student should be made to:
- Develop fundamental idea about the biopotential and various electrodes used for measurement
- Identify the signal quality and find the suitable amplifier for further processing the signal.
- Compare and contrast the recording setup of ECG, EEG, EMG, EOG and ERG
- Inspect the different techniques used for the measurement of non-electrical parameters
- Explain the biochemical measurement technique required for diagnosis and treatment.

UNIT I   BIOPOTENTIAL ELECTRODES   **9**
Origin of bio potential and its propagation, Electrode-electrolyte interface, Electrolyte-skin interface, skin contact impedance, Motion artifacts, polarization, Silver – Silver chloride electrode, Electrode theory, Biopotential electrodes - surface, needle and micro electrodes, Measurements with two electrodes.

UNIT II BIOSIGNAL AMPLIFIERS AND INTERFERENCE   **9**
General considerations for signal conditioners, preamplifier – biopotential amplifier, Instrumentation amplifier, Carrier amplifier, Chopper amplifier, Isolation amplifiers - Transformer and optical isolation. Power line interference, Right leg driven ECG amplifier.

UNIT III   BIOSIGNAL RECORDING SYSTEMS   **9**
Bio signals characteristics - frequency and amplitude ranges, Basic recording system, ECG – Recording set up, Einthoven's triangle, Standard 12 lead system, Vector cardiograph, EEG – Recording set up, 10-20 electrode system, EMG - Recording setup, EOG - Recording system, Recording of ERG.

UNIT IV MEASUREMENT OF NON-ELECTRICAL PARAMETERS   **9**
Temperature, respiration rate and pulse rate measuring methods. Blood pressure: Indirect methods - Auscultatory methods, Oscillometric method, Direct methods: H_2O Manometers, Cardiac output measurement - Indicator dilution, Thermal dilution and dye dilution methods, Blood flow - Electromagnetic and Ultrasonic blood flow measurement.

UNIT V   BIOCHEMICAL MEASUREMENT AND BIOSENSORS   **9**
Biochemical sensors - pH, pO_2 and pCO_2, Colorimeter, Spectrophotometer, Flame photometer, Selective- ion electrodes based electrolytes analyzer, Blood gas analyzers, Blood cell counter, Auto analyzer.

                                                        TOTAL: 45 PERIODS

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OUTCOMES:
On successful completion of this course, the students will be able to,

- Analyze and address the challenges in measuring biopotentials using various types of electrodes
- Assess the necessity of signal conditioning circuits and choose the appropriate amplifier for signal processing
- Contrast and appreciate the differences in the recording set up required for capturing various bio signals.
- Measure the non-electrical parameters and match with the normal values to determine the health of human
- Determine the biochemical parameters by means of suitable techniques for measuring and counting.

TEXT BOOK:
1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", 2nd Edition, Prentice Hall of India, New Delhi, 2015.
2. Khandpur R S. "Handbook of Biomedical Instrumentation", 3rd Edition, Tata McGraw Hill, New Delhi, 2014.

REFERENCES:
1. John G Webster, "Medical Instrumentation Application and Design", 4th Edition, Wiley India Pvt Ltd, New Delhi, 2015.
2. Joseph J Carr and John M Brown, "Introduction to Biomedical Equipment Technology, Pearson Education, 2004.
3. Myer Kutz, "Standard Handbook of Biomedical Engineering and Design", McGraw Hill Publisher, 2003.

Mapping of COs with POs and PSOs

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

CHAIRMAN
BoS

24BM402   SENSORS AND MEASUREMENTS   L T P C
                                              3 0 2 4

COURSE OBJECTIVES:

- Develop practical skills to calibrate instruments and analyze transducer performance using standardized techniques.
- Interpret transducer performance and assess precision measurement techniques
- Apply analysis techniques to assess photo transducers and standard signals.
- Design a measurement setup using appropriate signal conditioning tools
- Interpret sensor technologies and data methods in medical electronic systems.

UNIT I   FUNDAMENTALS OF MEASUREMENTS   9

Measurement System – Functional elements of an instrument - Classification and Characteristics of Transducers - Static and Dynamic - Standards and calibration – Errors in Measurements and their statistical analysis - methods of error analysis, - uncertainty analysis.

