M.A.M.SCHOOL OF ENGINEERING

(An Autonomous Institution)
(Accredited by NAAC || Approved by AICTE || Affiliated to Anna University)
Trichy – Chennai Trunk Road, Siruganur, Tiruchirappalli – 621 105

B.E. BIOMEDICAL ENGINEERING

CURRICULUM

(CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION)

I TO VIII SEMESTERS CURRICULUM

(Applicable for the students admitted from 2024-2025 onwards)

REGULATIONS 2024

M.A.M SCHOOL OF ENGINEERING

(AUTONOMOUS)

REGULATIONS 2024

CHOICE BASED CREDIT SYSTEM

B. E. BIOMEDICAL ENGINEERING

I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. To enable the graduates to demonstrate their skills in design and develop medical devices for health care system through the core foundation and knowledge acquired in engineering and biology.

2. To enable the graduates to exhibit leadership in health care team to solve health care problems and make decisions with societal and ethical responsibilities.

3. To Carryout multidisciplinary research, addressing human healthcare problems and sustain technical competence with ethics, safety and standards.

4. To ensure that graduates will recognize the need for sustaining and expanding their technical competence and engage in learning opportunities throughout their careers.

II.PROGRAM OUTCOMES (POs)

PO1	**Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.**
PO2	**Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.**
PO3	**Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.**
PO4	**Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.**
PO5	**Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.**

PO6	**The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.**
PO7	**Environment and Sustainability: Understand the impact of the professional engineering solutionsin societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.**
PO8	**Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.**
PO9	**Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**
PO10	**Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**
PO11	**Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**
PO12	**Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.**

III.PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1	**To design and develop diagnostic and therapeutic devices that reduces physician burnout and enhance the quality of life for the end user by applying fundamentals of Biomedical Engineering.**
PSO2	**To apply software skills in developing algorithms for solving healthcare related problems in various fields of Medical sector.**
PSO3	**To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions for current societal and scientific issues thereby developing indigenous medical instruments that are on par with the existing technology**

CURRICULUM

M.A.M SCHOOL OF ENGINEERING

DEPARTMENT OF BIOMEDICAL ENGINEERING

REGULATIONS 2024

CHOICE BASED CREDIT SYSTEM

(Students admitted from the Academic Year 2024 – 25 onwards)

I TO VIII SEMESTERS CURRICULUM

Induction Program (Mandatory)	3 weeks duration
Induction program for students to be offered right at the start of the first year	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept. / Branch & Innovations

B.E. BIOMEDICAL ENGINEERING

SEMESTER I

S.No	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
THEORY COURSES										
1.	24HS101	Communicative English I	2	0	0	2	40	60	100	HS
2.	24HS102	Heritage of Tamil	1	0	0	1	40	60	100	HS
3.	24BS101	Matrices & Calculus	3	1	0	4	40	60	100	BS
4.	24ES101	Problem Solving and Python Programming	3	0	0	3	40	60	100	ES
THEORY COURSES WITH LABORATORY COMPONENT										
6.	24BS103	Engineering Physics	3	0	2	4	50	50	100	BS
LABORATORY COURSES										
7.	24HS103	Communicative English Laboratory	0	0	2	1	60	40	100	HS
8.	24ES102	Problem Solving and Python Programming Laboratory	0	0	3	2	60	40	100	ES
9.	24ES106	Engineering Practices Laboratory	0	0	2	1	60	40	100	ES
10.	24ES107	Workshop Practices Laboratory	0	0	2	1	60	40	100	ES
		TOTAL	13	1	12	19				

SEMESTER II										
THEORY COURSES										
S.No	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
1.		Language Elective	2	0	0	2	40	60	100	HS
2.	24HS201	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	1	0	0	1	40	60	100	HS
3.	24BS201	Transforms and Partial Differential Equations	3	1	0	4	40	60	100	BS
4.	24ES201	Design Thinking	1	0	0	1	40	60	100	ES
THEORY COURSES WITH LABORATORY COMPONENT										
5.	24BS203	Chemistry for Engineers	3	0	2	4	50	50	100	BS
6.	24ES213	Electrical Engineering for medical applications	3	0	2	4	50	50	100	ES
7.	24ES203	Circuit Analysis for Biomedical Engineers	3	0	2	4	50	50	100	ES
LABORATORY COURSES										
8.	24ES205	Engineering Drawing	0	0	4	2	60	40	100	ES
9.	24TP201	Aptitude Skills and Communication skills I	0	0	2	1	100	-	100	EEC
		TOTAL	17	1	12	23				

SEMESTER III										
THEORY COURSES										
S.No	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
1.	24BS301	Statistics and Numerical Method	3	1	0	4	40	60	100	BS
2.	24BM301	Electronic Devices and Circuits	3	0	0	3	40	60	100	PC
3.	24CSE01	Object Oriented Programming	3	0	0	3	40	60	100	PC
4.	24BM302	Biological sciences	3	0	0	3	40	60	100	PC
THEORY COURSES WITH LABORATORY COMPONENT										
5.	24BM303	Human Anatomy and Physiology	3	0	2	4	50	50	100	PC
LABORATORY COURSES										
6.	24CSE02	Object Oriented Programming Lab	0	0	4	2	60	40	100	PC
7.	24BM304	Biosciences Laboratory	0	0	4	2	60	40	100	PC
8.	24BM305	Electronic Devices and Circuits Lab	0	0	4	2	60	40	100	PC
9.	24TP301	Aptitude Skills and Communication skills I	0	0	2	1	100	-	100	EEC
		TOTAL	15	1	16	24				

SEMESTER IV										
THEORY COURSES										
S.No	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
1.	24BS401	Random process and linear algebra	3	1	0	4	40	60	100	BS
2.	24BM401	Analog and Digital Integrated Circuits	3	0	0	3	40	60	100	PC
3.	24BM402	Biomedical Instrumentation	3	0	0	3	40	60	100	PC
4.	24MC401	Environmental Science	3	0	0	0	40	60	100	MC
THEORY COURSES WITH LABORATORY COMPONENT										
5.	24BM403	BioSensors and Measurements	3	0	2	4	50	50	100	PC
6.	24BM404	Signal Processing	3	0	2	4	50	50	100	PC
LABORATORY COURSES										
7.	24BM405	Analog and Digital Integrated Circuits Lab	0	0	4	2	60	40	100	PC
8.	24BM406	Biomedical Instrumentation Lab	0	0	4	2	60	40	100	PC
9.	24TP401	Aptitude Skills III & Technical Skills	0	0	2	1	100	-	100	EEC
		TOTAL	18	1	14	23				

SEMESTER V										
THEORY COURSES										
S.No	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
1.	24BM501	Diagnostic and Therapeutic Equipment	3	0	0	3	40	60	100	PC
2.	24BM502	BioControl System	3	0	0	3	40	60	100	PC
3.		Professional Elective-I	3	0	0	3	40	60	100	PE
4.		Professional Elective-II	3	0	0	3	40	60	100	PE
5.		Open Elective-I	3	0	0	3	40	60	100	OE
THEORY COURSES WITH LABORATORY COMPONENT										
6.	24BM503	Embedded System and IOMT	3	0	2	4	50	50	100	PC
LABORATORY COURSES										
7.	24BM504	Diagnostic and Therapeutic Equipment Laboratory	0	0	4	2	60	40	100	PC
8.	24TP501	Aptitude Skills IV & Technical Skills II	0	0	2	1	100	-	100	EEC
9.	24BM505	Internship	0	0	0	2	100	-	100	EEC
		TOTAL	18	0	8	24				

SEMESTER VI										
THEORY COURSES										
S.No	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
1.	24HS601	Principles of Management	3	0	0	3	40	60	100	HS
2.		Professional Elective – III	3	0	0	3	40	60	100	PE
3.		Professional Elective – IV	3	0	0	3	40	60	100	PE
4.		Open Elective – II	3	0	0	3	40	60	100	OE
THEORY COURSES WITH LABORATORY COMPONENT										
5.	24BM601	Artificial Intelligence and Machine Learning in Health Care	3	0	2	4	50	50	100	PC
6.	24BM602	Medical Image Processing	3	0	2	4	50	50	100	PC
LABORATORY COURSES										
7.	24BM603	Mini Project	0	0	4	2	60	40	100	EEC
8.	24TP601	Aptitude Skills V & Technical Skills III	0	0	2	1	100	-	100	EEC
TOTAL			18	0	10	23				

SEMESTER VII										
THEORY COURSES										
S.NO	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
1.	24HS701	Human Values and Ethics	3	0	0	3	40	60	100	HS
2.	24BM701	Fundamentals of Healthcare Analytics	3	0	0	3	40	60	100	PC
3.		Professional Elective – V	3	0	0	3	40	60	100	PE
4.		Open Elective – III	3	0	0	3	40	60	100	OE
LABORATORY COURSES										
5.	24ES701	Hospital Training*	0	0	4	2	100	0	100	EEC
TOTAL			12	0	4	14				

*To be undertaken during summer holidays

SEMESTER VIII										
S.NO	Course Code	Course	L	T	P	C	Maximum Marks			Category
							CA	ES	Total	
LABORATORY COURSES										
1.		Project Work	0	0	20	10	60	40	100	EEC
		TOTAL	0	0	20	10	60	40	100	

PROFESSIONAL ELECTIVE COURSES						
S.No	Course Code	Course	L	T	P	C
VERTICAL I (BIO ENGINEERING)						
1.	24BMX01	Biomaterials	3	0	0	3
2.	24BMX02	Artificial Organs and Implants	3	0	0	3
3.	24BMX03	Biomedical Optics and Biophotonics	3	0	0	3
4.	24BMX04	Neural Engineering	3	0	0	3
5.	24BMX05	Principles of Tissue Engineering	3	0	0	3
6.	24BMX06	Genetic Engineering	3	0	0	3
7.	24BMX07	Fundamentals of cell and Microbiology	3	0	0	3
8.	24BMX08	Basics of Biomolecules	3	0	0	3
VERTICAL II (MEDICAL DEVICE INNOVATION AND DEVELOPMENT)						
9.	24BMX09	Foundation Skills in Integrated Product Development	3	0	0	3
10.	24BMX10	Medical Device Design	3	0	0	3
11.	24BMX11	Patient Safety, Standards and Ethics	3	0	0	3
12.	24BMX12	Medical Device Regulations	3	0	0	3
13.	24BMX13	Medical Innovation and Entrepreneurship	3	0	0	3
14.	24BMX14	Rapid Prototyping	3	0	0	3
15.	24BMX15	Pharmaceutical Nanotechnology	3	0	0	3
16.	24BMX16	Oncology	3	0	0	3

S.No	Course Code	Cour se	L	T	P	C
		VERTICAL III (HEALTHCARE MANAGEMENT)				
17.	24BMX17	Clinical Engineering	3	0	0	3
18.	24BMX18	Hospital Planning and Management	3	0	0	3
19.	24BMX19	Medical Waste Management	3	0	0	3
20.	24BMX20	Economics and Management for Engineers	3	0	0	3
21.	24BMX21	Biostatistics	3	0	0	3
22.	24BMX22	Forensic Science in Healthcare	3	0	0	3
23.	24BMX23	Healthcare policy and law	3	0	0	3
24.	24BMX24	Risk management and patient safety	3	0	0	3
		VERTICAL IV (BIOMECHANICS)				
25.	24BMX25	Biomechanics	3	0	0	3
26.	24BMX26	Rehabilitation Engineering	3	0	0	3
27.	24BMX27	Physiological Modelling	3	0	0	3
28.	24BMX28	Assistive Technology	3	0	0	3
29.	24BMX29	Ergonomics	3	0	0	3
30.	24BMX30	Haptics	3	0	0	3
31.	24BMX31	Biomechanics for Injury and Trauma	3	0	0	3
32.	24BMX32	Orthopedic Biomechanics	3	0	0	3
		VERTICAL V (SIGNAL AND IMAGE PROCESSING)				
33.	24BMX33	Oncologic imaging techniques	3	0	0	3
34.	24BMX34	Computer Vision	3	0	0	3
35.	24BMX35	Speech and Audio Signal Processing	3	0	0	3
36.	24BMX36	Medical Imaging Systems	3	0	0	3
37.	24BMX37	Brain Computer Interface and Applications	3	0	0	3
38.	24BMX38	Biometric Systems	3	0	0	3
39.	24BMX39	Radiography and X ray imaging	3	0	0	3
40.	24BMX40	Neuro imaging	3	0	0	3

