MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

An Autonomous Institution

Department of Computer Science and Engineering

Curriculum and Syllabus (I & II Semester) 2024 - 2025

[Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai | Recognised by UGC 12(B) & 2(f) Act | An ISO 9001:2015 Certified | NAAC Accredited with 'A' Grade | NBA – Mechanical]

34, Rajiv Gandhi Salai (OMR) Siruseri IT Park, Chennai - 603 103

MOHAMED SATHAK A J COLLEGE OF ENGINEERING
Chennai – 603103

REGULATIONS 2024
(CHOICE BASED CREDIT SYSTEM)

B.E – COMPUTER SCIENCE AND ENGINEERING

I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: **Technical Proficiency and Innovation**
Graduates will possess strong technical knowledge and skills in **Computer Science Engineering**, enabling them to solve complex problems, design and implement, innovative and sustainable solutions for Industry and Society.

PEO2: **Professional and Ethical Leadership**
Graduates will achieve successful careers and contribute towards technological advancements in terms of leadership, ethical responsibility, effective communication, and teamwork.

PEO3: **Lifelong Learning and Societal Contribution**
Graduates will engage in lifelong learning to be updated with cutting edge technology and apply their skills to address global challenges thus promoting socio economic development.

II. PROGRAM OUTCOMES (POs)

i. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
ii. **Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
iii. **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.
iv. **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 for complex problems
v. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
vi. **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.
vii. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

viii. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

ix. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

x. **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.

xi. **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.

xii. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

III. PROGRAM SPECIFIC OUTCOMES (PSOs)

Graduates will be able to

PSO1: Design and implement sustainable solutions in **Computer Science Engineering** domain by using innovation, technical knowledge acquired, modern hardware and software tools.

PSO2: Adapt and excel in **Computer Science Engineering** domain through continual learning, higher education, research and use of new technology for societal and industry needs.

PSO3: Contribute in leadership roles to create new opportunities and ensuring adherence of economic, environmental and ethical standards.

PEO	**PO**												**PSO**		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO4
1	3	3	3	3	3						2	1	3	3	2
2						2	2	3	3	3	3	1	3	1	3
3						3	3		1			3	2	2	2

1 - Low, 2 - Medium, 3 - High, '-' - No correlation

Department of Computer Science and Engineering

Curriculum for the students Admitted from 2024 - 2025 onwards

Semester - I

S.No	Subject Code	Subject	L	T	P	Credit	Conduct Periods	Category
	24IP101	Induction Program : (Universal Human Value - I)						
Theory Course								
1	24TA101	Heritage of Tamils / தமிழர் மரபு	1	0	0	1	1	HSMC
2	24EN101	Technical Communication - I	3	0	0	3	3	HSMC
3	24MA101	Matrices and Calculus	3	1	0	4	4	BSC
4	24CS111	Programming in C	2	0	4	4	6	ESC
5	24CS112	Computational Thinking	1	0	2	2	3	ESC
6	24EE111	Basic Electrical and Electronics Engineering	3	0	2	4	5	ESC
7	24GE101	Basic Civil and Mechanical Engineering	3	0	0	3	3	ESC
Laboratory Course								
8	24EN121	English for Enhancing Self Competence	0	0	2	1	2	EEC
9	24IT121	IT Essential Skills	0	0	2	1	2	ESC
10	24GE124	Electrical and Electronics Workshop Practice	0	0	2	1	2	ESC
11	24GE122	Product Tinkering Laboratory	0	0	2	1	2	ESC
			16	**1**	**16**	**25**	**33**	

Semester - II								
S.No	**Subject Code**	**Subject**	**L**	**T**	**P**	**Credit**	**Conduct Periods**	**Category**
Theory Course								
1	24TA201	Tamils and Technology / தமிழரும் தொழில் நுட்பமும்	1	0	0	1	1	HSMC
2	24EN201	Technical Communication - II	3	0	0	3	3	HSMC
3	24MA201	Transforms and Numerical Methods	3	1	0	4	4	BSC
4	24PY111	Engineering Physics	3	0	2	4	5	BSC
5	24CH111	Engineering Chemistry	3	0	2	4	5	BSC
6	24CS211	Python Programming	2	0	4	4	6	PCC
7	24GE121	Engineering Visualization	1	0	4	3	5	ESC
Laboratory Course								
8	24EN221	English for Professional Competance	0	0	2	1	2	EEC
9	24MA221	Engineering Mathematics Laboratory	0	0	2	1	2	BSC
			16	**1**	**16**	**25**	**33**	
Mandatory Course#								
A		Personality and Character Development Activity: (Universal Human Value - II)						MC
B		NSS / NCC / NSO / YRC / Club Activity : Phase 1*						MC*
*	The student may opt any one. They have to complete the respective Phase II and Phase III. It is a mandatory course to get the degree certificate after completing 4 years as per the norms of UGC, AICTE & Anna University. If any student did not complete the course after completing it only degree certificate is awarded.							
#	Activities are conducted exclusively for two week apart from the academic activity							

HERITAGE OF TAMILS

(Common to all branches)

Course Code	24TA101	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	1:0:0	**Credits**	1
Total Teaching Periods	15	**IAT + ESE Marks**	40 + 60
Teaching Department	Tamil		

Course Objectives:

1. To familiarize about the importance of Tamil Language and its literature
2. To teach about the heritage of Tamil from art and sculpture
3. To teach about the culture of Tamil from Folk music and martial arts
4. To impart knowledge on thinai concepts
5. To provide insight on the contribution of Tamil in freedom struggle and Indian culture

Unit: I LANGUAGE AND LITERATURE **3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Unit: II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE **3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Unit: III FOLK AND MARTIAL ARTS **3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Unit: IV THINAI CONCEPT OF TAMILS **3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

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.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Total **15**

Pedagogical Methods:

Unit 1:	Sol Vilayattu
Unit 2:	Drawing
Unit 3:	Theme based activities (Folk and Dance)
Unit 4:	Essay & Poetry Writing (Thinai)
Unit 5:	Try to learn about basic Siddha Vaithiyam

Course Outcomes:

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

CO1:	Explain the salient features of Tamil language and its literature.
CO2:	Discuss about the heritage of Tamil exhibited by various forms of art and sculpture.
CO3:	Describe Tamil heritage displayed by folk music and martial arts
CO4:	Discuss and describe the features of five Thinais in Tamil.
CO5:	Describe the contribution of Tamil in freedom struggle and Indian culture.

