



BIOMEDICAL ENGINEERING

R2024

CURRICULUM & SYLLABI



**GRT INSTITUTE OF
ENGINEERING AND
TECHNOLOGY, Tiruttani
(An Autonomous Institution)**

Accredited by NBA (ECE), NAAC with "A++" Grade & An ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

**B.E - BIOMEDICAL ENGINEERING
CURRICULUM REGULATIONS - 2024
CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABI (SEMESTER I TO VIII)
(FOR THE STUDENTS ADMITTED DURING 2024)**

SEMESTER - I									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
1	IP24101	Induction Programme	-	-	-	-	-	0	-
THEORY COURSES									
2	HS24101	Professional English	HS	3	-	-	3	3	60/40
3	MA24101	Algebra and Calculus	BS	3	1	-	4	4	60/40
4	PH24101	Engineering Physics	BS	3	-	-	3	3	60/40
5	CY24101	Engineering Chemistry	BS	3	-	-	3	3	60/40
6	GE24101	Problem Solving and Python Programming	ES	3	-	-	3	3	60/40
7	TA24101	Heritage of Tamils	HS	1	-	-	1	1	60/40
PRACTICAL COURSES									
8	GE24102	Problem Solving and Python Programming Laboratory	ES	-	-	4	4	2	40/60
9	PC24101	Physics and Chemistry Laboratory	BS	-	-	4	4	2	40/60
10	HS24102	English Laboratory	HS	-	-	2	2	1	0/100
TOTAL				16	1	10	27	22	

SEMESTER - II									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
THEORY COURSES									
1	MA24201	Statistics and Numerical Techniques	BS	3	1	-	4	4	60/40
2	GE24201	Engineering Graphics	ES	2	-	3	5	4	60/40
3	PH24203	Medical Physics	BS	3	-	-	3	3	60/40
4	TA24201	Tamils and Technology	HS	1	-	-	1	1	60/40
THEORY CUM PRACTICAL COURSES									
5	BM24201	Anatomy and Human Physiology	PC	3	-	2	5	4	50/50
6	EE24203	Basic Electrical and Electronics Engineering	ES	3	-	2	5	4	50/50
PRACTICAL COURSES									
7	GE24202	Engineering Practices Laboratory	ES	-	-	4	4	2	40/60
8	HS24201	English Communication Laboratory	HS	-	-	4	4	2	40/60
TOTAL				15	1	16	32	24	

SEMESTER - III									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
THEORY COURSES									
1	MA24302	Transforms and Partial Differential Equations	BS	3	1	-	4	4	60/40
2	BM24301	Signals and Systems	PC	3	-	-	3	3	60/40
3	CS24307	Fundamentals of Data Structures using C	ES	3	-	-	3	3	60/40
THEORY CUM PRACTICAL COURSES									
4	BM24302	Biosciences for Medical Engineering	PC	3	-	2	5	4	50/50
5	BM24303	Bio Sensors and Measurements	PC	3	-	2	5	4	50/50
6	BM24304	Fundamentals of Electronic Devices and Circuits	PC	3	-	2	5	4	50/50
PRACTICAL COURSES									
7	CS24308	Fundamentals of Data Structures using C Laboratory	ES	-	-	4	4	2	40/60
TOTAL				18	1	10	29	24	

SEMESTER - IV									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
THEORY COURSES									
1	MA24402	Random Processes	BS	3	1	-	4	4	60/40
2	BM24401	Analog and Digital Integrated Circuits	PC	3	-	-	3	3	60/40
3	EC24407	Microprocessors and Microcontrollers	PC	3	-	-	3	3	60/40
4	GE24402	Environmental Science and Sustainability	BS	2	-	-	2	2	60/40
THEORY CUM PRACTICAL COURSES									
5	BM24402	Bio Signal Processing	PC	3	-	2	5	4	50/50
6	BM24403	Biomedical Instrumentation	PC	3	-	2	5	4	50/50
PRACTICAL COURSES									
7	BM24404	Analog and Digital Integrated Circuits Laboratory	PC	-	-	3	3	2	40/60
8	GE24S03	Soft Skills and Aptitude	EEC	2	-	-	2	0	0/100
TOTAL				20	1	7	27	22	

SEMESTER - V									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
THEORY COURSES									
1	BM24501	Diagnostic and Therapeutic Equipment	PC	3	-	-	3	3	60/40
2	BM24502	Bio Control Systems	PC	3	-	-	3	3	60/40
3		Open Elective I	OE	-	-	-	-	3	-
4		Professional Elective I	PE	3	-	-	3	3	60/40
5		Professional Elective II	PE	3	-	-	3	3	60/40
6		Non-Credit Mandatory course I	EEC	3	-	-	3	-	0/0
THEORY CUM PRACTICAL COURSES									
7	BM24503	Medical Image Processing	PC	3	-	2	5	4	50/50
PRACTICAL COURSES									
8	BM24504	Diagnostic and Therapeutic Equipment Laboratory	PC	-	-	4	4	2	40/60
9	BM24S01	Design Thinking and Innovation Laboratory	ES	2	-	-	2	1	0/100
TOTAL				-	-	-	-	22	

SEMESTER - VI									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
THEORY COURSES									
1	BM24601	Biomechanics and Rehabilitation Engineering	PC	3	-	-	3	3	60/40
2	BM24602	Virtual Instrumentation	PC	3	-	-	3	3	60/40
3	AD24604	Artificial Intelligence and Machine Learning	ES	3	-	-	3	3	60/40
4		Professional Elective III	PE	3	-	-	3	3	60/40
5		Professional Elective IV	PE	-	-	-	-	3	-
6		Open Elective II	OE	3	-	-	3	3	60/40
7		Non-Credit Mandatory course II	EEC	3	-	-	3	-	0/0
PRACTICAL COURSES									
8	BM24603	Biomechanics and Virtual Instrumentation laboratory	PC	-	-	4	4	2	40/60
9	BM24604	Mini Project	EEC	-	-	3	3	2	0/100
TOTAL				-	-	-	-	22	

SEMESTER - VII									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
THEORY COURSES									
1	BM24701	Healthcare Management Systems	PC	3	-	-	3	3	60/40
2	GE24701	Human Values and Ethics	HS	2	-	-	2	2	60/40
3		Management Elective	HS	3	-	-	3	3	60/40
4		Professional Elective V	PE	3	-	-	3	3	60/40
5		Professional Elective VI	PE	3	-	-	3	3	60/40
6		Open Elective III	OE	3	-	-	3	3	60/40
7		Open Elective IV	OE	3	-	-	3	3	60/40
PRACTICAL COURSES									
8	BM24702	Hospital Internship with Training	EEC	-	-	4	4	2	40/60
TOTAL				-	-	-	-	21	