S.No	Course Code	Course	L	T	P	C
VERTICAL VI (COMMUNICATION)						
41.	24BMX41	Communication Systems	3	0	0	3
42.	24BMX42	Wearable Devices	3	0	0	3
43.	24BMX43	Body Area Networks	3	0	0	3
44.	24BMX44	Virtual Reality and Augmented Reality in Healthcare	3	0	0	3
45.	24BMX45	Telehealth Technology	3	0	0	3
46.	24BMX46	Medical Informatics	3	0	0	3
47.	24BMX47	Brain Human Interface	3	0	0	3
48.	24BMX48	Basics of Microbial Technology	3	0	0	3

OPEN ELECTIVES I						
S.No	Course Code	Course	L	T	P	C
1.	24BMY01	Medical Electronics	3	0	0	3
2.	24BMY02	Human Assist Devices	3	0	0	3
3.	24BMY03	Therapeutic Equipment	3	0	0	3
4.	24BMY04	Robotics in Medicine	3	0	0	3
5.	24BMY05	Bio MEMS	3	0	0	3
OPEN ELECTIVES II						
1.	24BMY06	Critical Care and Operation Theatre Equipment	3	0	0	3
2.	24BMY07	Wearable Devices	3	0	0	3
3.	24BMY08	Telehealth Technology	3	0	0	3
4.	24BMY09	Medical Imaging systems	3	0	0	3
5.	24BMY10	Biomechanics	3	0	0	3
OPEN ELECTIVES III						
1.	24BMY11	Hospital Planning and Management	3	0	0	3
2.	24BMY12	Neural Engineering	3	0	0	3
3.	24BMY13	Holistic Nutrition	3	0	0	3
4.	24BMY14	Pharmaceutical Nanotechnology	3	0	0	3
5.	24BMY15	Telehealth Technology	3	0	0	3
LANGUAGE ELECTIVE						
1.	24HS203	Japanese	3	0	0	3
2.	24HS204	German	3	0	0	3
3.	24HS205	Italy	3	0	0	3

S.No.	**Category**	**Credits Per Semester**								**Total Credit**	**Credits in %**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**		
1	HS	**5**	**3**				**3**	**3**		**14**	**8.5%**
2	BS	**8**	**8**	**4**	**4**					**24**	**14.6%**
3	ES	**7**	**12**							**19**	**12.8%**
5	PC			**19**	**18**	**12**	**8**	**3**		**60**	**36.6%**
6	PE					**6**	**6**	**3**		**15**	**9.1%**
7	OE					**3**	**3**	**3**		**9**	**5.5%**
8	EEC		**1**	**1**	**1**	**3**	**3**	**2**	**10**	**21**	**12.8%**
Total		**20**	**24**	**24**	**23**	**24**	**23**	**14**	**10**	**162**	**100**

HS – Humanities and Social Science

BS –Basic Science

ES –Engineering Science

PC – Professional Core

PE –Professional Elective

OE–Open Elective

EEC – Employability Enhancement Course

MC – Mandatory course

CA – Continuous Assessment

ES – End Semester Examination

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TAMIL NADU, INDIA

B.E.BIOMEDICAL ENGINEERING

SEMESTER I

REGULATIONS 2024

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

R 2024	SCIENCE &HUMANITIES					SEMESTER: I
24HS101	COMMUNICATIVE ENGLISH - I	L	T	P	C	HS
		3	0	0	3	

COMMON TO: ALL PROGRAMS

COURSE OBJECTIVES:

The objectives of learning this course are to:

- ✓ Enable learners to use words appropriately in their communication.
- ✓ Enhance learners' grammatical accuracy in communication.
- ✓ Develop learners ability to read and listen to texts in English.
- ✓ Strengthen the communication skills of the learners.
- ✓ Help learners write appropriately in professional contexts

COURSE OUTCOMES:

At the end of this course, students are able to

CO1: Understand the basic grammatical structures and apply them in right context

CO2: Identify and report cause and effects in events, industrial processes through technical texts.

CO3: Apply appropriate words in a professional context.

CO4: Interpret information presented in tables, charts and other graphic forms.

CO5: Draft effective resumes in the context of job search.

UNIT: I	BASICS OF LANGUAGE	9

Reading - Reading brochures (technical context), telephone messages advertisements, user manuals. **Writing** - Sequential Writing – connecting ideas using transitional words (Jumbled Sentences), **Gramma**r – basics; parts of speech, Simple Tenses – Form, Function and Meaning;
Vocabulary - Synonyms; One word substitution

Pedagogical Tools	Black board, chalk, group discussion, role play, youtube videos, NPTEL videos

UNIT: II	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	9

Reading - Reading biographies, travelogues, newspaper reports, **Writing** -Cause and Effect Essays, **Grammar**: Continuous Tenses, Subject-Verb Agreement, Idioms; **Vocabulary:** Antonyms, Language puzzles.

Pedagogical Tools	Black board, chalk, group discussion, role play, youtube videos, NPTEL videos

UNIT: III	NARRATION AND SUMMATION	9

Reading – Reading advertisements, Case Studies, **Writing**- Check-list, Instructions. **Grammar**: Perfect Tenses, Imperatives; Adjectives, **Vocabulary:** Language Games/ Group Discussion.

Pedagogical Tools:	Black board, chalk, group discussion, role play, youtube videos, NPTEL videos

UNIT: IV	REPORTING OF EVENTS AND RESEARCH	9

Reading –Newspaper articles; **Writing** – Recommendations, Transcoding **Grammar** – Reported Speech, Pronouns - Possessive & Relative pronouns, **Vocabulary:** Oral Presentation.

Pedagogical Tools	Black board, chalk, group discussion, role play, youtube videos, NPTEL videos

UNIT: V	THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY	9

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; **Writing** – Job / Internship application – Cover letter & Resume; **Grammar** – Numerical adjectives, Relative Clauses. Degrees of comparison, Phrasal Verbs; **Vocabulary:** Informal Vocabulary and Formal Substitutes.

Pedagogical Tools	Black board, chalk, group discussion, role play, youtube videos, NPTEL videos

Total Periods :45

TEXT BOOKS:				
Sl.No	**Authors**	**Title of the Book**	**Publisher**	**Year of publication**
1	Raymond, Murphy	English Grammar in Use (5th Edition)	Cambridge Press: New York	2019
2	Dr. KN. Shoba, and Dr. Lourdes Joevani	English for Science & Technology	Cambridge University Press	2021

REFERENCE BOOKS:				
Sl.No	**Authors**	**Title of the Book**	**Publisher**	**Year of publication**
1	Meenakshi Raman &	Technical Communication Principles And Practices	Oxford Univ. Press	2016
2	Lakshmi Narayanan	A Course Book on Technical English	Scitech Publications (India) Pvt. Ltd.	2017
3	Kulbhusan Kumar	Effective Communication Skill	R S Salaria, Khanna Publishing House.	2018

WEB LEARNING RESOURCES:
1 https://store.acolad.com/products/english-for-engineering
2 https://www.cambridge.es/en/catalogue/business-english/other-titles/cambridge-english-for/engineering
3 https://shipcon.eu.com/english-for-engineers/
4 https://www.udemy.com/course/english-for-engineers/
5 https://store.acolad.com/products/english-for-engineering

CO – PO – PSO MAPPING															
	PO 1	**PO 2**	**PO3**	**PO 4**	**PO5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	1	1	-	-	-	-	3	-	-	-
CO2	-	3	-	-	-	-	3	3	-	3	-	3	-	-	-
CO3	-	-	-	-	2	-	2	-	-	3	-	3	-	-	-
CO4	-	-	-	-	-	3	-	1	2	3	-	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	3	3	-	-	-
AVG	-	3	-	-	2	2	2	2	2	3	3	3	-	-	-

R 2024	SCIENCE & HUMANITIES					SEMESTER: I
24HS102	Heritage of Tamil	L	T	P	C	HS
		1	0	0	1	

COMMON TO: ALL PROGRAMS

COURSE OBJECTIVES:

The objectives of learning this course are to

- ✓ Learn the Extensive literature of classical tamil
- ✓ Review the fine arts heritage of tamil culture
- ✓ Realize the contribution of tamil in Indian freedom struggle

COURSE OUTCOMES:

At the end of this course, students are able to

CO1: Understand the weaving and ceramic technology of ancient tamil people nature.

CO2: Understand the construction technology, building materials in sangam period and case studies.

CO3: Infer the metal process, coin and beads manufacturing with relevant archaeological evidence.

CO4: Realize the agriculture methods, irrigation technology and pearl diving.

CO5: Apply the knowledge of scientific tamil and tamil computing.

UNIT: I	LANGUAGE AND LITERATURE	3
Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – 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		
Pedagogical Tools	Board & Chalk, PPT, NPTEL video, you tube video, Group Discussion	
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 - Mridangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	
UNIT: III	**FOLK AND MARTIAL ARTS**	**3**
Therukoothu, Karakattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather Puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Role Play	
UNIT: IV	**THINAI CONCEPT OF TAMILS**	**3**
Flora and Fauna of Tamils & Agam 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.		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	
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.		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	

Total Periods :15

TEXT CUM REFERENCE BOOKS:				
Sl. No	**Authors**	**Title of the Book**	**Publisher**	**Year of publication**
1	Dr.K.K.Pillay	tamilnadu history people and culture	Tamilnadu Textbook and Education works Corporation	2019
2	EL Sundaram	Computer Tamil	Vikatanprasuram	2016
3	Dr.S.Singaravelu	Social Life of the Tamils - The Classical Period	International Institute of Tamil Studies.	2001
4	Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu	Historical Heritage of the Tamils	International Institute of Tamil Studies	2010
5	Dr.M.Valarmathi	The Contributions of the Tamils to Indian Culture	International Institute of Tamil Studies	2001
6		Keeladi - 'Sangam City Civilization on the banks of river Vaigai'	Department of Archaeology& Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu	2019
7	Dr. K. K. Pillay	Studies in the History of India with Special Reference to Tamil Nadu	The Author	1979
8		Porunai Civilization	Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu	2019
9	R.Balakrishnan	Journey of Civilization Indus to Vaigai	RMRL	2019
10	Dr.K.K.Pillay	Social Life of Tamils	A joint publication of TNTB & ESC and RMRL	1975

WEB LEARNING RESOURCES:
https://youtu.be/8J3UJXu4JZ0?si=ekqrc_x3J79C_MwI
https://www.youtube.com/live/WbnNQM2LNQA?si=S5YS3vXjIotIuDxp
https://www.youtube.com/live/10Z7NdBPAYU?si=Xbvjmr9wzfQBCHH6
https://www.youtube.com/live/xkrRTmvPsbY?si=Xdj6zDOA-WI7Vu9j
https://youtu.be/ByHvsH0I080?si=O2HnEcVubA8tb5h8

CO – PO – PSO MAPPING															
	PO 1	**PO 2**	**PO3**	**PO 4**	**PO5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PS O3**
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
AVG	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-

R 2024	SCIENCE & HUMANITIES					SEMESTER: I
24BS101	MATRICES AND CALCULUS	L	T	P	C	BS
		3	1	0	4	

COMMON TO: ALL PROGRAMS

COURSE OBJECTIVES:

The objectives of learning this course are to:

- ✓ Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- ✓ Familiarize the student with functions of several variables. this is needed in many branches of engineering.
- ✓ Make the students understand various techniques of integration.
- ✓ Acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.
- ✓ Make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.