Text Books:

T1: Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

T2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. ISBN 9788185693343.

References

R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Published by: International Institute of Tamil Studies

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).ISBN 9788185329567.

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author) ISBN 8170260548.

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Web links and Video Lectures (e-Resources):

1. https://onlinecourses.nptel.ac.in/noc24_cs36/preview - Unit IV
2. https://digimat.in/nptel/courses/video/113106106/L01.html - Unit I

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
2	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
3	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
4	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
5	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
AVG	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

தமிழர் மரபு

(Common to all branches)

Course Code	24TA101	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	1:0:0	**Credits**	1
Total Teaching Periods	15	**IAT + ESE Marks**	40 + 60
Teaching Department	Tamil		

Course Objectives:

1. தாய்மொழியின் நிகரற்ற தொன்மையை விளக்குவது
2. பழம் தமிழரின் துறை சார்ந்த ஓவியங்கள் மற்றும் சிற்பங்கள் நவீன கலைகள் குறித்து விளக்குவது
3. வியக்க வைக்கும் பழந்தமிழரின் கலைகள், இசை மற்றும் வீரவிளையாட்டுகள் பற்றி தெரியப்படுத்துவது
4. தமிழர்களின் திணைக் கோட்பாடுகளை பற்றி விளக்குவது
5. தமிழரின் தன்னிகரற்ற ஈடுபாடு - சித்த மருத்துவம் மற்றும் விடுதலைப் போராட்டம் பற்றி விளக்குவது

அலகு – I மொழி மற்றும் இலக்கியம் **3**

இந்திய மொழிக் குடும்ங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கirள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம் ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

அலகு - II மரபு பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை சிற்பக் கலை **3**

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

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

அலகு – III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் **3**

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

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

அலகு – IV தமிழர்களின் திணைக் கோட்பாடுகள் **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

அலகு – V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு **3**

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

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Total **15**

Pedagogical Methods:

Unit 1:	Sol Vilayattu
Unit 2:	Drawing
Unit 3:	Theme based activities (Folk and Dance)
Unit 4:	Essay & Poetry Writing (Thinai)
Unit 5:	Try to learn about basic Siddha Vaithiyam

Course Outcomes:

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

CO1:	தமிழ் மொழி மற்றும் அதன் இலக்கியத்தின் முக்கிய அம்சங்களை விளக்குவார்கள்.
CO2:	கலை மற்றும் சிற்பத்தின் பல்வேறு வடிவங்களால் காட்சிப்படுத்தப்பட்ட தமிழின் பாரம்பரியத்தைப் பற்றி விவாதிப்பார்கள்
CO3:	நாட்டுப்புற இசை மற்றும் தற்காப்பு கலைகளால் காட்டப்படும் தமிழ் பாரம்பரியத்தை விளக்குவார்கள்
CO4:	தமிழில் ஐந்து திணைகளின் அம்சங்களைப் பற்றி விளக்குவார்கள்.
CO5:	சுதந்திரப் போராட்டத்திலும் இந்திய கலாச்சாரத்திலும் தமிழின் பங்களிப்பை விவரிப்பார்கள்.

Text Books:

T1:	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்.)
T2:	கணினித் தமிழ் - முனைவர் இல.சுந்தரம் (விகடன் பிரசுரம்)

References

R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Published by: International Institute of Tamil Studies

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).ISBN 9788185329567.

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author) ISBN 8170260548.

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Web links and Video Lectures (e-Resources):

3. https://onlinecourses.nptel.ac.in/noc24_cs36/preview - Unit IV
1. https://digimat.in/nptel/courses/video/113106106/L01.html - Unit I

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
2	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
3	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
4	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
5	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
AVG	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

TECHNICAL COMMUNICATION -I

(Common to all branches)

Course Code	24EN101	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	3:0:0	**Credits**	3
Total Teaching Periods	45	**IAT + ESE Marks**	40 + 60
Teaching Department	English		

Course Objectives:

1. To facilitate students to develop their comprehension skills.
2. To equip the students to improve their receptive skills.
3. To equip learners with better vocabulary and enhance their writing skills.
4. To aid students to speak effectively in all kinds of communicative contexts.
5. To improve the learners' basic proficiency in workplace communication.

Unit: I DEVELOPING COMPREHENSION SKILLS 9

Listening: Introduction to Informational listening **Reading**: Short Narratives and Skimming Passages. **Speaking** Introducing Oneself, Narrating a Story / Incident. **Writing:** Sequential Writing (Jumbled Sentences), Process/Product Description **Grammar:** Parts of Speech -Verbs – Main & Auxiliary-Pronouns **Vocabulary**: Misleading words- Spell check - Homonyms & homophones.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: II LISTENING AND EXTENDED READING 9

Listening: Listening for Comprehension-Gap Filling **Reading**: News reading-Scanning Passages – Reading Longer Texts- Cloze Reading **Speaking**: Importance of speaking skill - Short Conversation-Public Speaking Do's & Don'ts **Writing**: Note Making, Note Taking - Paragraph Writing - Types of Paragraph - Compare and Contrast **Grammar**: Tenses – Form, Function and Meaning - Basic Sentence structure-Articles **Vocabulary**: One-Word Substitutes, Phrasal Verbs – Cause and Effect expressions

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: III INTRODUCTION TO FORMAL WRITING 9