SEMESTER - VIII									
S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	EXT / INT
				L	T	P			
PRACTICAL COURSES									
1	BM24801	Project Work/ Internship	EEC	-	-	20	20	10	40/60
TOTAL				-	-	-	-	10	

TOTAL CREDITS	168
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SUMMARY

Name of the Programme: Biomedical Engineering										
S.No	Subject Area	Credits per Semester								Total Credits
		1	2	3	4	5	6	7	8	
1	HS	5	3					5		13
2	BS	12	7	4	6					29
3	ES	5	10	5		1	3			24
4	PC		4	15	16	12	8	3		58
5	PE					6	6	6		18
6	OE					3	3	6		12
7	EEC						2	2	10	14
8	Non-Credit Mandatory					✓	✓			
TOTAL		22	24	24	22	22	22	22	10	168

MANDATORY COURSE**NON-CREDIT MANDATORY COURSE I: SEMESTER V**

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	MX24C71	Introduction to Women and Gender Studies	MC	3	-	-	3	-
2	MX24C72	Elements of Literature	MC	3	-	-	3	-
3	MX24C73	Disaster Risk Reduction and Management	MC	3	-	-	3	-
4	MX24C74	Film Appreciation	MC	3	-	-	3	-

NON-CREDIT MANDATORY COURSE II: SEMESTER VI

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	MX24C75	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	-	-	3	-
2	MX24C76	History of Science and Technology in India	MC	3	-	-	3	-
3	MX24C77	Industrial Safety	MC	3	-	-	3	-
4	MX24C78	Political and Economic Thought for a Human Society	MC	3	-	-	3	-
5	MX24C79	State, Nation Building and Politics in India	MC	3	-	-	3	-

MANAGEMENT ELECTIVE**MANAGEMENT ELECTIVE : SEMESTER VII**

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	GE24M01	Principles of Management	HS	3	-	-	3	3
2	GE24M02	Total Quality Management	HS	3	-	-	3	3
3	GE24M03	Engineering Economics and Financial Accounting	HS	3	-	-	3	3
4	GE24M04	Human Resource Management	HS	3	-	-	3	3
5	GE24M05	Knowledge Management	HS	3	-	-	3	3
6	GE24M06	Industrial Management	HS	3	-	-	3	3

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Management (Healthcare)	Vertical II Communication	Vertical III Advanced Signal Processing	Vertical IV Image Processing and Bio Engineering	Vertical V Mechanics	Verticals VI Advanced Healthcare Devices	Verticals VII Medical Device Innovation and Development
Clinical Engineering	Communication Systems	Bio Signal Analysis	Embedded Systems and IoMT	Biomechanics	Bio MEMS	Foundation Skills in Integrated Product Development
Hospital Planning and Management	Wearable Devices	Computer Vision	Telehealth Technology	Genetic Engineering	Critical Care and Operation Theatre Equipment	Patient safety, Standards and Ethics
Medical Waste Management	Body Area Networks	Speech and Audio Signal Processing	Medical Device Design	Physiological Modeling	Human Assist Devices	Principles of Tissue Engineering
Economics and Management for Engineers	Virtual Reality and Augmented Reality in Healthcare	Rapid Prototyping	Rapid Prototyping	Assistive Technology	Advancements in Healthcare Technology	Medical Innovation and Entrepreneurship
Biostatistics	Medical Device Regulations	Brain Computer Interface and Applications	Artificial Organs and Implants	Ergonomics	Robotics in Medicine	Biomaterials
Forensic Science in Healthcare	Medical Informatics	Biometric Systems	Neural Engineering	Haptics	Therapeutic Equipment	Biomedical Optics and Photonics

PROFESSIONAL ELECTIVE COURSES: VERTICALS**VERTICAL I: MANAGEMENT (HEALTHCARE)**

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	BM24P01	Clinical Engineering	PE	3	-	-	3	3
2	BM24P02	Hospital Planning and Management	PE	3	-	-	3	3
3	BM24P03	Medical Waste Management	PE	3	-	-	3	3
4	BM24P04	Economics and Management for Engineers	PE	3	-	-	3	3
5	BM24P05	Biostatistics	PE	3	-	-	3	3
6	BM24P06	Forensic Science in Healthcare	PE	3	-	-	3	3

VERTICAL II: COMMUNICATION

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	BM24P07	Communication Systems	PE	3	-	-	3	3
2	BM24P08	Wearable Devices	PE	3	-	-	3	3
3	EC24P38	Body Area Networks	PE	3	-	-	3	3
4	BM24P09	Virtual Reality and Augmented Reality in Healthcare	PE	3	-	-	3	3
5	BM24P10	Medical Device Regulations	PE	3	-	-	3	3
6	BM24P11	Medical Informatics	PE	3	-	-	3	3

VERTICAL III: ADVANCED SIGNAL PROCESSING

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	BM24P12	Bio Signal Analysis	PE	3	-	-	3	3
2	BM24P13	Computer Vision	PE	3	-	-	3	3
3	BM24P14	Speech and Audio Signal Processing	PE	3	-	-	3	3
4	BM24P15	Rapid Prototyping	PE	3	-	-	3	3
5	BM24P16	Brain Computer Interface and Applications	PE	3	-	-	3	3
6	BM24P17	Biometric Systems	PE	3	-	-	3	3

VERTICAL IV: IMAGE PROCESSING AND BIO ENGINEERING

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	BM24P18	Embedded Systems and IoMT	PE	2	-	2	4	3
2	BM24P19	Telehealth Technology	PE	2	-	2	4	3
3	BM24P20	Medical Device Design	PE	2	-	2	4	3
4	BM24P21	Rapid Prototyping	PE	2	-	2	4	3
5	BM24P22	Artificial Organs and Implants	PE	3	-	-	3	3
6	BM24P23	Neural Engineering	PE	3	-	-	3	3

VERTICAL V: MECHANICS

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	BM24P24	Biomaterials	PE	3	-	-	3	3
2	BM24P25	Genetic Engineering	PE	3	-	-	3	3
3	BM24P26	Physiological Modeling	PE	3	-	-	3	3
4	BM24P27	Assistive Technology	PE	3	-	-	3	3
5	BM24P28	Ergonomics	PE	3	-	-	3	3
6	BM24P29	Haptics	PE	3	-	-	3	3