UNIT II DISPLACEMENT, PRESSURE, TEMPERATURE SENSORS   9

Linear Potentiometers - LVDT - Ultrasonic Sensors - Capacitive Sensors - Strain Gauge. Capacitive transducer - Various arrangements, Piezoelectric transducer, Inductive transducer, Thermistor used for Cardiac output measurement and Nasal air flow measurement, Thermocouple, Radiation thermography, Pyrometer, Infrared temperature probe, Optical Pyrometer and Applications.

UNIT III PHOTO ELECTRIC AND PIEZO ELECTRIC SENSORS   9

Phototube, Photo multiplier tube (PMT), Photovoltaic, Photo conductive cells, Photo diodes, Phototransistor, comparison of photoelectric transducers. Optical displacement sensors and optical encoders. Piezoelectric active transducer - Equivalent circuit and its characteristics – Acoustic sensors.

UNIT IV SIGNAL CONDITIONING CIRCUITS AND METERS   9

Functions of signal conditioning circuits, Preamplifiers, Concepts of passive filters, Impedance matching circuits, AC and DC Bridges - wheat stone bridge, Kelvin, Maxwell, Hay, Schering, Q-meter, PMMC, MI and dynamometer type instruments - Digital voltmeter – Multi meter.

UNIT V RECORDING DEVICES AND BIOSENSORS   9

CRO – block diagram, CRT – vertical & horizontal deflection system, DSO, LCD monitor, servo recorders, photographic recorder, magnetic tape recorder, Inkjet recorder. Biosensors: transduction mechanism in a biosensor and Classification – Electronic nose, Blood Glucose sensors. Biosensors in medicine and health care - Biosensors for agriculture and Environment monitoring.

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PRACTICALS:

1. Calibration of voltmeter and ammeter using shunt type Potentiometer.
2. Characteristics of LVDT.
3. Characteristics of Temperature Transducer – Thermistor and RTD.
4. Measurement of unknown Resistance using Kelvin Double Bridge and Wheatstone bridge.
5. Characteristics of Photo electronic Transducers - LDR, Photo Diode, Photo Transistor.
6. Characteristics of Standard Signals (Step, Ramp, Impulse, Square, Triangular).
7. Characteristics of CRO & DSO.
8. Study of Electronic nose.

TOTAL:75 (45+30) PERIODS

COURSE OUTCOMES:

On successful completion of this course, the student will be able to:

- Apply calibration standards to assess instrument performance using potentiometer and LVDT techniques.
- Evaluate temperature transducer characteristics and apply precision bridge techniques for resistance measurement.
- Demonstrate evaluation of photo transducer characteristics and standard signal analysis.
- Interpret signal conditioning and measurement techniques using bridges, digital instruments, CRO, and DSO.
- Analyze sensor technologies and data methods in electronic systems for medical applications.

TEXT BOOKS:

1. A.K. Sawhney, "Electrical & Electronics Measurement and Instrumentation",10th edition, Dhanpat Rai & Co, New Delhi, 19th Revised edition 2011, Reprint 2014.
2. John G. Webster, "Medical Instrumentation Application and Design", 4th edition, Wiley India Pvt Ltd, New Delhi, 2015.
3. Ernest O Doebelin and Dhanesh N Manik, "Measurement systems, Application and design", 6th edition, McGraw-Hill, 2012.

REFERENCES:

1. Khandpur R.S, "Handbook of Biomedical Instrumentation", 3rd edition, Tata McGraw-Hill, New Delhi, 2014.
2. Albert D.Helfrick and William D. Cooper. Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 1st edition, 2016.
3. Leslie Cromwell, "Biomedical Instrumentation and measurement", 2nd edition, Prentice Hall of India, New Delhi, 2015.

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BoS

Mapping of COs with POs and PSOs

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

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BoS   03/07/25

24BM403   **BIOCONTROL SYSTEMS**   **L T P C**
                                                                3 0 0 3

OBJECTIVES

The student should be made to:

- Develop the ability to derive mathematical models (transfer functions) for various physical systems.
- Apply various methods for analyzing the time response of the systems
- Familiarize students with graphical tools for assessing the frequency response.
- Examine specific examples of physiological control, such as the lung mechanism and skeletal muscle, from a systems perspective.
- Explain the mathematical modeling of various physiological systems.