COURSE OUTCOMES:

At the end of this course, students are able to

CO1: Apply the knowledge of matrices with the concepts of eigenvalues to study their problems in core areas
CO2: Apply the basic techniques and theorems function of several variables in other areas of mathematics
CO3: Apply different methods of integration in solving practical problems.
CO4: Apply multiple integral ideas in solving areas, volumes and other practical problems.
CO5: Solve basic application problems described by second and higher order linear differential equations with constant coefficients.

UNIT: I	MATRICES	9+3
Eigen values and Eigenvectors of a real matrix - Properties of Eigen values and Eigenvectors (without proof) - Statement and applications of Cayley- Hamilton theorem (without proof) - Diagonalization of matrices- Reduction of a quadratic form to canonical form by orthogonal transformation-Nature of quadratic forms.		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	

UNIT: II	FUNCTIONS OF SEVERAL VARIABLES	9+3
Partial derivatives - Total derivative - Jacobian and properties - Taylor's series expansion for function of two variables - Extreme values of functions of two variables - Lagrange multipliers method.		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	

UNIT: III	INTEGRAL CALCULUS	9+3
Definite and indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by Partial fraction, Integration of irrational functions		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	

UNIT: IV	MULTIPLE INTEGRALS	9+3
Double integrals - Change of order of integration - Double integrals in polar coordinates - Triple integrals - Applications in area and volume (except spherical , cylindrical coordinates)		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	

UNIT: V	ORDINARY DIFFERENTIAL EQUATIONS	9+3
Second and higher order linear differential equations with constant coefficients - Variable coefficients - Euler Cauchy equation - method of variation parameters.		
Pedagogical Tools	Chalk & Board, PPT, NPTEL video, you tube video, Group Discussion	

Total Periods :60

TEXT BOOKS:				
Sl. No	**Authors**	**Title of the Book**	**Publisher**	**Year of publication**
1	Kreyszig.E	Advanced Engineering Mathematics	John Wiley and sons, New Delhi	2016
2	Grewal B.S	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2018
3	James Stewart	Calculus : Early Transcendentals	Cengage Learning, New Delhi	2015
REFERENCE BOOKS:				
Sl. No	**Authors**	**Title of the Book**	**Publisher**	**Year of Publication**
1	Bali.N, M.Goyal And Watkins.C	Advanced Engineering Mathematics	Lakshmi Publications, New Delhi	2015
2	Ramana B.V	Higher Engineering Mathematics	McGraw Hill Education, New Delhi	2016
3	Narayanan.S, Manicavasagam Pillai.T.K	Calculus	S.Vishwanathan Publishers, Chennai	2009
WEB LEARNING RESOURCES:				
1 https://nptel.ac.in/courses/111108157				
2 https://nptel.ac.in/courses/111104125				
3 https://nptel.ac.in/courses/111105121				
4 https://nptel.ac.in/courses/111104085				
5 https://nptel.ac.in/courses/111104521				
6 https://www.brainkart.com/subject/Matrices-and-Calculus_454/				
7 https://youtu.be/i8FukKfMKCI				
8 https://youtu.be/wRR715lkK-E				
9 https://youtu.be/iGJxxlyqrRM				
10 https://youtu.be/yyc4yhlFATk				
11 https://youtu.be/Ziu0y2kWTCM				

CO – PO – PSO MAPPING															
	PO 1	**PO 2**	**PO3**	**PO 4**	**PO5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	1	1	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	1	1	-	-	-	-	-	-	-	3	-	-	-
CO3	3	3	1	1	-	-	-	-	-	-	-	3	-	-	-
CO4	3	3	1	1	-	-	-	-	-	-	-	3	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	2	-	-	-
AVG	3	3	1	1	-	-	-	-	-	-	-	3	-	-	-

R 2024	COMPUTER SCIENCE AND ENGINEERING					SEMESTER:I
24ES101	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C	ES
		3	0	0	3	

Common to AERO, BME, ECE, EEE , MECH AND MCT Departments

COURSE OBJECTIVES:

The objectives of learning this course are:

- 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

COURSE OUTCOMES:

At the end of this course, students able to

CO1: Develop algorithmic solutions to simple computational problems and execute simple Python programs.
CO2: Write simple Python programs using conditionals and loops for solving problems.
CO3: Decompose a Python program into functions.
CO4: Represent compound data using Python lists, tuples, dictionaries etc.
CO5: Read and write data from/to files in Python programs.

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: Flowchart to find minimum in a list, Flowchart to insert a card in a list of sorted cards, Pseudo code to find an integer number in a range, Pseudo code to find the position of the largest element in an list of n numbers, Towers of Hanoi.

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

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, packing and unpacking arguments, precedence of operators, comments; Illustrative programs: swap the values of two variables, circulate the values of n variables, distance between two points, reverse the string.

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: III	CONTROL FLOW, FUNCTIONS, STRINGS	9

Conditionals: Boolean values and operators, 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, factorial, fibonacci series, palindrome, linear search, binary search.

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

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: Bubble sorting, Insertion, selection, merge sort, histogram, Add Two Matrices, Transpose a Matrix, Students marks statement, Retail bill preparation.

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

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, modules (numpy, pandas, scipy, matplotlib, statmodels), packages; Illustrative programs: word count, copy file, check voting eligibility, count the number of each vowel in a string, random number generation, time series analysis, Marks range validation (0-100).		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.	
		Total Periods : 45

TEXT BOOKS:

Sl. No	Authors	Title of the Book	Publisher	Year of publication
1	Allen B. Downey	Think Python: How to Think like a Computer Scientist	O'Reilly Publishers	2016
2	Karl Beecher	Computational Thinking: A Beginner's Guide to Problem Solving and Programming	BCS Learning & Development Limited	2017

REFERENCE BOOKS:

Sl. No	Authors	Title of the Book	Publisher	Year of publication
1	Paul Deitel and Harvey Deitel	Python for Programmers	Pearson Education	2021
2	G Venkatesh and Madhavan Mukund	Computational Thinking: A Primer for Programmers and Data Scientists	Notion Press	2021
3	John V Guttag	Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data	MIT Press	2021

WEB LEARNING RESOURCES:

1. https://www.python.org/
2. https://www.geeksforgeeks.org/python-programming-language-tutorial/
3. https://www.w3schools.com/python/

CO- PO -PSO MAPPING

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

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

R 2024	SCIENCE & HUMANITIES					SEMESTER: I
24BS204	ENGINEERING PHYSICS	L	T	P	C	BS
		3	0	2	4	

COMMON TO: BME ,EEE, AERONAUTICAL, MECHANICAL and MECHATRONICS ENGINEERING

COURSE OBJECTIVES:

The objectives of learning this course are to:

- ✓ Achieve an understanding of rotational dynamics of multi-particles
- ✓ Acquire the knowledge of transfer of heat in conductors and insulators
- ✓ Introduce the basics of oscillations, optics and lasers
- ✓ Equip the students to understand the importance of quantum physics
- ✓ Introduce and classify crystal structures of materials

COURSE OUTCOMES:

At the end of this course, students can able to

CO1: Understand and analyze the rotational dynamics of multi-particles
CO2: Apply the concepts of heat transfer in various applications.
CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers
CO4: Recognize the basics of quantum physics.
CO5: Differentiate crystal structures of materials

UNIT: I	MECHANICS	9

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

Pedagogical Tools	Chalk & board, PPT, NPTEL videos, Youtube videos, Role Play

UNIT: II	THERMAL PHYSICS	9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation –rectilinear heat flow – thermal conductivity - Forbe's and Lee's disc method: theory and experiment-conduction through compound media (series and parallel)–thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

Pedagogical Tools	Chalk & board, PPT, NPTEL videos, Youtube videos, Group Discussion

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, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

Pedagogical Tools	Chalk & board, PPT, NPTEL videos, Youtube videos, Group Discussion

UNIT: IV	BASIC QUANTUM MECHANICS	9

Photons and light waves - Electrons and matter waves – Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle

Pedagogical Tools	Chalk & board, PPT, NPTEL videos and Youtube videos, Group Discussion

UNIT: V	CRYSTAL STRUCTURE	9

Introduction – Classification of solids –Space lattice –Basis-Lattice parameter – Unit cell – Crystal system –Miller indices –d-spacing in cubic lattice - Calculation of number of atoms per unit cell – Atomic radius-Coordination number – Packing factor for SC, BCC, FCC and HCP structures – crystal imperfection – Burger vector.

Pedagogical Tools	Chalk & board, PPT, NPTEL videos, Youtube videos, Role Play

Total Periods: 45

Practical Exercises: (Any six experiments to be conducted) **Total Periods: 30**

1. Non-uniform bending - Determination of Young's modulus

2. Uniform bending – Determination of Young's modulus

3. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.

4. Laser- Determination of the wave length of the laser using grating

5. Optical fibre -Determination of numerical aperture (NA) and acceptance angle (AA)

6. Air wedge - Determination of thickness of a thin sheet/wire

7. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids

8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.

9. Simple harmonic oscillations of cantilever.

Total Periods: 75

TEXT BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	D. Kleppner and R. Kolenkow	An Introduction to Mechanics	McGraw Hill Education (Indian Edition)	2017
2	Gaur, R.K. and Gupta,S.L	Engineering Physics	DhanpatRai Publishers	2018
3	D. Halliday, R. Resnick and J. Walker	Principles of Physics	Wiley (Indian Edition)	2015
4	Arthur Beiser, Shobhit Mahajan, S. RaiChoudhury	Concepts of Modern Physics	McGraw-Hill (Indian Edition)	2017
5	M.Arumugam	Engineering Physics	Anuradha publications	2010
6	Gaur,R.K.andGupta,S.L	Engineering Physics	DhanpatRai Publishers	2018

REFERENCE BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	R.Wolfson	Essential University Physics. Volume 1 & 2	Pearson Education (Indian Edition)	2020
2	K.Thyagarajan and A.Ghatak	Lasers: Fundamentals and Applications	Laxmi Publications, (Indian Edition)	2019
3	R.K.Rajput	Thermal Engineering	Laxmi Publications,	2011
4	S.O.Pillai,	Solid State Physics	New Age International, (Multicolour Edition)	2018

WEB LEARNING RESOURCES:

1. https://youtu.be/fDJeVR0o__w?list=PLyQSN7X0ro203puVhQsmCj9qhlFQ-As8e (Rotating Objects, Moment of Inertia, Rotational KE)

2. https://archive.nptel.ac.in/courses/104/104/104104085/ (Lasers)

3. https://www.youtube.com/playlist?list=PL1gyM10tgL1hK9666oGndGlWDQdpQzkY9
(NPTEL: Heat transfer lectures by Dr.Gangesh A. Viswanathan, IITB)

4 https://archive.nptel.ac.in/courses/115/101/115101107/ (Quantum mechanics)