VERTICAL VI: ADVANCED HEALTHCARE

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	BM24P30	Bio MEMS	PE	3	-	-	3	3
2	BM24P31	Critical Care and Operation Theatre Equipment	PE	3	-	-	3	3
3	BM24P32	Human Assist Devices	PE	3	-	-	3	3
4	BM24P33	Advancements in Healthcare Technology	PE	3	-	-	3	3
5	BM24P34	Robotics in Medicine	PE	3	-	-	3	3
6	BM24P35	Biomedical Optics and Photonics	PE	3	-	-	3	3

OPEN ELECTIVES

OPEN ELECTIVE I								
S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	AS24901	Space Science	OE	3	-	-	3	3
2	IE24901	Introduction to Industrial Engineering	OE	3	-	-	3	3
3	FD24901	Food, Nutrition and Health	OE	3	-	-	3	3
4	CE24902	Environmental and Social Impact Assessment	OE	3	-	-	3	3
5	EE24901	Renewable Energy System	OE	3	-	-	3	3
6	EI24901	Introduction to Industrial Instrumentation and Control	OE	3	-	-	3	3
7	MA24901	Graph Theory	OE	3	-	-	3	3
8	AD24906	Neural Networks and Deep Learning	OE	2	-	2	4	3
9	CS24901	Digital Marketing	OE	2	-	2	4	3

OPEN ELECTIVE II								
S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	IE24902	Resource Management Techniques	OE	3	-	-	3	3
2	MG24901	Fintech Regulation	OE	3	-	-	3	3
3	FD24902	Holistic Nutrition	OE	3	-	-	3	3
4	AI24902	IT in Agricultural System	OE	3	-	-	3	3
5	EE24903	Introduction to PLC Programming	OE	3	-	-	3	3
6	CS24904	DevOps	OE	2	-	2	4	3
7	RA24901	Robotic Process Automation	OE	2	-	2	4	3
8	IP24901	Intellectual Property Rights	OE	3	-	-	3	3
9	CE24901	Climate Change and its Impact	OE	3	-	-	3	3

OPEN ELECTIVE III

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	RA24902	Remote Sensing Concepts	OE	3	-	-	3	3
2	CH24901	Nano Technology	OE	3	-	-	3	3
3	MF24901	Cost Management of Engineering Projects	OE	3	-	-	3	3
4	EE24905	Sensors	OE	3	-	-	3	3
5	BT24901	Biotechnology in Health Care	OE	3	-	-	3	3
6	BT24902	Lifestyle Diseases	OE	3	-	-	3	3
7	HS24902	Project Report Writing	OE	3	-	-	3	3
8	ME24901	Applied Design Thinking	OE	3	-	-	3	3
9	MG24902	Democracy and Good Governance	OE	3	-	-	3	3
10	HS24901	English for Competitive Examinations	OE	3	-	-	3	3

OPEN ELECTIVE IV

S.NO	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	SF24902	Fire Safety Engineering	OE	3	-	-	3	3
2	MR24901	Mechatronics	OE	3	-	-	3	3
3	EC24902	VLSI Design	OE	3	-	-	3	3
4	BT24903	Biotechnology for Waste Management	OE	3	-	-	3	3
5	FD24903	Food safety and Quality Regulations	OE	3	-	-	3	3
6	AU24901	Batteries and Management system	OE	3	-	-	3	3
7	RA24903	Foundation of Robotics	OE	3	-	-	3	3
8	AD24903	Multivariate Data Analysis	OE	3	-	-	3	3
9	AI24904	Agriculture Entrepreneurship Development	OE	3	-	-	3	3
10	RA24904	Drone Technologies	OE	3	-	-	3	3

SEMESTER-I
Common To All Branches
(B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH)

HS24101	PROFESSIONAL ENGLISH	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Improve the communicative competence of learners.
- Help learners use language effectively in academic /work contexts.
- Build on students’ English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- Develop learners’ ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- Use language efficiently in expressing their opinions via various media

UNIT I INTRODUCTION OF EFFECTIVE COMMUNICATION 1

What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C’s of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 8

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. **Writing** - Writing emails / letters introducing oneself. **Grammar** - Present Tense (simple and progressive); Question types: Why/ Yes or No/ and Tags. **Vocabulary** - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II NARRATION AND SUMMATION 9

Reading-Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. **Writing** - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) **Grammar**–Past tense(simple); Subject Verb Agreement; and Prepositions. **Vocabulary**-Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs

UNIT III DESCRIPTION OF PROCESS AND PRODUCT 9

Reading – Reading advertisements, gadget reviews; user manuals. **Writing** - Writing definitions; instructions; and Product /Process description. **Grammar** - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. **Vocabulary** - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT IV CLASSIFICATION**9**

Reading–Newspaper articles; Journal reports–and Non-Verbal Communication (tables, pie charts etc.,). Writing–Note-making/Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from nonverbal (chart , graph etc., to verbal mode) Grammar–Forms of Verbs, Articles; Pronouns- Possessive & Relative pronouns. Vocabulary-Collocations; Fixed/Semi fixed expressions.

UNIT V EXPRESSION OF VIEWS**9**

Reading–Reading editorials; and Opinion Blogs; Writing–Minutes of Meeting, Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary-Cause & Effect Expressions–Content vs Function words.

Total: 45 Periods**COURSE OUTCOMES:**

After completion of this course, the students should be able to

CO1:Use appropriate words in a professional context.

CO2:Gain understanding of basic grammatical structures and use them in right context.

CO3:Read and interpret and also infer information presented in tables, charts, denotative and connotative meanings of technical texts and other graphic forms.

CO4:Write definitions, descriptions, narrations and essays on various topics.

TEXTBOOKS:

1. English for Engineers & Technologists Orient Black Swan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology CambridgeUniversityPress,2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. K N. Shoba, and Dr. Lourdes Joevani Department of English, Anna University.

REFERENCEBOOKS:

1. Technical Communication– Principles and Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English for Technical Communication (With CD) By Aysha Viswa Mohan, McGraw Hill Education, ISBN: 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate–Dr. V. Chellammal, Allied Publishing House, New Delhi,2003.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2		2		2	2		3	3	2	2	1		
CO2		2		2		2	2		3	3	2	2	1		
CO3		2		2		2	2		3	3	2	3	1		
CO4		1		2		3	2		3	3	2	3	1		
Avg		1.75		2		2.25	2		3	3	2	2.5	1		

1 - Low, 2 - Medium, 3 - High

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

MA24101	ALGEBRA AND CALCULUS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.
- To introduce integral ideas in solving areas, volumes and other practical problems in vector.