UNIT I   CONTROL SYSTEM MODELING   **9**

Control System –Introduction, Open loop and Closed loop systems, Differential equation – Transfer function, Modeling of Mechanical Translational and Rotational Systems, Electrical systems, Analogous system, Block diagram reduction Techniques, Signal flow graph.

UNIT II   TIME RESPONSE ANALYSIS   **9**

Time response, Time response of First Order Systems and Second Order Systems, Time domain specifications, Steady state error, Generalized error co–efficient, Routh- Hurwitz criteria of stability, Root locus technique

UNIT III   FREQUENCY RESPONSE ANALYSIS   **9**

Frequency domain specifications - Polar plots, Bode plots, Nyquist plot, Nyquist stability criterion, closed loop stability, Constant M and N circles.

UNIT IV   PHYSIOLOGICAL CONTROL SYSTEMS   **9**

Physiological Control Systems: A simple Example - Difference between engineering and physiological control system-Generalized System Properties-Models with combinations of system elements- -Linear Models of Physiological Systems- Lung Mechanism , Skeletal Muscle Distributed parameter versus lumped parameter models.

UNIT V   BIOLOGICAL CONTROL SYSTEM ANALYSIS   **9**

Determination of steady state operating point-Study of regulation of cardiac output, Study of Regulation of Glucose Insulin – Study of Chemical Regulation of Ventilation- Stability analysis of Pupillary light reflex.

                                                     TOTAL: 45 PERIODS

CHAIRMAN
BoS 04/07/25

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

- Apply mathematical modeling to various systems using block diagrams and signal flow graphs.
- Determine the time response of various systems and discuss the concept of system stability
- Analyze the frequency response characteristics of various systems using different charts.
- Construct and interpret the basic physiological systems model and compare it with engineering systems.
- Comprehend the application aspects of various response analysis in biological systems.

TEXT BOOKS:
1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 7th Edition, 2021.
2. Michael C K Khoo, "Physiological Control Systems", IEEE Press, Prentice Hall of India, 2nd Edition, 2018

REFERENCES:
1. Benjamin C. Kuo, "Automatic Control Systems", Prentice Hall of India, 10th Edition, 2017.
2. John Enderle Susan Blanchard, Joseph Bronzino "Introduction to Biomedical Engineering", 3rd Edition, Academic Press, 2012.
3. Richard C. Dorf, Robert H. Bishop, "Modern control systems", Pearson, 13th Edition, 2017.
4.S. Salivahanan, R. Rengaraj, G. R. Venkatakrishnan, "Control Systems Engineering" 1st Edition, Pearson Education, 2016.
5. A. Anand Kumar, "Control Systems", PHI Learning Private Limited, 2nd Edition, 2014.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	2	2	2
CO2	3	2	-	-	3	-	-	-	-	-	2	2	2
CO3	2	2	-	-	3	-	-	-	-	-	2	2	3
CO4	2	-	2	-	2	2	-	-	-	-	2	3	2
CO5	2	2	-	2	2	-	-	-	-	-	2	3	3

CHAIRMAN
BoS

24EC406 ANALOG AND DIGITAL INTEGRATED CIRCUITS

L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:
- Develop the ability to design and evaluate operational amplifier circuits for Analog signal conditioning.
- Apply the principles of data conversion and special function ICs for accurate signal acquisition and processing.
- Implement combinational logic using Boolean algebra and simplification rules.
- Construct fundamental combinational circuits for digital system design.
- Investigate the design and behavior of sequential circuits in digital systems.

UNIT I DESGIN AND APPLICATIONS OF OPERATIONAL AMPLIFIER　　　9
Operational amplifier –ideal characteristics, voltage follower, Inverting Amplifiers, Non-inverting Amplifiers, Differentiator, Integrator, Voltage to Current converter, Instrumentation amplifier, Low pass, High pass filter and band pass filters, Comparator.