Listening: Listening to Lectures and Taking Notes **Reading**: Reading on Visual Content **Speaking**: One-Minute Talk **Writing**: Informal Letter Writing , Email Writing, Data Interpretation-Pie chart, Bar chart **Grammar**: Tenses, Active Voice, Passive Voice, Impersonal-Preposition **Vocabulary**: Guessing the meaning from context, Cloze Exercise - Word power.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: IV ENHANCING SPEAKING ABILITY 9

Listening: Listening to Speeches **Reading:** Speed Reading **Speaking:** Just a Minute **Writing:** Instructions,Formal letter writing, Data Interpretation-Flow chart, Table **Grammar:** 'Wh' Questions / Yes or No Questions, Question Tag, Imperatives **Vocabulary:** Synonyms, Antonyms, Different forms of same words.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: V **EXTENSIVE LANGUAGES FOR WORKPLACE** **9**

Listening: Extensive Listening -Audio scripts – Listening to Conversation **Reading**: Extensive reading (Jigsaw Reading, Short Stories, Novels) - Introduction to Technical Article **Speaking**: Short Presentations on Technical Topics -Tips for Doing Presentation **Writing:** Recommendations, Essay Writing **Grammar:** Collocation, Concord -Compound words **Vocabulary:** Informal Vocabulary and Formal Substitutes

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT

RBT Level: L1, L2, L3

Total **45**

Pedagogical Methods:

Unit 1:	Speaking task
Unit 2:	Reading task
Unit 3:	Speaking task
Unit 4:	Reading task
Unit 5:	Speaking task

Course Outcomes:

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

CO1:	Apply comprehension skills and interpret different contents.
CO2:	Read and comprehend various texts and audiovisual contents
CO3:	Infer data from graphs and charts and communicate it in varied contexts.
CO4:	Participate in diverse speaking situations.
CO5:	Present, discuss and coordinate with peers in workplace using language skills.

Text Books:

T1: Anna University English Department, "English for Engineers and Technologists", Orient Black Swan, ISBN-978-93-5442-067-2, Edition 2022 –Vol-I.

T2: Ashraf Rizvi. M, "Effective Technical Communication", McGraw Hill Education, Second edition (2017)- ISBN-9352605780, 978-9352605781 2nd Edition.

T3: Sylvan Barnet, Hugo Bedau, and John O'Hara, "Critical Thinking Reading and Writing", Bedford/St. Martin's: 11th Edition, ISBN-13 : 978-1319332051 (16 December 2022)

References

R1: Addison Wesley Longman, "Technical English", Pearson, ISBN:978-1292042862, 8th Edition 2013.

R2: Norman Lewis, "Word Power Made Easy", Goyal Saab; Latest edition (1 January 2020), ebook ISBN-978-0-307-81749-5

R3: Pinnacle , "SSC 60 Days English Vocabulary book" 3rd edition, English and Hindi, 20,000+ words, , ISBN-715791456, 3rd Edition - 19 September 2023

Web links and Video Lectures (e-Resources):

1. https://leverageedu.com/blog/internship-request-letter/ - Unit - IV
2. https://www.englishgrammar.org/ - All Units Grammar
3. https://www.indeed.com/career-advice/career-development/letter-of-introduction - Unit III

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	-	1	3	-	2	1	1	1
2	-	-	-	-	-	-	-	-	1	3	-	2	1	1	1
3	-	-	-	-	-	-	-	-	1	3	-	2	1	1	1
4	-	-	-	-	-	-	-	-	1	3	-	3	1	1	1
5	-	-	-	-	-	-	-	-	1	3	-	3	1	1	1
AVG	-	-	-	-	-	-	-	-	1	3	-	2.4	1	1	1

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

MATRICES AND CALCULUS

(Common to All Branches)

Course Code	24MA101	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	3:1:0	**Credits**	4
Total Teaching Periods	60	**IAT + ESE Marks**	40 + 60
Teaching Department	Mathematics		

Course Objectives:

1. To impart knowledge on the concepts of matrix algebra techniques needed for practical applications.
2. To familiarize the students with differential calculus.
3. To familiarize students with single integrals and multiple integrals.
4. To illustrate the simple applications of vector calculus.
5. To make the students to understand the concept of analytic function.
6. To introduce the basic concepts of complex integration.

Unit: I MATRICES `12

Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Statement and applications of Cayley-Hamilton Theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

Teaching-Learning Process **Pedagogy:** Lecture, NPTEL Videos
RBT Level: L1 - L3

Unit: II DIFFERENTIAL CALCULUS 12

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

Teaching-Learning Process **Pedagogy:** Lecture, NPTEL Videos
RBT Level: L1 - L3

Unit: III INTEGRAL CALCULUS & MULTIPLE INTEGRAL 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts - Double integrals - Double integral in polar coordinates - Area-enclosed by plane curves – Triple integrals – Volume of solids.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1 - L3

Unit: IV VECTOR CALCULUS 12

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems.

Teaching-Learning Process **Pedagogy:** Lecture, NPTEL Videos
RBT Level: L1 - L3

Unit: V ANALYTIC FUNCTIONS AND COMPLEX INTEGRATION 12

Analytic functions –Necessary and sufficient conditions for analyticity -Construction of analytic function - Conformal mapping – Mapping by functions w=z+c, cz, 1/z -Bilinear Transformation, Line integral - Cauchy‟s integral theorem – Cauchy's integral formula – Taylor's and Laurent's series

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1 - L3

Total 60

Pedagogical Methods:

Unit 1:	To Explore the applications of matrices in real-world scenarios.
Unit 2:	Use differential equations to model the rate of change of pollutant concentration over time and space.
Unit 3:	Apply integral calculus to optimize production levels, pricing strategies, and economic decision- making.
Unit 4:	Apply concepts of gradient, divergence, and curl in various coordinate systems to analyze vector fields.
Unit 5:	Use Python to visualize complex functions in the complex plane., Example: $w= 1/z^2$