UNIT I MATRICES 9+3

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

UNIT II DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV MULTIPLE INTEGRALS 9+3

Double integrals in Cartesian and polar coordinates - Change of order of integration in Cartesian coordinates - Area enclosed by plane curves - Change of variables in double integrals -Triple integrals - Volume of Solids. Applications: Moments and centres of mass, moment of inertia.

UNIT V VECTOR CALCULUS 9+3

Gradient, divergence and curl (excluding vector identities) – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem in a plane and Gauss divergence theorem and Stoke's theorem (without proof) – Simple applications involving cubes and rectangular parallelepipeds.

Total: 60 Periods

COURSE OUTCOMES:

After completion of this course, the students should be able to

CO1:Demonstrate the matrix techniques in solving the related problems in engineering and technology.

CO2:Apply differential calculus tool to solve engineering applications.

CO3:Use differential calculus ideas on functions several variables.

CO4:Evaluate the area and volume by applying the concept of multiple integration.

CO5:Utilize the concept of vector calculus in evaluating integrals.

TEXTBOOKS:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, John Wiley and Sons, 10th Edition,
2. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rdEdition, 2014.

REFERENCEBOOKS:

1. M. K. Venkataraman, “Engineering Mathematics”, Volume I, 4th Edition, The National Publication Company, Chennai, 2003.
2. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, 5th Edition, New Delhi, 2017.
3. H. K. Dass and Er. Rajnish Verma, “Higher Engineering Mathematics”, S. Chand Private Limited, 3rd Edition 2014.
4. B.V. Ramana, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, 6th Edition, New Delhi, 2008.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2					2		2	3		1	1
CO2	3	3	1	2					2		2	3		1	1
CO3	3	3	2	2					2		2	3		1	1
CO4	3	3	1	1					2		2	3		1	1
CO5	3	3	2	2					2		2	3		1	1
Avg	3	3	1.6	1.6					2		2	3		1	1

1 - Low, 2 - Medium, 3 - High

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

PH24101	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS 9

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of the system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M. I – moment of inertia continuous bodies – M.I of a diatomic molecule-rotational energy state of a rigid diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum - gyroscope - torsional pendulum.

UNIT II ELECTROMAGNETIC WAVES 9

The Maxwell’s equations - wave equation; Plane electromagnetic waves in vacuum, - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - Source of electromagnetic waves. EM waves: Energy, momentum, intensity and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion – resonance –analogy between electrical and mechanical oscillating systems – waves on a string – standing waves – traveling waves – Energy transfer of a wave – sound waves – Doppler effect. Reflection and refraction of light waves – total internal reflection – interference –Michelson interferometer – Theory of air wedge and experiment. Theory of laser – characteristics – Spontaneous and stimulated emission – Einstein’s coefficients – population inversion – Nd-YAG laser, CO2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves – Electrons and matter waves –Compton effect – Schrodinger equation (Time dependent and time independent forms) – Physical meaning of wave function – particle in a infinite one dimensional (1D) potential well - Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator (qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope – Resonant diode – Finite potential wells (qualitative)- Bloch’s theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

COURSE OUTCOMES:

After completion of this course, the students should be able to

CO1:Recognized the importance of mechanics.

CO2:Express their knowledge in electromagnetic waves.

CO3:Demonstrate a strong foundational knowledge in oscillations, optics and lasers.

CO4:Illustrate the importance of quantum physics.

CO5:Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXTBOOKS:

1. D. Kleppner and R. Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M. Purcell and D.J. Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

REFERENCEBOOKS:

1. R. Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K. Thyagarajan and A. Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. Halliday, R. Resnick and J. Walker. Principles of Physics, Wiley (Indian Edition), 2015.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	1	-	-	1	-	1	-	-	-	-	-
CO2	3	2	2	1	2	1	2	2	-	1	-	2	-	1	
CO3	3	2	1	1	2	1	1	1	-	1	-	2	-	1	-
CO4	3	3	2	2	2	-	1	2	-	1	-	2	-	1	1
CO5	2	3	2	1	1	1	-	2	-	1	-	2	-	-	-
Avg	2.8	2.6	1.75	1.25	1.6	1	1.3	1.6	-	1	-	2	-	1	1

1 - Low, 2 - Medium, 3 - High

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

CY24101	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

UNIT II NANOCHEMISTRY 9

Basics: Distinction between molecules, non-materials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of non-material's: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapor deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES 9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process. Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil – cetane number; Power alcohol and biodiesel. - natural gas- compressed natural gas (CNG)- liquefied petroleum gases(LPG).

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO₂ emission and carbon footprint.

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor- environmental consequences of fossil fuel- Importance of renewable energy sources -Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Batteries: Types of batteries- lead acid battery- Solid Battery – Lithium Battery, Lithium-ion; Battery Electric vehicles-working principles; Fuel cells: H₂-O₂ fuel cell, microbial fuel cell.

Total: 45 Periods

COURSE OUTCOMES:

After completion of this course, the students should be able to

- CO1:**Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- CO2:**Identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nonmaterial for engineering and technology applications.
- CO3:**Apply the knowledge of phase rule and composites for material selection.
- CO4:**Analyze the quality of fuel and its various uses.
- CO5:**Recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXTBOOKS:

1. P. C. Jain and Monica Jain, “Engineering Chemistry”, 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, “A text book of Engineering Chemistry”, S. Chand Publishing, 12th Edition, 2018.

REFERENCEBOOKS:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, “Text book of nanoscience and nanotechnology”, Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, “Engineering Chemistry” McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2				1	1	2							
CO2	2		1	1	2	2	2	1				3		1	1
CO3	3	1				-	-	2				3			
CO4	3	1	1			1	3	2				2			
CO5	3	2	2	2		3	3	1				3			1
Avg	2.8	1.5	1.33	1.5	2	1.75	2.25	1.6				2.75		1	1

1 - Low, 2 - Medium, 3 - High

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

GE24101	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, operators, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, GCD, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V FILES, MODULES, PACKAGES 9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, Predefined modules (Numpy Pandas, Matplotlib, Scipy, Django) packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

Total: 45 Periods

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems.

CO2: Develop and execute simple Python programs.