5 https://youtu.be/5EiZjZjG-IY (NPTEL lectures: Crystal Structure - 2 (Unit Cell, Lattice, Crystal)

6. https://www.youtube.com/watch?v=mx2P1_M-7UA&list=PLFE3074A4CB751B2B&index=9
(Rotations, Part I: Dynamics of Rigid Bodies)

7. https://www.youtube.com/watch?v=UzrZxpup3rc&list=PLFE3074A4CB751B2B&index=10
(Rotations, Part II: Parallel Axis Theorem)

8. https://youtu.be/7Bj3N1E7vZk?list=PLZOZfX_TaWAHZOgn8CRjpqRElp5Dd-GaY
(Introduction to heat transfer, conduction, convection, and radiation)

9. https://youtu.be/dRpyfm66GxM (Particle in an Infinite Potential Well ,QUANTUM MECHANICS)

CO – PO – PSO MAPPING															
	PO 1	PO 2	PO3	PO 4	PO5	PO 6	PO 7	PO8	PO9	PO 10	PO1 1	PO1 2	PS01	PS02	PS0 3
CO1	3	3	2	1	1	1	-	-	-	-	-	-	-	-	-
CO2	3	-	1	1	-	-	-	-	-	-	-	1	-	-	-
CO3	3	3	2	1	2	1	-	-	-	-	-	-	-	-	-
CO4	3	3	1	1	2	1	-	-	-	-	-	-	-	-	-
CO5	3	1	-	-	-	-	-	-	-		-	-	-	-	-
AVG	3	3	2	1	2	1						1			

R 2024	SCIENCE & HUMANITIES					SEMESTER: I
24HS103	COMMUNICATIVE ENGLISH LABORATORY	L	T	P	C	BS
		0	0	2	2	

COMMON TO: ALL PROGRAMS

COURSE OBJECTIVES:

The objectives of learning this course are 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
- ✓ Build on students' English language skills by engaging them in listening, speaking
- ✓ Use language efficiently in expressing their opinions via various media.

COURSE OUTCOMES:

At the end of this course, students are able to

CO1: Identify varied group discussion skills and apply them to take part in effective

CO2: Listen to and understand different points of view in a discussion

CO3: Speak fluently and accurately in formal and informal communicative contexts

CO4: Describe products and processes and explain their uses and purposes clearly and accurately

CO5: Express their opinions effectively in both formal and informal discussions

LIST OF EXPERIMENTS

1. Write about a self introduction for your future job opportunities
2. Write a telephonic conversation between a father and a son on "career"
3. Write a product description for a fire extinguisher
4. Give any one product user manual
5. Prepare a TED talk about artificial intelligence
6. Describe a famous person's inspirational you heard before in your life
7. Write about panel discussion
8. Write your view and opinion the solve the water scarcity

Total Periods :30

CO – PO – PSO MAPPING

	PO1	PO 2	PO3	PO4	PO5	PO6	PO 7	PO8	PO9	PO 10	PO1 1	PO1 2	PSO 1	PSO 2	PS O3
CO1	-	-	-	-	-	1	1	-	-	-	-	3	-	-	-
CO2	-	3	-	-	-	-	3	3	-	3	-	3	-	-	-
CO3	-	-	-	-	2	-	2	-	-	3	-	3	-	-	-
CO4	-	-	-	-	-	3	-	1	2	3	-	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	3	3	-	-	-
AVG	-	3	-	-	-	1	-	1	1	-	3	3	-	-	-

R 2024	DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING					SEMESTER : 01
24ES102	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	L	T	P	C	ES
		0	0	4	2	

Common to AERO, BME, ECE, EEE , MECH AND MCT Departments

COURSE OBJECTIVES:

The objectives of learning this course are:

- 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.

COURSE OUTCOMES:

At the end of this course, students able to

CO1: Develop algorithmic solutions to simple computational problems
CO2: Implement programs in Python using conditionals and loops for solving problems.
CO3: Deploy functions to decompose a Python program.
CO4: Process compound data using Python data structures.
CO5: Utilize Python packages in developing software applications.

PRACTICAL EXERCISES:

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.Mini Project - Developing a game activity using Pygame like bouncing ball, car race, Cricket alerts etc.

Total Periods : 60

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

CO PO PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	2	2	1	2	1	1	1	2	-	3	2	2	2	-
CO2	2	3	2	1	2	1	1	1	2	-	3	2	2	2	-
CO3	3	2	2	1	3	1	1	1	2	-	3	3	2	2	-
CO4	2	3	3	1	2	1	2	1	2	-	3	2	2	3	-
CO5	2	3	3	1	2	1	-	-	2	1	2	2	2	2	-
AVG	2	3	2	1	2	1	1	1	2	1	3	2	2	2	-

R2024	GENERAL ENGINEERING					SEMESTER:I
24ES106	` ENGINEERING PRACTICES LABORATORY	L	T	P	C	ES
		0	0	2	1	

COMMONTO : ALL BRANCHES AIDS,CSE, BME, ECE, IT and EEE

COURSEOBJECTIVES:

The main objectives of this course are to:

- Study the various basic domestic wiring circuits and measure the electrical parameters.
- Impart the knowledge about the staircase wiring, wiring layout, and its connections.
- Impart the knowledge of various basic electronic components.
- Know about soldering and testing simple electronic circuits; assemble and test simple electronic components on PCB.
- Study about the operation of various Boolean operations in electronics..

COURSEOUTCOMES:

At the end of this course, students are able to:

CO1: Wire various electrical joints in common household electrical wire work.
CO2: Understand the staircase wiring, wiring layout, and its connections.
CO3: Measure the electrical quantities using ammeter, voltmeter, wattmeter, and energy meter.
CO4: Study the construction, working principle, and wiring of a single-phase energy meter.
CO5: Solder and test simple electronic circuits; assemble and test simple electronic components on PCB.

LIST OF EXPERIMENTS:

I . ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp, and energy meter.
2. Fitting and installation of household appliances – LED TV, Fan.
3. Staircase wiring.
4. Measurement of electrical quantities – voltage, current, power, and power factor in an RLC circuit.
5. Measurement of energy using a single-phase energy meter.

II ELECTRONIC ENGINEERING PRACTICE

1. Study of electronic components and equipment – Resistor, color coding, measurement of AC signal parameters (peak-peak, RMS, period, frequency) using CRO.
2. Verification of logic gates AND, OR, EX-OR, and NOT.
3. Generation of clock signal.
4. Soldering simple electronic circuits and checking continuity.
5. Assembling and testing electronic components on a small PCB.

TotalPeriods:30

CO PO PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	2	-		1	1	1	-	-	-	-	2	2	1	1
CO2	3	2	-		1	1	1	-	-	-	-	2	2	1	1
CO3	3	2	-		1	1	1	-	-	-	-	2	2	1	1
CO4	3	2	-		1	1	1	-	-	-	-	2	2	1	1
CO5	3	2	-		1	1	1	-	-	-	-	2	2	1	1
AVG	3	2	-		1	1	1	-	-	-	-	2	2	1	1

1-Low,2-Medium,3-High

R 2024	MECHANICAL ENGINEERING					SEMESTER: I
24ES107	WORKSHOP PRACTICE LABORATORY	L	T	P	C	PC
		0	0	2	1	

COMMON TO: AI&DS, BME, CSE, ECE, EEE and IT

COURSE OBJECTIVES:

The main objectives of this course are to:

- Practice few basic engineering operations in welding, and sheet metal works.
- Make the specified skills in fitting operations.
- Perform few basic operations to produce wooden joints
- Make pipe connections for household applications.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:
CO1-Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work
CO2Saw; plan; make joints in wood materials used in common household wood work.
CO3-Weld various joints in steel plates using arc welding work;
CO4-Make a tray out of metal sheet using sheet metal work.
CO5-Prepare metal joints using fitting tools

PRACTICAL EXERCISES:

1. Plumbing Works: Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components for pumping water from sump to overhead tank and pipe connections from overhead tank to bath shower and wash basin.
2. Carpentry using modern tools only: Hands-on-exercise: Wood work, joints such as T, Mortise and Tenon and Dove Tail.
3. Welding: Preparation of butt joints, lap joints and T- joints by Arc welding and Gas welding
4. Sheet Metal Work: Model making – Trays and funnels.
5. Fitting: Preparation of Square fitting and V – fitting models.

Total Periods: 30

CO PO PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
CO2	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
CO3	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
CO4	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
CO5	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
AVG	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1

M.A.M.SCHOOL OF ENGINEERING

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TAMIL NADU, INDIA

B.E.BIOMEDICAL ENGINEERING

SEMESTER II

REGULATIONS 2024

R 2024	SCIENCE & HUMANITIES	SEMESTER: II

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

24HS202	Professional English	L	T	P	C	HS
		2	0	0	2	

COMMON TO ALL PROGRAMS

COURSE OBJECTIVES:

The objectives of learning this course are to:

- Enable learners use words appropriately in their communication.
- Enhance learners grammatical accuracy in communication.
- Develop learners ability to read and listen to texts in English.
- Strengthen the communication skills of the learners.
- Help learners write appropriately in professional contexts.

COURSE OUTCOMES:

At the end of this course, students are able to:

CO1: Apply their comprehension skills and interpret different contents effortlessly
CO2: Participate effectively in diverse speaking situations
CO3: Apply technical information and knowledge in practical documents.
CO4: Demonstrate appropriate language use in extended discussions.
CO5: Present, discuss and coordinate with their peers in workplace using their language skills.

UNIT: I	BASICS OF LANGUAGE	6
Reading - Intentional Reading - Short Narratives and Passages. **Writing** - Writing emails / letters introducing oneself., **Gramma**r – Sentence Patterns, Why/ Yes or No/ and Tags; **Vocabulary** - Word formation – Prefix Suffix		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos	
UNIT: II	**INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION**	**6**
Reading - Excerpts from literature, and travel & technical blogs. **Writing** - Note Making, Note Taking – Paragraph Writing, **Grammar**: Prepositions, Articles, Model verbs; **Vocabulary:** Verbal Analogy / Cloze Exercise.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos	
UNIT: III	**NARRATION AND SUMMATION**	**6**
Reading – Timed Reading, Filling KWL, **Writing**- Writing responses to complaints. **Grammar**: Active Passive Voice transformations, Punctuations. **Vocabulary:** Different forms of the same words.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos Videos	
UNIT: IV	**REPORTING OF EVENTS AND RESEARCH**	**6**
Reading – Extensive reading (Jigsaw Reading, Short Stories, Novels); **Writing** – Problem solution essay / Argumentative Essay **Grammar** – Error correction, Infinitive and Gerunds **Vocabulary :** Compound Words.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos	
UNIT: V	**THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY**	**6**
Reading – Reading editorials; and Opinion Blogs – Reading editorials; and Opinion Blogs; **Writing** – Paragraph writing Short Report on an event (field trip etc.); **Grammar** – Concord, If conditionals ;**Vocabulary:** Dialogue writing.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos .	
		Total Periods :30

TEXT BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

1	M. Ashraf Rizvi	Effective Technical Communication	Orient Blackswan Private Ltd.	2020
2	Dr. KN. Shoba, and Dr. Lourdes Joevani	English for Science & Technology	Cambridge University Press	2021

REFERENCE BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	Meenakshi Raman &Sangeeta Sharma	Technical Communication – Principles And Practices	Oxford Univ. Press	2016
2	Lakshmi Narayanan	A Course Book on Technical English	Scitech Publications (India) Pvt. Ltd.	2017
3	Kulbhusan Kumar	Effective Communication Skill	R S Salaria, Khanna Publishing House.	2018

WEB LEARNING RESOURCES:

1 https://store.acolad.com/products/english-for-engineering

2 https://www.cambridge.es/en/catalogue/business-english/other-titles/cambridge-english-for/engineering

3 https://shipcon.eu.com/english-for-engineers/

4 https://www.udemy.com/course/english-for-engineers/

5 https://store.acolad.com/products/english-for-engineering

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	-	-	-	3	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	3	3	-	-	-
CO4	-	-	-	-	-	-	-	-	-	3	3	3	-	-	-
CO5	-	-	-	-	-	-	-	-	3	3	3	3	-	-	-
AVG	-	-	-	-	-	3	-	-	3	3	3	3	-	-	-

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

R 2024	Languages					SEMESTER: II
24HS203	Japanese	L	T	P	C	HS
		2	0	0	2	

COMMON TO: ALL BRANCHES

COURSE OBJECTIVES:

The objectives of learning this course are:

- To enable learners use words appropriately in their communication.
- To develop learners ability to read and listen to texts in Japanese.
- To strengthen the communication skills of the learners.