Course Outcomes:

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

CO1:	Use the matrix algebra methods to diagonalize a given matrix and identify the special properties of matrices.
CO2:	Demonstrate different differentiation techniques and find maxima and minima of a given function.
CO3:	Find area enclosed by plane curves and volume of solids using integration techniques.
CO4:	Apply the concepts of gradient, curl and divergence across various disciplines.
CO5:	Utilize the concepts of analytic functions and construct analytic functions.
CO6:	Apply the basic concepts of complex integration to solve complex integrals. Expand a given function into Taylor's Series and Laurent's Series

Text Books:

T1: Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.ISBN : 9788126567880

T2: B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2016.ISBN : 9789382332300

References

R1: M. K. Venkataraman, "Engineering Mathematics", Volume I, 4th Edition, The National Publication Company, Chennai, 2003. ISBN : 9788183311261

R2: Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2015. ISBN : 9789385509183

R3: S.S. Sastry, "Engineering Mathematics", Vol. I & II, PHI Learning Private Limited, 4th Edition, New Delhi, 2014 ISBN : 9788120350039

R4: Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.ISBN : 9781259064917

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/111/108/111108157/ - Unit I
2. https://archive.nptel.ac.in/courses/111/106/111106146/ - Unit II
3. https://archive.nptel.ac.in/courses/111/105/111105122/ - Unit III
4. https://archive.nptel.ac.in/courses/111/105/111105122/ - Unit IV
5. https://archive.nptel.ac.in/courses/111/103/111103070/ - Unit V

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	-	-	-	-	-	-	-	-	1	1	1	-
2	3	2	2	-	-	-	-	-	-	-	-	1	1	1	-
3	3	2	2	-	-	-	-	-	-	-	-	1	1	1	-
4	3	2	2	-	-	-	-	-	-	-	-	1	1	1	-
5	3	2	2	-	-	-	-	-	-	-	-	1	1	1	-
AVG	3	2	2	-	-	-	-	-	-	-	-	1	1	1	-

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

PROGRAMMING IN C

(Common to CSE / IT / AIDS / CSBS / CSCS / AIML / EEE / ECE)

Course Code	24CS111	**Course Type**	Integrated
Teaching Periods/Week (L:T:P)	2:0:4	**Credits**	4
Total Teaching Periods	90	**IAT + ESE Marks**	50 + 50
Teaching Department	Computer Science and Engineering		

Course Objectives: To equip the students with the knowledge in

1. C programs using fundamental programming structures.
2. C programs utilizing arrays and strings.
3. Applications of C using functions and pointers.
4. Advanced features of the C programming language, including structures and unions.
5. File operations in C

Unit: I INTRODUCTION AND BASICS OF C PROGRAMMING 6

Introduction - Structured programming - Problem solving techniques: Algorithms, Flowcharts, Pseudo code - Structure of a C program - Compiling and executing a C program - Data types and Variables – operators and expressions – Input and output functions -Control Structures: decision making and looping statements

Teaching-Learning Process **Pedagogy:** Chalk and Talk
RBT Level: L1, L2, L3, L4

Unit: II ARRAYS AND STRINGS 6

Arrays: One dimensional array: declaration, initialization and operations - Two & Multi-dimensional arrays. Strings: Strings vs Character arrays - String operations – String Functions – Arrays of Strings

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3, L4

Unit: III FUNCTIONS AND POINTERS 6

Need for Modular programming - Functions: declaration and definition – Function call - Call by value - Call by reference - Recursive functions - Pointers: Introduction - Pointers to primitive data types – Arrays and pointers - Array of pointers - Storage classes - Dynamic Memory Allocation

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3, L4

Unit: IV STRUCTURES AND UNIONS 6

Structures: Need, declaration, Accessing Structure elements – Nested structures - Arrays of structures – Self-referential structures – Pointers to structures - Unions: declaration and accessing

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3, L4

Unit: V FILES AND PREPROCESSOR DIRECTIVES 6

Files: Introduction, Types of file processing – Sequential and Random Access - Read /Write of binary and text files. - Preprocessor directives – Command line arguments

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT

RBT Level: L1, L2, L3, L4

Total 30

Pedagogical Methods:

Unit 1:	To draw a flowchart and a write algorithm for the following problems i) sum of two numbers ii) largest among three numbers
Unit 2:	Perform basic operations on arrays i) Find the largest element in the array ii) Calculate the sum of all elements in the matrix
Unit 3:	Program for swapping two integers using call by value and call by reference
Unit 4:	Create a student information system, i) Declare a structure Student with members: name, age and Roll number. ii) To calculate the GPA and CGPA from the student's marks
Unit 5:	Programs for file operations

Practical Exercises: 60

1. Programs for demonstrating the use of different types of operators like arithmetic, logical, relational, and ternary operators (Sequential structures)
    a) To find the area of a triangle
    b) To Convert temperatures from Celsius to Fahrenheit or vice versa using the appropriate formula
2. Write a C program to demonstrate the use of "scanf" and "printf" statements to "read" and "print" values of variables of different data types.
3. Programs using decision making statements like 'if', 'else if', 'switch', conditional and unconditiona 'goto' (Selective structures)
    a) To find the Largest among three numbers
    b) To print day of the week by giving a integer using switch Statement
    c) To find Roman number of a given number
4. Programs for demonstrating repetitive control statements like 'for', 'while', and 'do-while' (Iterative structures):
    a) Check whether the given number is Armstrong or not.
    b) To find the Sum of squares of first n numbers.
    c) To Check the given number is prime or not.
    d) To print the Multiplication table
    e) To convert the Octal number to decimal number.
5. Implement the following programs in C using one-dimensional array
    a) To Calculate the sum and average of elements
    b) To Find the min and max values of the given set of numbers
    c) To Reverse the elements
    d) To arrange the given set of number by using Bubble sort
    e) To find the given number from the list of elements by using Linear Search.
6. Write a C program using two-dimensional arrays for a) Matric Addition b) Matrix Multiplication