CO3: Write simple Python programs using conditionals and loops for solving problems.

CO4: Represent compound data using Python lists, tuples, dictionaries etc.

CO5: Read and write data from/to files in Python programs.

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.
3. Python Data Science Handbook: Essential Tools for Working with Data, Second Edition (Grayscale Indian Edition) by Jake VanderPlas.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. <https://www.python.org/>
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018. Comparison of Existing and Revised Syllabus

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		2							1	1		
CO2	3	3	3		2							1	1		
CO3	3	3	3		2							1	1	1	
CO4	3	3	3		2						1	1	1	1	
CO5	3	2	1		1						1	1	1	1	
Avg	3	2.8	2.6		1.8						0.5	1	1	1	

1 - Low, 2 - Medium, 3 - High

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

TA24101	HERITAGE OF TAMILS	L	T	P	C
		1	0	0	1

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

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடு மற்றும் கல்வியியல் பணிகள் கழகம்.
2. கணினித் தமிழ் முனைவர் இல.சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தோல்லியல் துறை வெளியீடு).
4. பொருதை - ஆற்றங்கரை நாகரிகம் (தோல்லியல் 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 river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

GE24102	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To understand the problem-solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

LIST OF EXPERIMENTS

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (Reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (Copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (Divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

Total: 60 Periods

COURSE OUTCOMES:

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

CO1 : Develop algorithmic solutions to simple computational problems

CO2 : Develop and execute simple Python programs.

CO3 : Implement programs in Python using conditionals and loops for solving problems.

CO4 : Process compound data using Python data structures.

CO5 : Utilize Python packages in developing software applications.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2						3	2	1		
CO2	3	3	3	3	2						3	2	1		
CO3	3	3	3	3	2						3		1	1	
CO4	1	2			1						1		1	1	
CO5	2	2			2						2		1	1	
Avg	2.4	2.6	3	3	1.8						2.4	2	1	1	

1 - Low, 2 - Medium, 3 - High

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

PC24101	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

PHYSICS LABORATORY

COURSE OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

EXPERIMENT TOPICS: (Any seven experiments to be conducted)

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
13. Michelson Interferometer.
14. Melde's string experiment
15. Experiment with lattice dynamics kit.

CHEMISTRY LABORATORY

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electro analytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles.

EXPERIMENT TOPICS: (Any seven experiments to be conducted)

1. Preparation of Na₂CO₃ as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample. Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles (TiO₂/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

COURSE OUTCOMES:

Upon completion of the course, the students should be able to

CO1 : Analysis the Modulus of elasticity of materials.

CO2 : Illustrate the Laser and Optical fiber.

CO3 : Determine the wavelength of Ultrasonic wave in Liquid.

CO4 : Analyze the effect of chloride in water and DO present in sample water.

CO5 : Identify basicity acidity and pH of the materials

TEXT BOOKS:

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's, Textbook of Quantitative Chemical Analysis (2009).

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1			2	2	1				2			
CO2	3	1	2			1	2	2				1		1	1
CO3	3	2	1	1			1	1						1	1
CO4	2	1	2			2	2	2							
CO5	2	1	2		1	2	2	2				1	1		1
Avg	2.6	1.3	1.6	1	1	1.4	1.8	1.6				1.3	1	1	1

1 - Low, 2 - Medium, 3 - High

SEMESTER-I
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

HS24102	ENGLISH LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To improve the communicative competence of learners
- To help learners use language effectively in academic/work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students’ English languages skills by engaging the listening, speaking and grammar learning activities that is relevant to authentic contexts.
- To 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 - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-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 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 CLASSIFICATION AND RECOMMENDATIONS 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 DISCUSSION 6

Listening –Listening to debates/discussions; different viewpoints on an issue; and panel discussions. Speaking –making predictions- talking about a given topic-giving opinions- understanding a website- describing processes

Total: 30 Periods

COURSE OUTCOMES:

At the end of the course, learners will be able

CO1 : To listen and comprehend complex academic texts

CO2 : To speak fluently and accurately in formal and informal communicative contexts

CO3 : To express their opinions effectively in both oral and written medium of communication

Assessment Pattern

- Conduction of Assessment to test speaking and writing skills

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2		3		2	3		3	3	3	1	1		
CO2		2		3		2	3		3	3	3	1	1		
CO3		2		3		1	1		1	3	1	1	1		
Avg		2		3		1.6	2.3		2.3	3	2.3	1	1		

1 - Low, 2 - Medium, 3 - High

SEMESTER-II
Common To All Branches
(B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH)

MA24201	STATISTICS AND NUMERICAL TECHNIQUES	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

The student should be made to:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 9+3

One way and two - way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATION 9+3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

Total: 60 Periods

COURSE OUTCOMES

At the end of the course, the students should be able to

CO1 : Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2 : Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3 : Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

CO4 : Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

CO5 : Solve the partial and ordinary differential equations with initial and boundary condition by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	1	1						2	2			
CO2	3	2	1	2	2						2	3		1	
CO3	2	2	1	1	1						2	2		1	
CO4	2	3	1	1	1						1	3			
CO5	2	3	1	1	1						2	2			
Avg	2.2	2.6	1	1.2	1.2						1.8	2.4		1	

1 - Low, 2 - Medium, 3 - High

SEMESTER-II
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

GE24201	ENGINEERING GRAPHICS	L	T	P	C
		2	0	3	4

COURSE OBJECTIVES:

- To understand the importance of the drawing in engineering applications.
- To develop graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.
- To improve their visualization skills so that they can apply this skill in developing new products.
- To improve their technical communication skill in the form of communicative drawings.

UNIT-I PLANE CURVES AND PROJECTION OF POINTS 5+9

Importance of graphics in engineering applications–Use of drafting instruments– BIS conventions and specifications–size, layout and folding of drawing sheets– lettering and dimensioning. (Not for examination)
 Curves used in engineering practices: Conics–construction of ellipse, parabola and hyperbola by eccentricity method, cycloidal curves–construction of cycloid, construction of involutes of square and circle–drawing of tangents and normal to the above curves. Orthographic projection – principles – principal planes – first angle projection – projection of points.

UNIT-II PROJECTION OF LINES AND PLANE SURFACES 5+9

Projection of straight lines (only first angle projection) inclined to both the principal planes – determination of true lengths and true inclinations by rotating line method and traces.
 Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT-III PROJECTION OF SOLIDS AND SECTION OF SOLIDS 5+9

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.
 Sectioning of solids in simple position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.