COURSE OUTCOMES:

At the end of this course, students can able to

CO1 Demonstrate proficiency in Japanese language topics and vocabulary.
CO2: Apply Japanese grammar rules effectively in both written and spoken communication.
CO3: Analyze and appreciate cultural contexts within the Japanese language.
CO4: Develop and apply Japanese language skills in real-life situations through speaking, listening, reading, and writing activities.

Module 1:	Topics & Vocabulary	8

- Introduce yourself with greetings in Japanese
- Exchanging business card in Japanese
- Asking about of services in stores
- Shopping
- Describing about the whereabouts of things and people
- Transportation
- Time and numbers – telling and asking the time, counting cardinal numbers
- Everyday objects
- Places – shops, important buildings
- Daily life – routines, free time
- Job
- Home
- Culture
- Existence of People and Things
- Ordinal numbers•

Tools Required:	Board & Chalk, PPT, youtube videos

Module 2:	Grammar	8

- Basic Japanese grammar rules – particles : か (ka), は (wa), の (no), と (to), を (o),に (ni),も(mo), が (ga), や (ya)
- Present, Past, Future
- Pronouns – subject, object, possessive
- Singular vs. Plural
- Word order – sentence, question, negative
- Question formation
- Modal verbs•

Tools Required:	Board & Chalk, PPT, youtube videos

Module 3:	Cultural Content	7

- Three writing systems in Japanese (Hiragana, Katakana, Kanji)
- How to bow
- Japanese currency
- Shops in Japan
- Transportation
- Excursions to Japanese spas (温泉onsen)

Tools Required:	Board & Chalk, PPT, youtube videos

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

Module 4:	Skills Work	7

- Lots of speaking-inc. situational exercises & interaction
- Basic pronunciation rules
- Listening activities
- Numbers and Counters rules
- Writing practice (Hiragana)

Tools Required:	Board & Chalk, PPT, youtube videos	

TOTAL PERIODS : 30

TEXT CUM REFERENCE BOOKS:

1.Genki I: An Integrated Course in Elementary Japanese (Eri Banno et al.)

- Covers self-introductions, shopping, daily routines, and transportation.
- Introduces particles, sentence structure, and essential grammar.
- Includes cultural notes, listening exercises, and hiragana practice.

2.Minna no Nihongo Shokyu I

- Great for practical conversations like shopping and asking for services.
- Strong grammar foundation with exercises on particles and verb conjugations.
- Requires a translation guide unless you're familiar with Japanese.

3.Japanese for Busy People I (AJALT)

- Focused on conversational skills and real-life scenarios like business card exchange.
- Simple grammar explanations and cultural context.

Supplementary Resources:

- *NHK World: Easy Japanese* (free online lessons with dialogues and videos)
- *Tae Kim's Guide to Japanese Grammar* (online resource for grammar concepts)

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	1	1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	1	1	1	3	-	-	-	-	-	-	-	-	-	-	-
Avg	1.5	1.5	1.5	2.25	-	-	-	-	-	-	-	-	-	-	-

R 2024	Languages					SEMESTER: II
24HS205	Italian	L	T	P	C	HS
		2	0	0	2	

COMMON TO: ALL BRANCHES

COURSE OBJECTIVES:

The objectives of learning this course are:

- To enable learners use words appropriately in their communication.
- To develop learners ability to read and listen to texts in Italian Language.
- To strengthen the communication skills of the learners.

COURSE OUTCOMES:

At the end of this course, students can able to

CO1: understand the Italian Language- basics of day-to-day conversation such as talking about your likes, and dislikes, knowing the numbers, alphabet, habitual actions, and more. Learn grammar and its usage

CO2: communicate in simple terms aspects of his/her background, immediate environment & matters in areas of immediate basic need.

UNIT: I	Beginner Level A1	15

Learn the basics of day-to-day conversation such as talking about your likes, and dislikes, knowing the numbers, alphabet, habitual actions, and more. Learn grammar and its usage.

Topics

- Introducing yourself
- Saying hello and goodbye
- Nationality
- Asking and Saying how one is
- Apologizing
- Spelling one's name
- Ordering Food
- Reading simple menu
- Asking and telling time

Grammar

- Personal Subject Pronouns
- Definite and indefinite articles
- Nouns
- Adjectives
- Present Tense of a regular verb
- Interrogatives•

Tools Required:	Board & Chalk, PPT, youtube videos

UNIT: II	Beginner Level A2	15

Learn to communicate in simple terms aspects of his/her background, immediate environment & matters in areas of immediate basic need

Topics

- Booking a table at a restaurant
- Understanding a menu
- Understanding simple city directions
- Expressing agreements/disagreements
- Adjectives
- Some Italian recipes
- Some expressions of place
- Talking about past events
- Writing a greeting card

Grammar

- The verb sapere and potere
- More about the verb piacere
- Prepositions in and a
- Regular and Irregular participles
- The present perfect
- The Adverb fa
- More interrogatives

Tools Required:	Board & Chalk, PPT, youtube videos
	TOTAL PERIODS :30

TEXT CUM REFERENCE BOOKS:

Italian Language Textbooks

1. **Nuovo Espresso 1 (A1-A2)** *(Alma Edizioni)*
   - Covers greetings, introductions, ordering food, and city directions.
   - Grammar focus on articles, present tense, passato prossimo, and prepositions.
   - Includes listening exercises, cultural notes, and interactive practice.

2.Italian Grammar in Practice (A1-A2) *(Susanna Nocchi)*

- Practical grammar explanations with exercises.
- Good for mastering verbs like *sapere*, *potere*, and *piacere*.

3. **Practice Makes Perfect: Basic Italian** *(Alessandra Visconti)*

- Focus on conversational phrases, simple dialogues, and essential grammar.
- Great for pronunciation and everyday vocabulary like time, directions, and ordering food.

4. **Progetto Italiano Junior 1** *(Edilingua)* – if teaching younger learners.

Supplementary Online Resources:

- **BBC Languages – Italian:** Interactive lessons for beginners.
- **Duolingo/Busuu:** For extra vocabulary practice.
- **ItalianPod101:** Great for listening and pronunciation practice.

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	2	2	3	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	-	-	-	-	-	-	-	-	-	-	-
Avg	2.5	2.5	2.5	2.5	-	-	-	-	-	-	-	-	-	-	-

R 2024	SCIENCE & HUMANITIES					SEMESTER: II
24HS204	German	L	T	P	C	HS
		2	0	0	2	

COMMON TO: ALL PROGRAMS

COURSE OBJECTIVES:

The objectives of learning this course are:

- To enable learners use words appropriately in their communication.
- To develop learners ability to read and listen to texts in German.
- To strengthen the communication skills of the learners.

COURSE OUTCOMES:

At the end of this course, students can able to

CO1: Demonstrate the ability to read and comprehend texts in the German language.

CO2**:** Develop listening skills to understand spoken German in various contexts**.**

CO3: Communicate effectively in spoken German with appropriate pronunciation and vocabulary.

CO4**:** Write coherent and grammatically correct texts in the German language.

UNIT: I	Reading	8

i. The pupils recognize the following types of text: dialogue; interview; advertisement; programme of a performance (cinema, theatre, concert, sport); a television and radio programme; notice; folder page of books, of audio cassettes, of videocassettes and of CDs; articles in dictionaries and lexica; a form to be filled in; menu; poem, short story, diary, comics, picture novel, greeting card, personal letter, e- mail letter, announcement, invitation.

ii. The pupils can understand the following types of text globally and/or selectively: leaflet, catalogue, label, transport timetable, city map, a programme of a performance (cinema, theatre, concert, sport), T.V. & radio programme, advertisement, notice, article in a dictionary and lexicon, menu, personal letter, e-mail letter, columns in a newspaper and magazine, comics, cuttings of reports, poem, short story, short texts of information.

iii. The pupils understand in detail the type of problem and the instructions in the text book as well as short announcements, signs denoting advice and forbidding, simple forms, invitations and greeting cards.

iv. The pupils make use of the following strategies while reading:

- they recognize the correlation between text and picture.
- they recognize personal names, numbers and dates.
- they recognize the meaning of punctuation marks and text typography.
- they establish the correlation between the title of a text and main points of information.
- they recognize the parts of speech and clauses, word roots, prefixes, suffixes and endings of words of those learnt as well as internationalisms.
- they look for and mark main points of information in a text.
- they recognize the communicative function of the types of text listed under point (i).
- they work with word card indexing.
- they perceive the foreign culture in that they take a critical look at their own culture in the process.
- they make use of the knowledge, skills and strategies which they have acquired in the lessons of their mother language or their first foreign language, when deducing pieces of information from text or making connections between them.

v. The pupils can handle reference works (e.g., dictionaries, grammars).

Pedagogical Tools	Board & Chalk, PPT, youtube videos

UNIT: II	Listening	8

The pupils are in a position to understand different German language texts globally or in detail through a direct contact or over the media. The texts should follow the standards of level A1 of the *Framework* and observe the phonetical and intonation variants of the German language. Of special significance in the training for the skill of *listening* is the inclusion of sight perception.

i. The pupils understand questions and instructions of the teacher during the lesson.

ii. The pupils can create correlations between hearing texts and pictures.

iii. The pupils can understand short dialogues between two or several partners who refer to themes and situations already dealt with.

iv. The pupils can understand short everyday and especially tourist- related information (e.g., at the post office, in a travel agency, at the railway station / airport).

v. The pupils infer main announcements from conversations on themes and situations already dealt with.

vi. The pupils can infer selective information from news, advertisements and programme information on Radio or in T.V. as well as from easy descriptive texts.

vii. The pupils can understand short literary forms like poems and songs on the basis of directed explanation.

viii. The pupils make use of the following strategies while listening:

- they put forward hypotheses and examine them in the light of the intention of the statement of various types of text.
- they recognize intonation models, linguistic and metalinguistic means of expressing affirmation and negation.
- they make use of already known models of word building.
- they recognize the communicative function of varied types of text.
- they work with a dialogue – diagram.
- they draw up the construction plan of a text they have heard.