7. Programs to demonstrate modular programming concepts using user-defined functions
    a) Swapping two integers using call by value and call by reference
    b) Create a recursive function to calculate the factorial of a number and for binary search
8. Implement various character and string operations with and without using built-in functions in C.
    a) Find length of a string
    b) String Concatenation
    c) To Check whether the given string is Palindrome or not
9. Write a C program using pointers for the following:
    a) Swapping two numbers
    b) Greatest and the smallest among three numbers
    c) Reverse of a string
    d) Linear searching in array
10. Programs to illustrate the use of user-defined data types using Structures:
    a) Employee Payroll
    b) Student information system
11. Write a C program to implement various file operations listed below:
    a) Copy the contents from one file to another file
    b) Merging two files
12. Programs to demonstrate the use of pre-processor directives and command line arguments for the following:
    a) Finding area of circle and area of a square using #define
    b) Simple arithmetic operations using #include
    c) Program that accepts two file names as command-line arguments and copy the contents from one file to another file.

System requirement

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse	30
2.	Windows 8 or higher operating system / Linux Ubuntu 20 or higher	30
3.	Systems with Linux Operating System with GNU Compiler / Windows with Turbo C compiler	30

Course Outcomes:

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

CO1: Develop simple applications in C using basic constructs
CO2: Design and implement applications using arrays and strings
CO3: Create applications in C using functions and pointers
CO4: Utilize advanced features of the C programming with structures and unions
CO5: Develop applications using file operations in C

Text Books:

T1: E. Balaguruswamy, "Programming in ANSI in C", Tata McGraw Hill, Eight Edition, 2019

T2: Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016

T3: Pradip Dey, Manas Ghosh, "Programming in C", First Edition, Oxford University Press, 2018

References

R1: R G Dromey, "How to Solve it using Computer", Pearson,2006

R2: Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition Pearson Education,2015

R3: Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011

R4: Byron S Gottfried, "Programming with C", Schaum's Outlines, Third Edition, Tata McGraw Hill, 2010

Web links and Video Lectures (e-Resources):

1. https://www.udemy.com/course/c-programming-for-beginners/ - All Units
2. https://en.wikibooks.org/wiki/C_Programming - Unit 1, 2 & 3
3. https://www.coursera.org/specializations/c-programming - Unit 2 & 3
4. https://onlinecourses.nptel.ac.in/noc22_cs40/preview - All units

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	2	-	-	-	-	-	-	3	2	1	1
2	3	2	2	2	2	-	-	-	-	-	-	3	2	1	1
3	3	2	2	2	2	-	-	-	-	-	-	3	2	1	1
4	3	2	2	2	2	-	-	-	-	-	-	3	2	1	1
5	3	2	2	2	2	-	-	-	-	-	-	3	2	1	1
AVG	3	2	2	2	2	-	-	-	-	-	-	3	2	1	1

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

COMPUTATIONAL THINKING

(Common to CSE / IT / AIDS / CSBS / CSCS / AIML / EEE / ECE)

Course Code	24CS112	**Course Type**	Integrated
Teaching Periods/Week (L: T:P)	1:0:2	**Credits**	2
Total Teaching Periods	45	**IAT + ESE Marks**	50 + 50
Teaching Department	Computer Science and Engineering		

Course Objectives: To Equip the students with the Knowledge in

1. Problems in a way that enables a computer to solve them.
2. Organising and analysing data using logical approaches.
3. Developing solutions through algorithmic thinking.
4. Identifying, analysing, and implementing possible solutions to achieve the most efficient and effective combination of steps and resources.
5. Generalising and transferring the problem-solving process to a wide variety of problems.

Unit: I INTRODUCTION TO COMPUTATIONAL THINKING 1+4

Understanding the concepts: Decomposition, pattern recognition/data representation, generalization, abstraction, and algorithms, Representation, automation, Analysis, visualization. Logical thinking - reasoning

Teaching-Learning Process **Pedagogy:** Chalk and Talk

RBT Level: L1, L2, L3, L4

Unit: II UNDERSTANDING DATA 2+6

Performing analytics on numeric data using any spreadsheet software and representing the data using charts, histograms, scatter plots, graphs etc. Understanding patterns in data sequences, puzzles, and nonograms. Data Encryption – ciphering sentences and Compression.

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT

RBT Level: L1, L2, L3, L4

Unit: III DECOMPOSITION AND PATTERN RECOGNITION 3+8

The divide and Conquer, pattern recognition, Algorithmic thinking - creating oral algorithms for everyday tasks – visualizing algorithms through sequence of steps, pseudocode, flow charts, selection, iteration, functions, procedures and parameters.

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT

RBT Level: L1, L2, L3, L4

Unit: IV ABSTRACTIONS AND SCRATCH 3+6

Understanding Abstraction Object Description, Abstraction and Modeling, Objects and Objects based modeling -Repair, Reuse, Recycle, Scratch / equivalent - Motion, events, control

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT

RBT Level: L1, L2, L3, L4

Unit: V FILES AND PREPROCESSOR UNDERSTANDING COMPLEXITY 6+6

Understanding complexity, sorting algorithms, search algorithms, AI and Turing Test, FSA (Finite State Automata), Debugging, Enhancing the clarity of a program - documentation, style, idioms, Automation and Simulation, generalizing a solution.

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT

RBT Level: L1, L2, L3, L4

Total 45

Pedagogical Methods:

Unit 1:	Explore algorithm design by creating oral algorithms.
Unit 2:	Decompose a complex problem into discrete steps and Design a simple algorithm for solving the problem
Unit 3:	Programming implementation
Unit 4:	Develop algorithms for sorting and determine the complexity of the algorithm and how it scales as the number of items to sort increases
Unit 5:	External Learning: Study the best practices of documentation, style, idioms, etc that are used to ensure the code can be understood and maintained over a long period.