UNIT-IV DEVELOPMENT OF SURFACE AND ISOMETRIC PROJECTIONS 5+9

Development of lateral surfaces of simple and sectioned solids – prisms, pyramids cylinders and cones.
 Principles of isometric projection – isometric scale –isometric projections of simple solids and truncated solids –prisms, pyramids, cylinders, cones and combination of two solid objects in simple vertical positions.

UNIT-V FREE HAND SKETCHING AND PERSPECTIVE PROJECTIONS 5+9

Visualization concepts–representation of three dimensional objects – layout of views–freehand sketching of multiple views from pictorial views of objects.
 Principle of perspective projection – terminology –perspective projection of simple solids-prisms, pyramids, cylinder and cone by visual ray method.

UNIT-VI COMPUTER AIDED DRAFTING (Not for examination)**5**

Introduction to drafting packages: Initial Setup Commands, Coordinate system in AutoCAD, UCS, WCS, and MCS. Draw Commands, Modify Commands, View Commands, Annotation commands, 2D Drawings and 3D Models -Simple Exercises.

Total: 75 Periods**COURSE OUTCOMES**

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

CO1 : To construct different plane curves and to comprehend the theory of projection.

CO2 : To project orthographic projections of lines and plane surfaces.

CO3 : To draw the projection of simple solids and sectional solids.

CO4 : To draw the development of lateral surfaces of sectional solids and Isometric projections of solids.

CO5 : To perform freehand sketching of multiple views from pictorial view and visualize perspective view of simple solids.

TEXT BOOKS:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 51th Edition, 2012.
2. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 31th Edition, 2018.

REFERENCE BOOKS:

1. Varghese P I., "Engineering Graphics", McGraw Hill Education (I) Pvt. Ltd., First Edition, 2013.
2. Venugopal K. and PrabhuRaja V., "Engineering Graphics", New Age International (P) Limited, 12th Edition, 2014.
3. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 23th Edition, 2017.
4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill Publishing Company Limited, New Delhi, 2nd Edition, 2008.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	2	-	3	-	2	2	2	
CO2	3	2	2	-	-	-	-	2	-	3	-	2	2	2	
CO3	3	2	2	-	-	-	-	2	-	3	-	2	2	2	
CO4	3	2	2	-	-	-	-	2	-	3	-	2	2	2	
CO5	3	2	2	-	-	-	-	2	-	3	-	2	2	2	
Avg	3	2	2	-	-	-	-	2	-	3	-	2	2	2	

1 - Low, 2 - Medium, 3 - High

SEMESTER-II
B.E. - BIOMEDICAL ENGINEERING

PH24203	MEDICAL PHYSICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To provide understanding of the application of the radiation concepts and methods of Physics in Medical science
- To accentuate the principle, effects and clinical applications of ionizing, non-ionizing and electromagnetic radiation.
- To instill the basics of logical information about the interaction of light with material.
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To study effects of sound and light in human body

UNIT I LOW ENERGY ELECTROMAGNETIC SPECTRUM AND ITS MEDICAL APPLICATION 9

Physics of light, Intensity of light, limits of vision and color vision an overview, Non-ionizing Electromagnetic Radiation: Overview of non-ionizing radiation effects-Tissue as a leaky dielectric-Low Frequency Effects-Higher frequency effects. Thermography– Application.

UNIT II PRINCIPLES OF RADIOACTIVE NUCLIDES 9

Radioactive Decay – Spontaneous Emission – Isometric Transition – Gamma ray emission, alpha, beta, Positron decay, electron capture, Sources of Radioisotopes Natural and Artificial radioactivity, Radionuclide used in Medicine and Technology, Decay series, Production of radionuclides – Cyclotron produced Radionuclide- Reactor produced Radionuclide-fission and neutron capture reaction, radionuclide Generator- Technetium generator.

UNIT III 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 IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) – photo current in a P- N diode – solar cell – photo detectors - LED – Organic LED – Optics in quantum structures – quantum well laser.

UNIT V PRINCIPLES AND APPLICATIONS OF SOUND IN MEDICINE 9

Physics of sound, Normal sound levels, ultrasound fundamentals, Generation of ultrasound (Ultrasound Transducer), Interaction of Ultrasound with matter- Cavitation's, Reflection, Transmission, Scanning methods, Artifacts, Ultrasound- Doppler effect, Clinical Applications

COURSE OUTCOMES:

At the end of the course, the students should be able to

CO1 : Interpret the properties of electromagnetic radiations and its effect on human.

CO2 : Apply the principles and understand the production of radioactive nuclides.

CO3 : Explain the interaction of radiation with matter

CO4 : Illustrate the optical properties of materials and working principles of various optical devices

CO5 : Demonstrate the knowledge on the properties of sound and its application in medicine.

TEXT BOOKS:

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
2. R.F. Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.
3. G.W. Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.
4. 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.
5. Gopal B. Saha —Physics and Radiobiology of Nuclear Medicine, Fourth edition Springer, 2006.

REFERENCES:

1. Laszlo Solymar, Walsh, Donald, Syms and Richard R.A., Electrical Properties of Materials, Oxford Univ. Press (Indian Edition) 2015.
2. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Education (Indian Edition), 2019.
3. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
4. W.J. Meredith and J.B. Massey “Fundamental Physics of Radiology” Varghese Publishing house, Third Edition, 2013.
5. Steve Webb, The Physics of Medical Imaging, Taylor & Francis, New York, Second Edition, 2012.
6. R.S. Khandpur, “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi, 2003.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1	-	-	-	-	1	-	-	-	-	1	-	1
CO2	3	2	1	2	-	2	-	2	-	-	-	-	-	-	-
CO3	3	2	2	-	2	-	-	2	-	-	-	-	2	-	2
CO4	3	-	1	-	3	2	3	1	-	-	-	1	-	-	1
CO5	3	-	2	1	-	2	-	2	-	-	-	1	-	-	2
Avg	3	2	1.4	1.5	2.5	2	3	1.6	-	-	-	1	1.5	-	1.5

1 - Low, 2 - Medium, 3 - High

SEMESTER-II
Common To All Branches
(B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH)

TA24201	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

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

SEMESTER-II
Common To All Branches
(B.Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH)

TA242001	தமிழரும் மற்றும் தொழில்நுட்பம்	L	T	P	C
		1	-	-	1

அலகு I நெசவு மற்றும் பானை தொழில்நுட்பம் 3
சங்க காலத்தில் நெசவுத் தொழில் - பானை தொழில்நுட்பம் - கருப்பு மற்றும் சிவப்பு பாண்டங்கள் பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம் 3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரம் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெரியகோவில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோவில்கள் - மாதிரி கட்டமைப்புகள் பற்றிய அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாடு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ- சாரோசெனிக் கட்டிடக் கலை.