UNIT II DATA CONVERSION TECHNIQUES AND SPECIAL FUNCTION ICs　　9
Sample and hold circuit, Types of D/A converter -Weighted resistor, R-2R ladder DAC, D/A Accuracy and Resolution. A/D converter - Flash, Successive approximation, A/D Accuracy and Resolution. Voltage controlled oscillator, Monolithic PLL IC565, IC 555 Timer – Function Description.

UNIT III DIGITAL LOGIC AND MINIMIZATION TECHNIQUES　　　　9
Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map.

UNIT IV LOGIC DESIGN WITH COMBINATIONAL CIRCUITS　　　　9
Design of combinational circuits - Code-Converters, Half and Full Adders, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Multiplexer and Demultiplexer.

UNIT V ANALYSIS AND DESIGN OF SEQUENTIAL LOGIC　　　　　9
Flip flops – SR, JK, T, D, Analysis and design of clocked sequential circuits – state minimization, state assignment, circuit implementation. Counters, Ripple Counters, Ring Counters. Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In -Serial Out, Parallel In - Parallel Out, Universal Shift Register.

OUTCOMES:
On successful completion of this course, the student will be able to,
- Design and analyze operational amplifier circuits for signal conditioning applications.
- Analyze and evaluate data conversion circuits and special function ICs
- Develop basic digital circuits using number systems, Boolean expressions, and logic simplification.
- Design and build fundamental combinational logic circuits to solve digital problems
- Demonstrate sequential circuit functionality using flip-flops, counters, and shift registers for digital system design.

TOTAL:45 PERIODS

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BoS/ECE 07/07/25

TEXT BOOKS

1. D. Roy Choudhury, Shali B. Jain "Linear Integrated Circuits", Fourth Edition
2. Sergio Franco, "Design with operational amplifiers and analog integrated circuits", Mc Graw Hill Education, 3rd Edition, 2017
3. M. Morris Mano and Michael D.Ciletti, "Digital Design", Pearson, 5th Edition, 2013
4. John.F.Wakerly, "Digital design principles and practices", Pearson Education, 5th Edition, 2018

REFERENCES

1. Taub and Schilling, "Digital Integrated Electronics", Mc Graw Hill, 2017.
2. Charles H.Roth, Jr, "Fundamentals of Logic Design", Jaico Books, 7th Edition, 2013.
3. S Salivahanan and V S Kanchana Bhaaskaran, Linear Integrated Circuits, McGraw Hill Education, 3rd Edition, 2018.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	3	2	3	–	–	–	–	–	2	3	2
CO2	3	3	2	2	3	–	–	–	–	–	2	2	3
CO3	3	2	2	–	3	–	–	–	–	–	2	–	–
CO4	3	3	3	–	3	–	–	2	2	–	2	–	–
CO5	3	2	3	–	3	–	–	2	2	–	2	–	2

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BoS/ECE

OBJECTIVES:

The students should be made to:

- Apply the understanding of fundamental rights and duties to real life situations and legal case studies.
- Illustrate the roles and responsibilities parliamentary framework.
- Analyze the general structure of the state executive roles in the state level.
- Investigate the powers and judicial responsibilities of the higher Judiciary.
- Judge the strength and limitations of India's federal power structure in practice.

UNIT 1   INTRODUCTION   6

Historical background - Government of India act - Indian councils act - Making of the constitution - Philosophy of the Indian constitution - Preamble.

UNIT II   GOVERNMENT OF THE UNION   6

Powers and Functions of President and Prime Minister - Council of Ministers – President in relation to his council - Legislature structure and functions of Lok Sabha and Rajya Sabha - Speaker.

UNIT III   GOVERNMENTS OF THE STATES AND LOCAL GOVERNMENT   6

The state executive: General structure - Governor - Council of ministers - State legislature. Local government - Panchayat - Municipality - Power authority and responsibilities municipalities.

UNIT IV   THE JUDICATURE   6

Organization and Composition of Judiciary – Constitution – Appointment - Qualifications - Powers and functions of the supreme court– High courts – Control over subordinate courts.