Practical Exercises:

MODULE I:	Algorithmic thinking - creating oral algorithms for everyday tasks - Data abstraction and representation - Abstraction and translation of everyday data for use on a computer.
MODULE II:	Decomposing a complex problem - Strategies for decomposition and algorithm design - Divide and conquer - Simple program implementations.
MODULE III:	Overall data representation, abstraction, analysis and algorithm design. Program implementations.
MODULE IV:	Measuring the complexity of an algorithm - sorting algorithms - the notion of unsolvable problems. Programming illustrations.
MODULE V:	Enhancing the clarity of a program - documentation, style, idioms.

System requirement

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse	30
2.	Windows 8 or higher operating system / Linux Ubuntu 20 or higher	30

Course Outcomes:

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

CO1:	Formulate problems for effective computer-based solutions.
CO2:	Systematically organize and analyse data.
CO3:	Develop solutions using algorithmic approaches.
CO4:	Identify, evaluate, and implement optimal solutions by efficiently utilizing steps and resources.
CO5:	Apply and adapt the problem-solving process across diverse scenarios.

Text Books:

T1: Karl Beecher, Computational Thinking - A Beginner's Guide to Problem-Solving and Programming, BCS Learning, 2017.

T2: Venkatesh G, Madhavan Mukund, Computational Thinking, Notion Press, 1st Edition, 2021.

T3: Hunt, Kenny A._ Riley, David D, Computational Thinking for the Modern Problem Solver, CRC Press, 2015

References

R1: David Clark, Computational and Algorithmic Thinking Book 2, AMT Publishing, 2016.

R2: Paul Curzon, "Computing Without Computers: A Gentle Introduction to Computer Programming, Data Structures, and Algorithms", 2014. https://teachinglondoncomputing.files.wordpress.com/2014/02/booklet-cwc-feb2014.pdf)

R3: Wang Paul S, From computing to computational thinking, CRC Press, 2016.

R4: Peter J. Denning, Matti Tedre, Computational Thinking, MIT Press, 2019.

R5: Paolo Ferragina, Fabrizio Luccio, Computational Thinking_ First Algorithms, Then Code, Springer International Publishing, 2018.

R6: Aman Yadav, Ulf Berthelsen, Computational Thinking in Education_ A Pedagogical Perspective, Routledge, 2021.

R7: Zhiwei Xu, Jialin Zhang, Computational Thinking_ A Perspective on Computer Science, Springer, 2021

R8: Exploring Computational Thinking.https://edu.google.com/resources/programs/exploring-computational- thinking/.

Web links and Video Lectures (e-Resources):

1. https://teachinglondoncomputing.org – Unit 1_
2. https://classic.csunplugged.org Unit 3 & Unit 5
3. http://Study.iitm.ac.in/D's/course_pages/bscs1001.html - Unit 3
4. http://Learning.com/blog/defining-computationalthinking - Unit 1
5. https://centre-for-humanities-computing.github.io – Unit 1
6. http://Nptel.ac.in/course/115106121 - All units

CO-PO & PSO Mapping:

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

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CSE / IT / CSBS / AIDS / AIML / CSCS)

Course Code:	24EE111	**Course Type:**	Integrated
Teaching Periods/Week (L: T:P):	3:0:2	**Credits:**	4
Total Teaching Periods:	75	**IAT + ESE Marks:**	50 + 50
Teaching Department:	Electrical and Electronics Engineering		

Course Objectives:

1. To introduce the basics of electric circuits and its analysis
2. To impart knowledge in the working principles and application of electrical machines
3. To familiarize various types of semiconductor devices and its characteristics
4. To introduce the functional blocks of instruments and working principle of sensors
5. To introduce the working of Biomedical Instruments

UNIT I ELECTRICAL CIRCUITS 9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law – Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor –Measurement of power by two wattmeter method

Teaching-Learning Process **Pedagogy:** Lectures, PPT, NPTEL
RBT Level: L1, L2, L3, L4

UNIT II ELECTRICAL MACHINES 9

Construction, Working principle and characteristics - DC Separately and Self Excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

Teaching-Learning Process **Pedagogy:** Lectures, PPT, NPTEL
RBT Level: L1, L2, L3, L4

UNIT III BASICS OF ELECTRONICS 9

Semiconductor materials – Types- Intrinsic and Extrinsic Semiconductor - P-N Junction Diode - Zener Diode – BJT - MOSFET - Principle of operation and VI Characteristics - Display devices – LED - Solar Cell

Teaching-Learning Process **Pedagogy:** Lectures, PPT, NPTEL
RBT Level: L1, L2, L3, L4

UNIT IV SENSORS AND TRANDUCERS 9

Functional elements of an instrument – Standards and Calibration - Measurement of Pressure – Torque – Displacement – Velocity – Vibration – Acceleration – Temperature – Flow -- Measurement of Liquid Level – Humidity - Sound.

Teaching-Learning Process **Pedagogy:** Lectures & PPT
RBT Level: L1, L2, L3, L4

UNIT V BIOMEDICAL INSTRUMENTATION **9**

Cardio Vascular system – Pressure pulses in Cardiac Chamber – ECG – Interpretation of ECG - EEG – EMG – Blood Pressure Measurement – Pathological test – CT scan – MRI Scan.

Teaching-Learning Process **Pedagogy:** Lectures, PPT, NPTEL
RBT Level: L1, L2, L3, L4

Total **45**

Pedagogical Methods:

Unit 1: Tutorials on Kirchhoff's Law
Unit 2: Recent development in dc machines
Unit 3: Measure the resistance, inductance, and capacitance using a multi-meter.
Unit 4: Review on electronic sensors
Unit 5: Review on interpretation of ECG

Practical Exercises: **30**

1) Verification Kirchhoff's Law.
2) Study of RL, RC and RLC circuits.
3) Measurements of nonelectrical Parameters-Pressure, Displacement, Temperature and Flow.
4) Characteristics of PN junction Diode and Zener Diode
5) Characteristics of BJT.
6) Measurement of Power by two wattmeter method.
7) Series Resonant circuit.
8) Energy Audit.
9) Study of components and Equipment.
10) Study of biomedical instruments.