Pedagogical Tools	Board & Chalk, PPT, youtube videos	
UNIT: III	**Speaking**	**7**

The pupils realize in their statements ways of speaking which are mentioned in the subsequent part entitled *Contents*.

i. The pupils reproduce the phonetic and intonation pattern correctly.

ii. The pupils ask and answer questions in connection with the themes and situations already dealt with.

iii. The pupils participate in conversation with their teacher and / or with their classmates in the course of the lesson.

iv. The pupils hold short conversations with one or several partners (known or unknown) in the sphere of the themes and situations already dealt with.

v. The pupils make short telephone calls.

vi. The pupils make short announcements in connection with themes already handled.

vii. The pupils make use of appropriate patterns of behaviour (mimics, gesticulations, body distance or nearness, etc) during conversation.

viii. The pupils can make use of the following strategies while speaking:

- they ask for and themselves provide additional / explanatory information.
- they signal lack of understanding and demand from their partner an appropriate reaction.
- they direct the conversation according to their own interests and / or change the subject.
- they make use of clichés in order, e.g., to cope more easily with situations in which they are under pressure of time.
- they make use of paralinguistic means.

Pedagogical Tools	Board & Chalk, PPT, youtube videos	
UNIT: IV	**Writing**	**7**

i. The pupils fill in tables with key words according to a text they have read or heard. ii. The pupils fill in easy forms, write greeting cards, invitations and short personal announcements. iii. The pupils lay down vocabulary cards according to a preset pattern. iv. The pupils write short texts to photos and pictures. v. The pupils make use of the following strategies while writing: - they employ preset patterns and examples with sense. - they use reference works for self correction of mistakes.

Pedagogical Tools	Board & Chalk, PPT, youtube videos	
		TOTAL PERIODS:30

TEXT CUM REFERENCE BOOKS:

The aims, methods and contents, as they are formulated in the syllabus for German as a second foreign language for level 1 (**A1**), are to be adopted in the textbook for this level. While the autonomy of the school in the choice of the textbook and related material is respected, choice is to be made of a work which contains the following basic text material.

3.1. Pupils' book which contains the learning material obligatory for level 1, as well as the grammar overview and an alphabetical word list;

3.2. Work book with exercises, which supplement the learning material of the pupil's book and makes possible a differentiation within the class of pupils and various social forms (single, partner, group work) during the lesson. The book contains tests which help the periodical control of the learning process and success;

3.3. Teacher's book in which the concept of the pupil's book is presented, methodological tips given and alternative lesson schemes suggested, additional cultural (*Landeskunde*) and linguistic information included, as well as indications of possible forms of control and assessment of performance. It includes also I listening comprehension texts, exercises on cassette, keys to the tests and vocabulary to each unit;

3.4. Cassettes with listening comprehension texts from the pupil's book and where possible phonetic and grammar tests as well as further authentic texts which contribute towards the development of listening comprehension.

3.5. I.T. Material which instills in the pupil an awareness of the German-speaking world and encourages him/her to make use of interactive exercises with partners abroad and in one's own country (e-mail) and to satisfy the desire to research and increase one's knowledge of certain aspects of topics treated in class (internet). This medium should make up for the lack of actual resources at school and complete the overall picture of the German-speaking media.

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	1	2	3	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	1	1	3	-	-	-	-	-	-	-	-	-	-	-
AVG	1.75	1.75	1.75	1.75	-	-	-	-	-	-	-	-	-	-	-

R 2024	SCIENCE & HUMANITIES					SEMESTER: II
24HS201	Tamils and Technology	L	T	P	C	HS
		1	0	0	1	

COMMON TO: ALL PROGRAMS

COURSE OBJECTIVES:

The objectives of learning this course are to:

- Learn weaving, ceramic and construction technology of Tamil.
- Understand the agriculture, irrigation and manufacturing technology of tamil.
- Realize the development of scientific Tamil and computing.

COURSE OUTCOMES:

At the end of this course, students can able to :

CO1: Understand the weaving and ceramic technology of ancient Tamil people nature.
CO2: Understand the construction technology, building materials in sangam period and case studies.
CO3: Infer the metal process, coin and beads manufacturing with relevant archaeological evidence.
CO4: Realize the agriculture methods, irrigation technology and pearl diving.
CO5: Apply the knowledge of 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.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos .	
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 Silapathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study Madurai Meenakshi Temple)- ThirumalaiNayakarMahal - Chettinad Houses, Indo - Saracenic architecture at Madras during British Period		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos .	
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 - Gemstone types described in SilapathikaramTherukoothu, Karakattam, VilluPattu, KaniyanKoothu, Oyilattam, Leather Puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos .	
UNIT: IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	**3**
Flora and Fauna of Tamils &Agam 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		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos .	
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 – Sekai Project.		

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

Total Periods :15

TEXT CUM REFERENCE BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	Dr.K.K.Pillay	Tamilnadu history people and culture	Tamilnadu Textbook and Education works Corporation	2019
2	EL Sundaram	Computer Tamil	Vikatanprasuram	2016
3	Dr.S.Singaravelu	Social Life of the Tamils - The Classical Period	International Institute of Tamil Studies.	2001
4	Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu	Historical Heritage of the Tamils	International Institute of Tamil Studies	2010
5	Dr.M.Valarmathi	The Contributions of the Tamils to Indian Culture	International Institute of Tamil Studies.	2001
6	Dr. R. Sivanantham	Keeladi - 'Sangam City Civilization on the banks of river Vaigai'	Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu	2019
7	Dr.K.K.Pillay	Studies in the History of India with Special Reference to Tamil Nadu	This Author	1979
8		Porunai Civilization	Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu	2019
9	R.Balakrishnan	Journey of Civilization Indus to Vaigai	RMRL	2019
10	Dr.K.K.Pillay	Social Life of Tamils	A joint publication of TNTB & ESC and RMRL	1975

WEB LEARNING RESOURCES:

1 https://youtu.be/jteRvnNiD6w?si=HmAS7a_gng6hYcL_
2 https://youtu.be/WZwdo20QgP8?si=2oTevNPCiGzTPi0-
3 https://youtu.be/05e3v0xGA9k?si=SHa2vsQG39RpDPtZ
4 https://youtu.be/bxYdHw4rvec?si=Eryg0PF72BPhbRBH
5 https://youtu.be/MRfbeJvJZ0k?si=YpAYFFEpLdV8FIrX
6 https://youtu.be/BS_BSDZp6HA?si=D_QdZn1Zr6X3C95p

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
AVG	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-

Recommended by I[st] BOS held on 05.9.24 & Approved by I[st] Academic Council held on 25.11.24

R 2024	SCIENCE & HUMANITIES					SEMESTER: II
24BS201	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C	BS
		3	1	0	4	

COMMON TO: BME, ECE, EEE, AERONAUTICAL, MECHANICAL & MECHATRONICS ENGINEERING

COURSE OBJECTIVES:

The objectives of learning this course are:

- Introduce the basic concepts of PDE for solving standard partial differential equations.
- Make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.
- Introduce fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- Acquaint the student with fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z-Transform techniques for discrete time systems.

COURSE OUTCOMES:

At the end of this course, students are able to :

CO1: understand how to solve the given standard partial differential equations.
CO2: apply Laplace transform techniques in solving linear differential equations.
CO3: apply Fourier series techniques in engineering applications.
CO4: use the Fourier transforms techniques in solving engineering problems.
CO5: use the Z-Transforms techniques in solving difference equations.

UNIT: I	**PARTIAL DIFFERENTIAL EQUATIONS**	**9+3**
Formation of partial differential equations –Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Homogeneous Linear partial differential equations of second and higher order with constant coefficients		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.	
UNIT: II	**LAPLACE TRANSFORMS**	**9+3**
Existence theorem - Transform of standard functions – Transform of Unit step function and Dirac delta function – Basic properties - Shifting theorems - Transforms of derivatives and integrals – Transform of periodic functions - Inverse Laplace Transforms- Convolution theorem (without proof) – Solving differential equations using Laplace Transform techniques.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.	
UNIT: III	**FOURIER SERIES**	**9+3**
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series and cosine series – Root mean square value – Parseval's identity – Harmonic analysis.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.	
UNIT: IV	**FOURIER TRANSFORMS**	**9+3**
Fourier integral theorem – Fourier transform pair - Fourier sine and cosine transforms – Properties – Transform of elementary functions - Convolution theorem (without proof) – Parsevals's identity.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.	
UNIT: V	**Z – TRANSFORMS**	**9+3**
Z-transforms - Elementary properties – Inverse Z-transform using partial fraction and convolution theorem - Formation of difference equations – Solution of difference equations using Z - transforms.		
Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.	
		Total Periods :60

TEXT BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

1	Kreyszig.E	Advanced Engineering Mathematics	John Wiley and sons, New Delhi	2016
2	Grewal B.S	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2018

REFERENCE BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	Bali.N, M.Goyal	A text book of Engineering Mathematics	Lakshmi Publications, Reprint,New Delhi	2015
2	Jain R.K. and Iyengar S.R.K.	Advanced Engineering Mathematics	Narosa Publications, New Delhi , 3rd Edition	2017
3	Ramana B.V.	Higher Engineering Mathematics	Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi	2010
5	Peter V. O'Neil	Advanced Engineering Mathematics	Cengage Learning India Pvt., Ltd,7th Edition, New Delhi	2012

WEB LEARNING RESOURCES:

1	https://www.brainkart.com/subject/Transforms-and-Partial-Differential-Equations_93/
2	https://nptel.ac.in/courses/111105093
3	https://nptel.ac.in/courses/111102129
4	https://nptel.ac.in/courses/111105123
5	https://nptel.ac.in/courses/111106046
6	https://nptel.ac.in/courses/111103021
7	https://nptel.ac.in/courses/111105035
8	https://nptel.ac.in/courses/111106111
9	https://nptel.ac.in/courses/111106139
10	https://youtu.be/Sb6qrdMPRPE?si=2kqgDNOyQYkh1UJC
11	https://youtu.be/l4pFAAR5km8?si=wcPssWizT66RCYiP
12	https://youtu.be/NNTJ5VinRPU?si=dOq5vs2VbpJx0cOo
13	https://youtu.be/PG_-ax_HmS0?si=bCbVoOtY68o0uZC0
14	https://youtu.be/kum70H2NcqU?si=WelThJwV8X_ysdDa

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	2	3	-	-	-	-	-	-	-	-	3	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	3	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	3	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	3	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	3	-	-	-
Avg	3	2	3									3			

R 2024	MECHANICAL ENGINEERING					SEMESTER:II
24BS202	DESIGN THINKING	L	T	P	C	BS
		2	0	0	2	

Common to All Departments

COURSE OBJECTIVES:

The objectives of learning this course are to:

- Provide the new ways of creative thinking.
- Learn the innovation cycle of Design Thinking process for developing innovative products.
- Learn which useful for a student in preparing for an engineering career and to apply them for the prospective.
- Learn various types of design thinking models.
- Learn how to apply the Design Thinking Principles, through real world case studies.

COURSE OUTCOMES:

At the end of this course, students able to

CO1 Understand the Concept of Design Thinking through its principles.
CO2 Learn the tools and techniques of Design Thinking and to apply them in real life cases.
CO3 Understand the different stages of Structured Models used in Design thinking.
CO4 Apply the perspectives of design thinking in the entrepreneurial activities.
CO5 Learn from the real world case studies about how to apply the concept of design thinking in product development.

UNIT: I	OVERVIEW OF DESIGN THINKING	6

Introduction to Design Thinking – Conceptual Understanding, Evolution of Design Thinking, Attributes, Principles (Human Rule, Ambiguity Rule, Re-Design Rule and Tangibility Rule) – Cycle of Design Thinking – Resources (3Ps) – Applications.