UNIT V   THE FEDERAL SYSTEM   6

Distribution of financial powers: Need, principles-Underlying distribution of tax revenues- Distribution of legislative power – Interstate relation - Emergency provisions.

TOTAL: 30 PERIODS

OUTCOMES:

On successful completion of the course, the students will be able to,

- Distinguish and apply constitutional principles and democratic values of the Indian constitution.
- Emphasize on the powers and interactions of the president, prime ministers in the parliamentary structure.
- Evaluate the structure, powers and functions of state and local governance.
- Demonstrate the Indian judiciary, structure and functions of courts.
- Explore the financial, legislative provisions of Indian federation.

CHAIRMAN
BoS (S&H) 20/cc/25

TEXT BOOKS:
1. Basu D.D, "Introduction to Indian Constitution", Prentice Hall of India, New Delhi, 2015.
2. Gupta D.C, "Indian Government and Politics", Vikas Publishing House, New Delhi, 2010.

REFERENCES:
1. Pylee M.V, "Introduction to the Constitution of India", Vikas Publishing House, New Delhi, 2011.
2. Kashyap S, "Our Constitution", National Book Trust, New Delhi, 2010.
3. The Constitution of India, 1950 (Bare Act), Government Publication.
4. Jain M P, Indian Constitution Law, 7th Edition. Lexis Nexis, 2014.
5. Busi S N, Ambedkar B R framing of Indian Constitution, 1st Edition, 2015.

Mapping of COs with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	3	3	-	-	-	2
CO2	-	-	-	-	-	3	3	2	2	2	3
CO3	-	-	-	-	-	3	3	2	2	2	3
CO4	-	-	-	-	-	3	3	-	2	2	3
CO5	-	-	-	-	-	3	3	-	-	3	2

CHAIRMAN
BoS (S&H)

24BM405L BIOMEDICAL INSTRUMENTATION LABORATORY   **L T P C**
                                                              0 0 2 1

OBJECTIVES:

The student should be made to:

- Apply bio-signal acquisition principles in designing amplification and filtering circuits
- Construct safe and reliable analog front-ends for physiological signal measurement.
- Develop customized circuit solutions for detecting and analyzing specific bioelectric events
- Demonstrate the use of transducers and instrumentation for measuring physiological and biochemical parameters
- Determine peripheral blood flow, pH and conductivity of the circulatory dynamics

LIST OF EXPERIMENTS:

1. Design of ECG Amplifiers with appropriate filter to remove power line and other artifacts.
2. Design of EMG amplifier.
3. Design a suitable circuit to detect QRS complex and measure heart rate.
4. Design of frontal EEG amplifier.
5. Design of EOG amplifier to detect eye blink.
6. Design a right leg driven ECG amplifier.
7. Design and study the characteristics of optical isolation amplifier.
8. Design a Multiplexer and Demultiplexer for any two bio signals.
9. Measurement of pulse-rate using Photo transducer.
10. Measurement of blood pressure using sphygmomanometer.
11. Measurement and recording of peripheral blood flow.
12. Measurement of pH and conductivity.

                                                    TOTAL: 30 PERIODS

OUTCOMES:

On successful completion of this course, the students will be able to,

- Design ECG and EMG amplifiers with appropriate filtering to eliminate artifacts and enhance signal quality.
- Construct and assess signal conditioning solutions for EEG, EOG, and safety-enhanced ECG
- Assess optical isolation and multiplexer/demultiplexer circuit designs for biosignal applications
- Apply appropriate biomedical instrumentation to measure and analyze pulse rate and blood pressure
- Conduct measurements and analyze data for peripheral blood flow, pH, and conductivity.

CHAIRMAN
BoS 04/07/25

Mapping of COs with POs and PSOs

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

CHAIRMAN
BoS

24EC407L ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY   L T P C
                                                                   0 0 2 1

OBJECTIVES:

The student should be made to:

- Identify and select appropriate components for constructing Op-Amp circuits.
- Construct operational amplifier-based Schmitt trigger and instrumentation amplifier circuits according to design specifications.
- Determine how component values influence the output characteristics of the RC/LC and Multivibrator waveform generation circuits.
- Explain the fundamental principles of Boolean algebra and the operation of basic logic gates
- Construct and validate digital logic circuits by applying multiplexing and sequential counting techniques in combinational and sequential systems.