Equipment required

Sl. No.	Description of Equipment	Required numbers (for batch of 30 students)
1	Regulated Power Supply: 0 – 15 V D.C	**10 nos**
2	Function Generator (1 MHz)	10 nos
3	Oscilloscope (20 MHz)	10 nos
4	Digital Storage Oscilloscope (20 MHz)	1 no
5	AC/DC - Voltmeters	10 nos.
6	Ammeters	10 nos.
7	Multi-meters	5 nos.
8	UPF Watt meters	5 nos.
9	Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box	6 nos each
10	Circuit Connection Boards	**10 nos.**
11	Pressure, Displacement, Temperature and Flow measurement kit	2 nos each
12	Necessary quantities of PN Junction diode, Zener diode and BJT	Adequate quantity
13	Necessary Quantities of connecting wires, Resistors, Inductors, Capacitors of various capacities.	Adequate quantity
14	Necessary quantities of biomedical sensors	Adequate quantity

Course Outcomes:

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

CO1: Compute the electrical parameters of simple electric circuits with AC and DC Supply
CO2: Explain the working principle of DC and AC Machines
CO3: Describe the working and characteristics of semiconductor devices
CO4: Discuss the working principle of various sensors and transducers
CO5: Summarise the instruments used for measuring biomedical parameters

Text Books:

T1: Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
T2: S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
T3: Sedha R.S., "A text book of Applied Electronics", S. Chand & Co., 2008
T4: James A. Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
T5: A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

References

R1: Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
R2: Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017.
R3: Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
R4: Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
R5: H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/108/102/108102185/- Unit 1
2. https://onlinecourses.nptel.ac.in/noc20_ee60/preview -Unit 2
3. https://archive.nptel.ac.in/courses/108/105/108105188/ -Unit 3
4. https://archive.nptel.ac.in/courses/108/105/108105153/ - Unit 4
5. https://www.youtube.com/watch?v=iK6q4nnmtA&list=PLVsrfTSlZ_42OoOyhzWoDgZrL9iineZx Q&index=1 – Unit 5
6. https://www.youtube.com/watch?v=1K4ASqq0Rhk&list=PLVsrfTSlZ_42OoOyhzWoDgZrL9iineZxQ&index=4 – Unit 5

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	2	1	-	-	-	-	-	-	1	2	1	-
2	3	2	1	-	1	-	-	-	-	-	-	1	2	1	-
3	3	2	1	2	1	-	-	-	-	-	-	1	2	1	-
4	3	2	1	2	1	-	-	-	-	-	-	1	2	1	1
5	3	2	1	-	1	-	-	1	-	-	-	1	2	1	1
AVG	3	2	1	2	1	-	-	1	-	-	-	1	2	1	1

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to CSE, IT, AIDS, CSBS, AIML, CSE-CYS, ECE, ACT, VLSI and EEE)

Course Code	24GE101	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	3:0:0	**Credits**	3
Total Teaching Periods	45	**IAT + ESE Marks**	40+60
Teaching Department	Civil Engineering and Mechanical Engineering		

Course Objectives: To Equip the students with the knowledge in

1. Types of civil structures, civil engineering materials, and civil construction.
2. Different types of building plans, foundations, and infrastructures.
3. Parts of IC engines, pumps, and their working principles.
4. Components of the power plant and a detailed explanation of their working principles.
5. Parts of the Refrigeration & Air-conditioning system and their working principles and applications.
6. Additive manufacturing processes and their applications.

Unit: I INTRODUCTION OF CIVIL ENGINEERING AND CONSTRUCTION MATERIALS **9**

Civil Engineering – Specialized sub-disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation, and Water Resources Engineering Types of buildings: Residential buildings, Industrial buildings.

Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel – Timber – Modern Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building components (brief discussion only)

Teaching-Learning Process **Pedagogy:** Lecture, PPT

RBT Level: L1, L2, L3

Unit: II BUILDING COMPONENTS AND INFRASTRUCTURE **9**

Building plans – Setting out of a Building – Foundations: Types of foundations –Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering. Types of Bridges and Dams – Water Supply Network –Introduction to Highways and Railways – Introduction to Green Buildings - Stress prediction by AIML.

Teaching-Learning Process **Pedagogy:** Lecture, PPT

RBT Level: L1, L2, L3

Unit: III INTERNAL COMBUSTION ENGINES **9**

Internal combustion engines as an automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two-stroke engines - Concept of hybrid engines - Electric Vehicles – Components, Accessories, and working of electric vehicles.

Teaching-Learning Process **Pedagogy:** Lecture, PPT, Youtube Videos

RBT Level: L1, L2, L3

Unit: IV POWER PLANTS, REFRIGERATION AND AIR CONDITIONING SYSTEM **9**

Classification of Power Plants- Working principle of steam, Gas, Diesel, Hydroelectric, and Nuclear Power plants- Internal combustion engines as automobile power plants. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator–Window and Split type room Air conditioner.

Teaching-Learning Process **Pedagogy:** Lecture, PPT, YouTube Videos

RBT Level: L1, L2, L3

Unit: V ADDITIVE MANUFACTURING **9**

Additive Manufacturing Overview – VAT Photopolymerisation - Material Jetting - Binder Jetting - Material Extrusion - Powder Bed Fusion - Sheet Lamination - Directed Energy Deposition – Merits Demerits and its Applications.