அலகு III உற்பத்தி தொழில்நுட்பம் 3
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற் சாலை- இரும்பு உருகுதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சாடித்தல் - மணிகள் உருவக்கும் தொழிற் சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுங்கள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம் 3
அணை, ஏரி, குளங்கள், மதகு, - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக் குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

அலகு V அறிவியல் தமிழ் மற்றும் கணிதத்தமிழ் 3
அறிவியல் தமிழின் வளர்ச்சி - கணிதத்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் -சொற்குவைத் திட்டம்.

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடு மற்றும் கல்வியியல் பணிகள் கழகம்.
2. கணினித் தமிழ் முனைவர் இல.சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தோல்லியல் துறை வெளியீடு).
4. பொருதை - ஆற்றங்கரை நாகரிகம் (தோல்லியல் 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 river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

SEMESTER-II
B.E. - BIOMEDICAL ENGINEERING

BM24201	ANATOMY AND HUMAN PHYSIOLOGY	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

The student should be:

- To integrate the individual functions of all the cells and tissues and organs into functional whole, the human body.
- Function is dependent on a structure, the curriculum lays stress on functional anatomy of the organs.
- Emphasizes on the cardiovascular, respiratory, urinary and nervous system and their interrelatedness.
- Stimulate the students to understand the basic functioning of every system and the resultant unified organization.

UNIT I BASIC ELEMENTS OF HUMAN BODY 9

Cell – Cell Structure and organelles - Functions of each component in the cell. Cell membrane –transport across membrane - Action potential (Nernst, Goldman equation), Homeostasis. Tissue: Types, functions.

UNIT II SKELETAL AND MUSCULAR SYSTEM 9

Skeletal: Types of Bone and function – Physiology of Bone formation – Division of Skeleton -Types of joints and function – Types of cartilage and function. –Types of muscles – Structure and Properties of Skeletal Muscle- Changes during muscle contraction- Neuromuscular junction.

UNIT III CARDIOVASCULAR AND RESPIRATORY SYSTEM 9

Cardiovascular System: Structure – Conduction System of heart – Cardiac Cycle – Cardiac output. Blood: Composition – Functions - Haemostasis – Blood groups and typing. Blood Vessels – Structure and types - Blood pressure - Respiratory system: Parts of respiratory system – Respiratory physiology – Lung volumes and capacities – Gaseous exchange.

UNIT IV DIGESTIVE AND EXCRETORY SYSTEMS 9

Structure and functions of gastrointestinal system - secretory functions of the alimentary tract - digestion and absorption in the gastrointestinal tract - structure of nephron - mechanism of urine formation - skin and sweat gland - temperature regulation.

UNIT V NERVOUS AND SENSORY SYSTEM 9

Structure and function of nervous tissue – Brain and spinal cord – Functions of CNS – Nerve conduction and synapse – Reflex action – Somatic and Autonomic Nervous system. Physiology of Vision, Hearing, Integumentary, Olfactory systems. Taste buds.

Total: 45 Periods

LIST OF EXPERIMENTS:

1. Collection of Blood Samples
2. Identification of Blood groups (Forward and Reverse)
3. Bleeding and Clotting time
4. Estimation of Haemoglobin

5. Total RBC and WBC Count
6. Differential count of Blood cells
7. Estimation of ESR, PCV, MCH, MCV, MCHC
8. Hearing test – Tuning fork
9. Visual Activity – Snellen’s Chart and Jaeger’s Chart

Total: 30 Periods

Total: 75 Periods

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

- CO1** : Identify and explain basic elements of human body
- CO2** : Explain the functions of skeletal and muscular system
- CO3** : Describe the structure, function of cardiovascular system and respiratory system
- CO4** : Discuss the structure of digestive and excretory system.
- CO5** : Describe the physiological process of Nervous and sensory system

TEXT BOOKS:

1. Elaine.N. Marieb, “Essential of Human Anatomy and Physiology”, Ninth Edition, Pearson Education, New Delhi, 2018.

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. Sarada Subramanyam, K Madhavan Kutty, Singh H D, “Textbook of Human Physiology”, S. Chand and Company Ltd, New Delhi, 2012.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	1	-	1	-	-	-	1	3	3	-
CO2	3	3	2	-	-	1	-	1	-	-	-	1	3	3	-
CO3	3	3	2	-	-	1	-	1	-	-	-	1	3	3	-
CO4	3	3	3	-	-	1	-	1	-	-	-	1	3	3	-
CO5	3	3	3	-	-	1	-	1	-	-	-	1	3	3	-
Avg	3	3	2	-	-	1	-	1	-	-	-	1	3	3	-

1 - Low, 2 - Medium, 3 - High

7. VI characteristic of Zener Diode.
8. Study Of solar PV.

Total: 30 Periods

Total: 75 Periods

COURSE OUTCOMES

After completing this course, the students will be able to

- CO1** : Compute the electric circuit parameters.
- CO2** : Illustrate the working principle and applications of electrical machines.
- CO3** : Plot the characteristics of analog electronics.
- CO4** : Summarize the basic concepts of digital electronics.
- CO5** : Interpret the operating principles of measuring instruments.

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, Second Edition, McGraw Hill Education, 2020.
2. S.K.Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson Education, Second Edition, 2017.
3. Sedha R.S., “A textbook book of Applied Electronics”, S. Chand & Co., Third Edition, 2015.
4. James A .Svoboda, Richard C. Dorf, “Dorf’s Introduction to Electric Circuits”, Wiley, 2018.
5. A.K. Sawhney, Puneet Sawhney ‘A Course in Electrical & Electronic Measurements & Instrumentation’, Dhanpat Rai and Co, 2015.