LIST OF EXPERIMENTS:

1. Inverting, non-inverting amplifier and comparator
2. Integrator and Differentiator
3. Schmitt trigger using operational amplifier
4. Instrumentation amplifier using operational amplifier
5. RC and LC oscillators
6. Multivibrators using IC555 Timer
7. Study of logic gates, Half adder and Full adder
8. Encoder and BCD to 7 segment decoder
9. Multiplexer and demultiplexer using digital IC trainer Kit
10. Construction and verification of 4-bit ripple counter and Mod 10/Mod 12 Ripple counter

TOTAL: 30 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to,

- Construct and analyze the operational characteristics of fundamental analog circuits,
- Analyze the functional characteristics of Schmitt and instrumentation amplifiers in signal processing.
- Examine and assess the behavior of RC/LC oscillators and 555 timers in waveform generation
- Apply digital logic principles to implement and evaluate combinational circuits
- Implement and verify multiplexing and ripple counting techniques using Digital ICs to demonstrate data routing and sequential logic operations.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	3	–	–	–	–	–	2	2	2
CO2	3	2	2	2	3	–	–	–	–	–	2	3	3
CO3	3	2	2	2	3	–	–	–	–	–	2	2	2
CO4	3	2	3	–	3	–	–	2	2	–	2	–	–
CO5	3	2	3	–	3	–	–	2	2	–	2	–	–

CHAIRMAN
BoS/ECE 07/07/25

24EEC401L	LIFE SKILLS AND PERSONALITY DEVELOPMENT	L	T	P	C
	(Common to All Branches)	0	0	2	1

OBJECTIVES:

The students should be made to:

- Create self- confident among the students by the training
- Develop good personality for mature outlook in different circumstances
- Encourage effective presentation skills
- Dramatize role play by assigning the best role
- Enhance team building and time management skills

UNIT I   CAREER PLANNING   6

Introduction - Benefits of Career Planning - Expectation and Development - Guidelines for choosing a Career - Future planning - Evaluation of planning.

UNIT II   ATTITUDE   6

Introduction - Rightness of Attitude and behaviour - Formation of Attitudes - Evolving Behaviour of a person - Creating right attitudes - Approaches of Challenges - Lessons from Attitude.

UNIT III   ROLE PLAYING   6

Introduction - settings of role plays - Principles and Purpose - importance of communication in role plays - Arrangement of points and character - Extempore Talk - Debates - Emotional Intelligence.

UNIT IV   TEAM BUILDING   6

Purpose of Creating Team - Exploring Team roles and Processes - Importance of Building and Developing Strong Team - Leadership Qualities - Success of Team Building.

UNIT V   TIME MANAGEMENT   6

Value of time - Concept and applications of time management - Causes for wasting of time - Methods of Time Management - Diagnosing Time Management - Planning for presentation - To - do - list - Prioritizing work

TOTAL: 30 PERIODS

OUTCOMES:

On successful completion of this course, the students will be able to,

- Improve the leadership skills by identifying the strengths of a team
- Learn to lead a team on a project in an organization
- Helps students to perform on a distinct role and learn to face the challenges
- Build a strong team to achieve their goals with the right choice of people
- Develop the time management skills to achieve success

CHAIRMAN 14/10
BoS (S&H)

TEXT BOOKS:
1. "Soft Skills", Career Development Centre, Green Pearl Publications, 2015.

REFERENCES:
1. Thomas A Harris, "I Am Ok, You Are Ok", Harper and Row, New York 1972.
2. Daniel Coleman, "Emotional Intelligence", Bantam Book, 2006.
3. Nira Konar, "Communication Skills for Professionals", Eastern Economy Edition, 2010.

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	1	2	2	1	1	2	3	1	3
CO2	1	2	1	2	2	1	1	2	3	1	3
CO3	1	2	1	2	2	1	1	3	3	1	3
CO4	1	2	1	2	2	1	1	3	3	1	3
CO5	1	2	1	2	2	1	1	3	3	1	3

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BoS (S&H) 14/10