Pedagogical Tools	Chalk & Board, PPT, Brainstorming, Flipped Class Room

UNIT: II	TOOLS AND TECHNIQUES FOR DESIGN THINKING	6

Personas, Visualization, Stakeholder Mapping, Journey Mapping, Mind Mapping, Star Bursting, Divergent Thinking, Convergent Thinking, Ethnography, Brainstorming, Story Telling, Role Playing, User Interviews. (All these techniques shall be taught only to level of understanding the core concept)

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: III	DESIGN THINKING MODELS	6

Double Diamond Model – Phases of Discover, Define, Develop and Deliver – Feedback Mechanism. Stanford 5 Phase Model – Empathize, Define, Ideate, Prototype and Test.

Pedagogical Tools	Chalk & Board, PPT, Empathy Interviews & User Research

UNIT: IV	DESIGN THINKING FOR ENTREPRENEURS	6

Idea of Growth Design, Comparison of Growth Design and Product Design, Growth Process Model : What is? - What if? - What Wows? - What Works, Principle of Optimism. Ethics in Design Thinking : 5 Approaches – Utilitarian, Rights, Fairness, Common Good and Virtue - Ethical Issues – Ethical Design Test.

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: V	CASE STUDIES	6

1. Why Patients were not visiting a healthcare center for a free health checkup - Karnataka Health Promotion Trust
2. Why Sales Officers were not accessing help even though it was available and were still abandoning sales when a difficult objection was raised in a sales call -Shriram Life Insurance Corporation.
3. My City Savior APP - Government of Odisha.
4. Designing of a Banking APP – Kotak Mahindra Bank

Pedagogical Tools	Chalk & Board, PPT, Brainstorming, TEDx like public Speech

Total Periods : 30

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

TEXT BOOKS:				
Sl. No	**Authors**	**Title of the Book**	**Publisher**	**Year of publication**
1	E Bala Guruswamy, Bindu Vijayakumar	Design Thinking – A Business Perspective	McGraw Hill Education (India) Private Limited.	2024
REFERENCE BOOKS:				
Sl. No	**Authors**	**Title of the Book**	**Publisher**	**Year of publication**
1	David Lee	Design Thinking In the Class Room	Ulysses Press	2018

WEB LEARNING RESOURCES:

1.https://youtu.be/6-5J6YTrYf4?si=WE9MLo-2tbccTWNG

2.https://youtu.be/4nTh3AP6knM?si=rdEHE4yGxSJ4zDji

3.https://youtu.be/j6Ro7TPzRoo?si=wa75cakOWyR0dSZC

4.https://youtu.be/DmLVfQfxtPU?si=q6NyR6yCmir3Y2ia

5.https://youtu.be/OE2ooXUEAwc?si=A3yYLYTOKvuYx_Cn

CO – PO - PSO MAPPING

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

R 2024	SCIENCE & HUMANITIES					SEMESTER: II
24BS203	CHEMISTRY FOR ENGINEERS	L	T	P	C	BS
		3	0	2	4	

COMMON TO: BME, EEE, AERONAUTICAL, MECHANICAL and MECHATRONICS ENGINEERING

COURSE OBJECTIVES:

The objectives of learning this course are to:

- Inculcate sound understanding of water quality parameters and water treatment techniques.
- Introduce the basic concepts and applications of phase rule and alloys.
- Facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- Familiarize the students with the different energy sources, operating principles, working processes and applications of energy conversion and storage devices.
- Impart knowledge on the basic principles and preparatory methods of nanomaterials.

COURSE OUTCOMES:

At the end of this course, students are able to :

CO1: Understand the quality of water from quality parameter data, analyze and propose the suitable treatment methodologies to treat water.
CO2: Recognize different forms of energy resources and apply them for suitable applications in energy sectors.
CO3: Apply the knowledge of phase rule and alloys for material selection requirements.
CO4: Analyze and recommend suitable fuels for engineering processes and applications.
CO5: Apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials

UNIT: I	WATER TECHNOLOGY	9

Water: Sources, impurities and water quality parameters, Hardness of water – types – expression of hardness – units, Boiler troubles: Scale and sludge, Priming &foaming. Need for water treatment, Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment (Ion exchange or demineralization and zeolite process), Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis.

Pedagogical Tools	Chalk & Board, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: II	ENERGY SOURCES AND STORAGE DEVICES	9

Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Basic Electrochemical Terminologies, Batteries: Types of batteries, Primary battery (dry cell), Secondary battery (lead acid battery and lithium-ion-battery); Electric vehicles– working principles; Fuel cells: H_2-O_2 fuel cell, Bio Fuel Cell, microbial fuel cell; Super capacitors: Storage principle, types and examples.

Pedagogical Tools	Chalk & Board , Group Discussion, Role Play, Youtube Videos, Nptel videos.

UNIT: III	PHASE RULE AND ALLOYS	9

Phase rule: Introduction, definition of terms with examples. One component system - water system, sulphur system; Reduced phase rule; Construction of a simple eutectic phase diagram – Two component system: lead-silver system-Pattinson's process,$FeCl_2$-H_2O system.

Alloys: Introduction- Definition- properties of alloys- significance of alloying, Alloys-Nichrome and stainless steel (18/8) – heat treatment of steel. Introduction to composites – definition-types-uses.

Pedagogical Tools	Chalk & Board , Group Discussion, Role Play, Youtube Videos, Nptel videos.

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), Property - Knocking, Power alcohol and biodiesel (trans-esterification).Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Flue gas analysis-ORSAT Method.CO_2 emission and carbon footprint.

Pedagogical Tools	Chalk & Board , Group Discussion, Role Play, Youtube Videos, Nptel videos.

UNIT: V	NANO TECHNOLOGY	9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of - nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, laser ablation, chemical vapour deposition, Analytical techniques- SEM, TEM, Applications of nanomaterials

Pedagogical Tools	Chalk & Board , Group Discussion, Role Play, Youtube Videos, Nptel videos.

Total Periods:45

Practical Exercises: (Any six experiments to be conducted) — **Total Periods:30**

1. Preparation of Na_2CO_3 as a primary standard and determination of types and amount 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. Estimation of sodium /potassium present in water using a flame photometer.
5. Estimation of copper content of the given solution by Iodometry
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer
9. Estimation of Nickel in steel

Total Periods:75

TEXT BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	P.C.Jain and Monica Jain	Engineering Chemistry	16thEdition,DhanpatRaiPublishingCompany (P)Ltd, New Delhi	2018
2	S.S. Dara	A Text book of Engineering Chemistry	S.Chand Publishing,12thEdition	2018
3	Vairam S, Kalyani P and Suba Ramesh	Engineering Chemistry	2nd Edition, Wiley India Pvt. Ltd., New Delhi	2014
4	J Mendham RC Denn MJK Thomas David J Barnes	Vogel's Text book of Quantitative Chemical Analysis	Pearson Education	2018

REFERENCE BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	B.S.Murty,P. Shankar, Baldev Raj,B. B.Rath and James Murday	Text book of nano science and nanotechnology	Universities Press-IIM Series in Metallurgy and Materials Science	2018
2	Shikha Agarwal	Engineering Chemistry-Fundamentals and Applications	Cambridge University Press, Delhi, Second Edition	2019
3	O.G. Palanna	Engineering Chemistry	McGraw Hill Education (India) Private Limited, 2ndEdition	2017
4	Prasanta Rath	Engineering Chemistry	Cengage Learning India, Pvt., Ltd., Delhi. 1st Edition	2015

WEB LEARNING RESOURCES:

1	https://nptel.ac.in/courses/105106119 (Unit 1)
2	https://nptel.ac.in/courses/103103206 (Unit 2)

3	https://www.brainkart.com>article phase rule (Unit 3)
4	https://nptel.ac.in/courses/113/104/113104008/ (Unit 4)
5	https://nptel.ac.in/courses/104103019 (Unit 5)
6	https://www.brainkart.com/subject/engineering-chemistry_264/ (All Units)
7	https://www.youtube.com/watch?v=4RDA_B_dRQ0(Reverse Osmosis)
8	https://www.youtube.com/watch?v=XUzpG1-rJLA Bergius Process)
9	https://www.youtube.com/watch?v=2bDf7JSRvf8
10	https://www.youtube.com/watch?v=Pme64aNaE5A (Otto-Hoffmman Method)
11	https://www.youtube.com/watch?v=VxMM4g2Sk8U (Lithium ion Batteries)

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	2	2	1	-	1	1	-	-	-	-	1	-	-	-
CO2	3	1	2	1	-			-	-	-	-	2	-	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	1	-	-	1	2	-	-	-	-	-	-	-	-
CO5	2	1	1		-	-	-	-	-	-	-	-	-	-	-
AVG	3	1	2	1	-	1	2	-	-	-	-	2	-	-	-

R 2024	ELECTRICAL AND ELECTRONICS ENGINEERING					SEMESTER:02
24ES213	ELECTRICAL ENGINEERING FOR MEDICAL APPLICATIONS	L	T	P	C	ES
		3	0	2	4	

COMMON TO :NIL

COURSE OBJECTIVES:

The main objectives of this course are to:

- Introduce the basics of electric circuits and analysis .
- Educate the basics of magnetic circuits and analysis.
- Know the construction of transformer and its working principle.
- Impart knowledge in the basics of working principles and application of electrical machines.
- Learn about the power generation, distribution and safety.

COURSE OUTCOMES:

At the end of this course, students are able to:
CO1: Compute the electric circuit parameters for simple problems.
CO2: Understand basics of magnetic circuits and analysis.
CO3: Knowledge about the working principle and applications of transformer.
CO4: Explain the working principle and applications of electrical machines.
CO5: Describe the principles of power generation, distribution and safety.

UNIT: I	ELECTRICAL CIRCUITS	8

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: II	MAGNETIC CIRCUITS	10

Magnetic Quantities, Magnetic Circuits, Magnetic Materials Electromagnetic Induction and Force, Inductance: Self and Mutual inductance, Energy Stored in Magnetic Systems, Hysteresis and Eddy-Current Losses

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: III	TRANSFORMERS	10

Ideal Transformer (IT), Accounting for Finite Permeability and Core Loss, Circuit Model of Transformer, Per-Unit System, Determination of Parameters of Circuit Model of Transformer, Voltage Regulation, Nameplate Rating, Efficiency.

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: IV	ELECTRICAL MACHINES	8

Construction and Working principle- DC motors EMF equation, Types and Applications. Characteristics of dc motors, Torque Equation, Types and Applications. Construction and working principle of single and three phase induction motors. Mechanical characteristics

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

UNIT: V	ELECTRICITY DISTRIBUTION SYSTEM & SAFETY PRECAUTIONS	9

Electricity Distribution System-Service Mains, Meter Board and Distribution Board, Distribution Board for Single phase installation, Neutral and Earth wire, Earthing ,System of wiring, Electrical Circuits and sub circuits, Circuit Protective Devices safety and Precautions, Electric safety precautions and treatment for electric shock

Pedagogical Tools	Black board, chalk, Group Discussion, Role Play, Youtube Videos,Nptel videos.