REFERENCES:

1. Thomas L. Floyd, ‘Digital Fundamentals’, 11th Edition, Pearson Education, 2017.
2. Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 9th edition, 2021.
3. Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill, 7th Edition 2017.
4. H.S. Kalsi, ‘Electronic Instrumentation’, Tata McGraw-Hill, New Delhi, 4th Edition, 2019.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	1	-	1	-	2	-	1	1
CO2	2	2	1	-	-	-	-	1	-	1	-	2	-	1	1
CO3	2	2	1	-	-	-	-	1	-	1	-	2	-	1	1
CO4	2	2	1	-	-	-	-	1	-	1	-	2	-	1	1
CO5	2	2	1	-	-	-	-	1	-	1	-	2	-	1	1
Avg	2	2	1	-	-	-	-	1	-	1	-	2	-	1	1

1 - Low, 2 - Medium, 3 - High

SEMESTER-II
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

GE24201	ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
- Welding various joints in steel plates using arc welding; machining various simple processes like turning, drilling, and tapping in parts.
- Wiring various electrical joints in common household electrical wire work.
- Soldering and testing simple electronic circuits; assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & MECHANICAL ENGINEERING)

PART I **CIVIL ENGINEERING PRACTICES** **15**

PLUMBING WORK:

- a. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, and elbows in household fittings.
- b. Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- c. Preparation of plumbing line sketches for water supply.
- d. Laying pipe connection to the suction and delivery side of a pump
- e. Mixed pipe material connection – Pipe connections with different joining components.

WOOD WORK:

- a. Study of the joints in roofs, doors, windows and furniture.
- b. Making joints like Mortise and Tenon joint, T-Joint and Dovetail joint by sawing, planning and cutting.

PART II **MECHANICAL ENGINEERING PRACTICES** **15**

WELDING WORK:

- a. Welding of Butt joints, Lap joints and Tee joints using arc welding.
- b. Gas welding practice

BASIC MACHINING WORK:

- a. Simple step turning, taper turning
- b. Simple drilling.

ASSEMBLY WORK:

- a. Study of centrifugal pump
- b. Study of air conditioner
- c. Study of household mixer.

SHEET METAL WORK:

- a. Making models of a square/Rectangular tray and funnels.

FOUNDRY WORK:

- a. Demonstrating basic foundry operations.

GROUP B (ELECTRICAL & ELECTRONICS ENGINEERING)**PART III****ELECTRICAL ENGINEERING PRACTICES****15**

- a. Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket.
- b. Staircase Wiring.
- c. Fluorescent Lamp wiring with introduction to CFL and LED types.
- d. Energy meter wiring and related calculations/ calibration.
- e. Study of Iron Box wiring and assembly.
- f. Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac).
- g. Study of emergency lamp wiring/Water heater.

PART IV**ELECTRONIC ENGINEERING PRACTICES****15****STUDY OF ELECTRONIC COMPONENTS**

- a. Measurement of Resistance of a resistor using Color Coding.
- b. Measurement of AC signal parameters (Peak-Peak, RMS period, Frequency) using CRO.

SOLDERING WORK:

- a. Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

- a. Assembling and testing electronic components on a small PCB.

STUDY OF LOGIC GATES:

- a. Verification of logic gates - AND, OR, NOT, NAND, NOR, EXOR, EX-NOR.

ELECTRONIC EQUIPMENT STUDY:

- a. Study on elements of smart phone.
- b. Assembly and dismantle of LED TV.
- c. Assembly and dismantle of computer/ laptop.

Total = 60 Periods***At end of the semester students should submit the prototypes of their stem projects.****COURSE OUTCOMES**

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

CO1: draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work;

Saw; plan; make joints in wood materials used in common household wood work.

CO2: weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, and tapping in parts.

CO3: assemble simple mechanical assembly of common household equipment's; Make a simple model using sheet metal work.

CO4: wiring of various electrical joints in common household electrical wire work.

CO5: solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO6: understand the concept and verification of logic gates.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			1	1	1					2	1		
CO2	3	2			1	1	1					2	1		
CO3	3	2			1	1	1					2	1		
CO4	3	2			1	1	1					2	1		
CO5	3	2			1	1	1					2	1		
CO6	3	2			1	1	1					2	1		
Avg	3	2			1	1	1					2	1		

1 - Low, 2 - Medium, 3 - High

SEMESTER-II
Common To All Branches
B. Tech – AI&DS, IT, B.E – BME, CSE, ECE, EEE & MECH

HS24202	ENGLISH COMMUNICATION LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To be able to communicate effectively through writing.

UNIT I SELF INTRODUCTION AND EMAIL DRAFTING 12

Speaking: Role Play Exercises Based on Workplace Contexts, - talking about competition- discussing progress toward goals-talking about experiences-talking about events in life-discussing past events.

Writing: Writing emails (formal & semi-formal).

UNIT II INDIVIDUAL DISCUSSION ON SOCIAL ISSUES 12

Speaking: discussing news stories-talking about frequency-talking about travel problems- discussing travel procedures- talking about travel problems- making arrangements-describing arrangements-discussing plans and decisions- discussing purposes and reasons- understanding common technology terms.

Writing: Writing different types of emails.

UNIT III PRESENTATION ON TECHNICAL AND NON-TECHNICAL TOPICS 12

Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios-talking about purchasing-discussing advantages and disadvantages-making comparisons-discussing likes and dislikes-discussing feelings about experiences-discussing imaginary scenarios.

Writing: Short essays and reports-formal/semi-formal letters.

UNIT IV IMPORTANCE OF DESCRIPTIVE WRITING & INSTRUCTIONS 12

Speaking: discussing the natural environment-describing systems-describing position and movement-explaining rules-(example- discussing rental arrangements)- understanding technical instructions.

Writing: Writing instructions. Writing a short article.

UNIT V GROUP DISCUSSION AND IMPORTANCE OF RESUME WRITING 12

Speaking: describing things relatively-describing clothing-discussing safety issues (making recommendations) talking about electrical devices-describing controlling actions.

Writing: Job application (Cover letter+ Curriculum vitae)- product presentation)

Total: 60 Periods

COURSE OUTCOMES

After completion of this course, the students should be able to

CO1 : Speak effectively in group discussions held in a formal/semi formal contexts.

CO2 : Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions

CO3 : Write emails, letters and effective job applications.

CO4 : Write critical reports to convey data and information with clarity and precision.

CO5 : Give appropriate instructions and recommendations for safe execution of tasks.

Assessment Pattern

- Conduction of Assessment to test speaking and writing skills

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3		3		3	3		3	3	3	3			
CO2		3		3		3	3		3	3	3	3			
CO3		2		3		3	3		3	3	3	3			
CO4		3		3		3	3		3	3	3	3			
CO5		3		3		3	3		3	3	3	3			
Avg		2.8		3		3	3		3	3	3	3			

1 - Low, 2 - Medium, 3 - High