Total Periods : 45

PRACTICAL EXERCISES **Periods : 30**

1. Load test on DC Shunt Motor.
2. Load test on Single phase Transformer
3. Load Test on Three phase Induction Motor.
4. Speed control of DC Shunt Motor.
5. Load test on Single Phase Induction motor

Total Periods : 75

TEXT BOOKS:

Sl. No	Authors	Title of the Book	Publisher	Year of publication
1	Kothari DP and I.J Nagrath,	Basic Electrical and Electronics Engineering	Second Edition, McGraw Hill Education,	2020
2	C.L.Wadhwa	"Generation, Distribution and Utilization of Electrical Energy",	New Age International pvt.ltd.,	2015

REFERENCE BOOKS:

Sl. No	Authors	Title of the Book	Publisher	Year of publication
1	Mahmood Nahvi and Joseph A. Edminister,	Electric Circuits	Schaum' Outline Series, McGraw Hill,	2017
2	BL Theraja	A Textbook of Electrical Technology - Volume II	S. Chand Publishing	2020

WEB LEARNING RESOURCES:

1. https://www.brainkart.com/subject/Electric-Circuits-Laboratory_460/
2. https://www.scribd.com/document/575672953/EE3271-ELECTRIC-CIRCUITS-LABORATORY
3. https://youtu.be/_ybwKEBugiE
4. https://youtu.be/xsOiMH-rwrE

CO PO PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	3	2	2	-	-	-	-	3	-	-	2	3	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	2	3	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO4	3	3	3	2	-	-	-	-	3	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
AVG	3	3	2.8	2.6	-	-	-	-	3	-	-	2.6	3	-	-

Recommended by Ist BOS held on 05.9.24 & Approved by Ist Academic Council held on 25.11.24

R 2024	BIOMEDICAL ENGINEERING					SEMESTER: II
24ES203	CIRCUIT ANALYSIS FOR BIOMEDICAL ENGINEERING	L	T	P	C	ES
		3	0	2	4	

COMMON TO: NIL

COURSE OBJECTIVES:

The objectives of learning this course are:

- To learn the basic concepts and behavior of DC and AC circuits.
- To understand various methods of circuit/ network analysis using network theorems.
- To understand the steady state response of the circuits subjected to DC excitations and AC with sinusoidal excitations.
- To learn the applications of Laplace transformation in circuit analysis.
- To study the concepts of two port network analysis

COURSE OUTCOMES:

At the end of this course, students are able to :
CO1 : Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits.
CO2 : Apply suitable network theorems and analyze AC and DC circuits
CO3 : Analyze steady state response of any R, L and C circuits
CO4 : Apply Laplace transformation and analyze the behavior of electric circuits
CO5 : Analyze the two port networks

UNIT: I	BASIC CIRCUITS ANALYSIS AND NETWORK TOPOLOGY	9
Nodes, Paths, Loops, and Branches, Kirchhoff's Current Law, Kirchhoff's Voltage Law, The Single-Loop Circuit, The Single-Node-Pair Circuit, Series and Parallel Connected Sources, Resistors in Series and Parallel, Voltage and Current Division, Nodal analysis, Mesh analysis and Computer-Aided Circuit Analysis.		
Pedagogical Tools	Black board, PPT, Group Discussion, Role Play, YouTube Videos, NPTEL videos.	
UNIT: II	**HANDY CIRCUIT ANALYSIS TECHNIQUES FOR AC AND DC CIRCUITS**	**9**
Linearity and Superposition, Source Transformations, Thevenin and Norton Equivalent Circuit, Maximum Power Transfer, Reciprocity theorem, Delta-Wye Conversion, Star- Delta Conversion, Selecting an Approach: A Summary of Various Techniques.		
Pedagogical Tools	Black board, PPT, Group Discussion, Role Play, YouTube Videos, NPTEL videos.	
UNIT: III	**SINUSOIDAL STEADY-STATE ANALYSIS OF RLC CIRCUITS**	**9**
Sinusoidal response of series R-L,R-C,R-L-C, Sinusoidal response of parallel R-L,R-C,R-L-C, Series and Parallel AC Circuits, Current and Voltage division in Voltage circuits, Resonance and Selectivity.		
Pedagogical Tools	Black board, PPT, Group Discussion, Role Play, YouTube Videos, NPTEL videos.	
UNIT: IV	**LAPLACE TRANSFORMATION AND ITS APPLICATIONS IN CIRCUIT ANALYSIS**	**9**
Laplace Transform of a derivative and an integral, Initial value and Final value Theorem, Convolution, Laplace transform of common forcing functions, Applications of Laplace transformation techniques in Electric circuit analysis.		
Pedagogical Tools	Black board, PPT, Group Discussion, Role Play, YouTube Videos, NPTEL videos.	
UNIT: V	**TWO PORT NETWORKS ANALYSIS**	**9**

Port in Networks, Admittance Parameters, Some Equivalent Networks, Impedance Parameters, Hybrid Parameters, Transmission Parameters, Interrelationship between parameters of two port networks, Circuit modelling of an ideal transformer, modelling of network components.	
Pedagogical Tools	Black board, PPT, Group Discussion, Role Play, YouTube Videos, NPTEL videos.
	Periods : 45
PRACTICAL EXERCISES **Periods : 30**	
1. Verifications of KVL & KCL. 2. Verifications of Thevenin & Norton theorem. 3. Verification of Superposition Theorem. 4.Verification of maximum power transfer Theorem 5. Determination of Resonance Frequency of Series & Parallel RLC Circuits. 6. Transient analysis of RL and RC circuits.	
	Total periods : 75

TEXT BOOKS:

Sl.No	Authors	Title of the Book	Publisher	Year of publication
1	Hayt Jack Kemmerly, Steven Durbin	Engineering Circuit Analysis	Mc Graw Hill education, 9th Edition	2018
2	Chakrabarti	Circuit Theory	Dhanpat Rai & Co.(P) Ltd	2018
3	Joseph Edminister and Mahmood Nahvi	Electric Circuits, Schaum‘s Outline Series	Tata McGraw Hill Publishing Company,New Delhi, Fifth Edition	2016

REFERENCE BOOKS:

1	Robert.L. Boylestead	Introductory Circuit Analysis	Pearson Education India, 12th Edition	2015
2	John O Mallay, Schaum’s Outlines	Basic Circuit Analysis	Mc Graw Hill companies, 2nd Edition	2011
3	Allan H.Robbins, Wilhelm C.Miller	Circuit Analysis Theory and Practice	Cengage Learning, Fifth Edition	2013

WEB LEARNING RESOURCES:

1. NPTEL – Network Analysis - https://archive.nptel.ac.in/courses/108/105/108105159/
2. NPTEL – Basic Electrical Circuits- https://onlinecourses.nptel.ac.in/noc21_ee99/preview
3. https://www.coursera.org/courses?query=circuit%20analysis

CO- PO- PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
CO2	3	1	2	-	-	1	2	-	-	-	-	1	-	-	-
CO3	3	2	1	1	-	-	1	-	-	-	-	-	-	-	-
CO4	2	1	2	-	-	2	2	-	-	-	-	-	-	-	-
CO5	2	1	2	-	1	2	2	-	-	-	-	1	-	-	-
AVG	3	1.	2	1	1	1	2	-	-	-	-	1	-	-	-

R 2024	MECHANICAL ENGINEERING					SEMESTER: II
24 ES 205	ENGINEERING DRAWING	L	T	P	C	PC
		0	0	4	2	

COMMON TO : AI&DS, BME, CSE, ECE, EEE and IT

COURSE OBJECTIVES:

The main objectives of this course are to:

- To learn conventions and use of drawing tools in making engineering drawings
- To draw orthographic projection of points and lines
- To understand the projection of planes and simple solids
- To teach the section of solids and obtain the development of surfaces of given solids
- To deliver how to draw isometric and perspective projections of the given solids

COURSE OUTCOMES:

Upon completion of the course, the student are able to

CO1: Recognize the conventions and construct basic engineering curves.
CO2: Draw the projection of points and lines.
CO3: Sketch the projection of planes and simple solids.
CO4: Produce the projection section of solids and development of surfaces of given solids
CO5: Develop the isometric projection and Perspective projections of the given objects

PRACTICAL EXERCISES:

1. Fundamental of drawing: 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)
2. Fundamental of drawing: 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)
3. Projection of straight lines (only First angle projection) inclined to both the principal planes - Determination of true l lengths and true inclinations by rotating line method.
4. Projection of polygonal plane surface inclined to both the principal planes by rotating object method (Pentagonal and Hexagonal plane surface)
5. Projection of Circular plane inclined to both the principal planes by rotating object method.
6. Projection of simple prisms (Hexagon and pentagon) when the axis is inclined to one of the principal planes.
7. Projection of simple prisms (Hexagon and pentagon) when the axis is inclined to one of the principal planes.
8. Projection of simple pyramids (Hexagon and pentagon), cylinder and cone when the axis is inclined to one of the principal planes.
9. Projection of cylinder and cone when the axis is inclined to one of the principal planes.
10. Projection of sectioned solids 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 (Prism or Pyramid)
11. Development of lateral surfaces of simple and sectioned solids (Prism or Pyramid)
12. Draw the isometric view of frustum of solids like Prism or Pyramid of pentagonal or hexagonal base.
13. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Total Periods : 60

CO PO PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	3	3	3	2	-	-	-	-	3	-	2	1	3	2
CO2	3	3	3	3	2	-	-	-	-	3	-	2	1	3	2
CO3	3	3	3	3	2	-	-	-	-	3	-	2	1	3	2
CO4	3	3	3	2	2	-	-	-	-	3	-	2	1	3	2
CO5	3	3	3	2	2	-	-	-	-	3	-	2	1	3	2
AVG	3	3	3	2	2	-	-	-	-	3	-	2	1	3	2

R 2024	CAREER DEVELOPMENT AND PLACEMENT CELL M.A.M.SCHOOL OF ENGINEERING					SEMESTER:II
24TP201	Aptitude and Communication Skills - I	L	T	P	C	EEC
		0	0	2	1	

COURSE OBJECTIVES:

The main objectives of this course are to:

- To Learn and Practice Vedic Mathematics Principles and Techniques
- To Understand the Components of Effective Communication
- To understand the components of Presentation Skills and Delivery Techniques that are needed for Individual & Group Presentations.
- To learn about personal grooming, body language and Dress code.

COURSE OUTCOMES:

At the end of this course, students are able to:

CO1: Effectively applying the Vedic Mathematics Techniques to solve the Mathematical Aptitude Questions.
CO2: Learn and Practice the ways of Effective Communication and hence to excel in Public Speaking.
CO3: Present their Ideas in an professional way by learning the Presentation Skills and Delivery Techniques.
CO4: Effectively apply the body language and show case them with better dress code and grooming.

LIST OF ACTIVITIES/EXCERCISES:

1. Squares ending with 5 and 55.
2. Multiplication of Numbers by 5, 25, 50, 125, 9, 99, 999, 9999.
3. Multiplication of Two Numbers where Sum of unit digit is 10
4. Multiplication of Two Numbers where Sum of unit digit is 10, 1000 others digits same
5. Multiplication of Two numbers both having ‘5’ at Unit digits.
6. Multiples of 11, 111 & 22, 33, 44, 55 etc.,
7. Squaring of numbers using Base 10, 100, 1000, 50, 500, 5000.
8. Multiplication of numbers more than or below the Base 10, 100, 1000, 50, 500, 5000.
9. Squares ending with 555.
10. Dividing of 9, 19, 29, 39, 49.
11. Square Root & Cube Root, Decimals, Fractions.
12. Components of Effective Communication and Communication styles of others.
13. Barriers of Communication.
14. Dealing with emotions while communicating
15. Just a Minute (JAM) Session
16. Delivery Techniques & Visual Effects / Individual & Group Presentations
17. SWOT Analysis
18. Personality Enhancement & Body Language.
19. Hand Shaking & Dress Code.
20. Personal Grooming.

Total Periods : 30

CO PO PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	3	-	-	-	-	-
CO3	-	-	-	-	2	-	-	-	3	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	3	-	-	-	-	-
AVG	-	1	1	-	2	-	-	-	3	3	-	-	-	-	-