Teaching-Learning Process **Pedagogy:** Lecture, PPT, YouTube Videos

RBT Level: L1, L2, L3

Total **45**

Pedagogical Methods:

Unit 1:	Poster presentation - Civil Engineering Materials
Unit 2:	Seminar – Types of Bridges and Dams
Unit 3:	Seminar on Components of IC Engines
Unit 4:	Role Play – Vapour Compression Refrigeration System
Unit 5:	Model Making

Course Outcomes:

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

CO1:	Explain the types of civil structures, civil engineering materials, civil construction.
CO2:	Discuss about the different types of building plans, foundations, and infrastructures.
CO3:	Explain the components of IC engines, pumps, and their working principles.
CO4:	Describe the parts of the power plant and a detailed explanation of their working principles.
CO5:	Summarize the parts and working principle of refrigeration & air-conditioning system
CO5:	Discuss the additive manufacturing processes and their applications

Text Books:

T1: G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018. ISBN - 9789387572317

References

R1: Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai Publishing Co.(P) Ltd, 2022. ISBN - 9788187433545

R2: Basic Mechanical Engineering, Pearson Education, 2018, ISBN: 978-9386873293

R3: Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies, 2005.

R4: S.Shiva. Anuj K Shukla, “Additive Manufacturing Technologies” – Wiley Publications, 2024, ISBN - 9789357462419

R5: Basic Civil Engineering by Sateesh Gopi, Pearson Education, 2023, 978-8131729885

R6: Basic Mechanical Engineering, Basant Agrawal, and C.M. Agrawal, Wiley India pvt ltd, 2008 ISBN: 978-81-265-1878-4

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=m4m2AVqQtmk – Unit 1
2. https://www.youtube.com/watch?v=amxCBv2-5b4 – Unit 2
3. https://www.youtube.com/watch?v=8dAbcbAJRw8 – Unit 3
4. https://www.youtube.com/watch?v=IdPTuwKEfmA – Unit 4
5. https://archive.nptel.ac.in/courses/112/103/112103306/ - Unit 5

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
2	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
3	2	-	-	-	-	-	1	-	-	-	-	-	1	1	-
4	2	-	-	-	-	-	1	-	-	-	-	-	1	1	-
5	2	-	-	-	-	-	1	-	-	-	-	-	1	1	-
6	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
AVG	2	-	-	-	-	-	1	-	-	-	-	-	1	1	-

"1" – Low, "2" – Medium, "3"- High, "-" – No correlations

ENGLISH FOR ENHANCING SELF COMPETENCE

(Common to all branches)

Course Code:	24EN121	**Course Type:**	Practical
Teaching Periods/Week (L:T:P):	0:0:2	**Credits:**	1
Total Teaching Periods:	30	**IAT + ESE:**	60 + 40
Teaching Department:	English		

Course Objectives:

1. To articulate and learn various social behaviors and etiquette.
2. To develop writing and speaking skills for professional requirements.
3. To acquire techniques of fundamental communication skills.

Unit: I PERSONALITY TRAITS **6**

Self-Introduction, Ways to Identify Self (SWOT Analysis- Johari Window), Concepts of Self-Management and Self-Motivation, Self-Assessment.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: II COMMUNICATION SKILLS **6**

Effective Communication Skills, Interpersonal & Social Skills

Teaching-Learning Process **Pedagogy:** PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: III SOCIAL BEHAVIOUR **6**

Time Management, Personal Grooming, Making Small Talk, Inter-Cross-Cultural Communication, Professional Presentation Techniques.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: IV CULTURAL ETIQUETTE **6**

Formal Presentation, Sensitivity towards multi-cultural work spaces, Presentation skills –Formal Presentation - Just a minute

Teaching-Learning Process **Pedagogy:** PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: V JOB-RELATED COMMUNICATION **6**

Resume & Cover Letter, Formal E-mails, Framing Requests, Greetings, Salutations, Close, Interview-Types-Interview Questions-Techniques, Introduction to Interviews-FAQ's

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT, YouTube videos

RBT Level: L1, L2, L3

Total **30**

System requirement

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse	30
2.	Windows 8 or higher operating system	30
3.	Hot Potatoes / Globarina	30

Course Outcomes:

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

CO1: To listen to and comprehend general as well as complex academic information
CO2: To speak fluently and accurately in formal and informal communicative contexts
CO3: To express their opinions effectively in both formal and informal discussions.

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	-	2	3	-	2	1	1	1
2	-	-	-	-	-	-	-	-	2	3	-	3	1	1	1
3	-	-	-	-	-	-	-	-	2	3	-	2	1	1	1
AVG	-	-	-	-	-	-	-	-	2	3	-	2.3	1	1	1

'1' – Low, '2' – Medium, '3'- High, '-' – No correlation

IT ESSENTIAL SKILLS

(Common to all branches)

Course Code	24IT121	**Course Type**	Practical
Teaching Periods/Week (L: T:P)	0:0:2	**Credits**	1
Total Teaching Periods	30	**IAT + ESE Marks**	60 + 40
Teaching Department	Information Technology		

Course Objectives: To equip students with the knowledge in:

1. PC components, diagnose and resolve common issues to maintain optimal performance.
2. PowerPoint and Word for crafting compelling presentations and professional documents with advanced formatting, multimedia integration, and design techniques.
3. Spreadsheets for the creation, management, and analysis of data across various tasks.
4. Use of ChatGPT for prompt engineering, creative writing, and language translation to enhance communication and content creation.
5. HTML and CSS to design and build well-structured, visually appealing, and interactive web pages.

Practical Exercises **30**

PC Hardware & Software Installation **6**

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

WORD **6**

Word Orientation: The mentor needs to give an overview of Microsoft (MS) office or equivalent (FOSS) tool word: Importance of MS office or equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that would be covered in each, using word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 1: Using Word to create a project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Task 2: Creating project abstract Features to be covered: -Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 3: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL **6**

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered: - Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,
Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"
Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."
Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT **4**

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

T**ask 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc.,), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS –Chat GPT **4**

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas.

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.
Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?"

HTML AND CSS

HTML & CSS Orientation: The mentor needs to tell the importance of HTML tags as a design tool, give the details of the three tasks and features that would be covered in each. Using HTML – Formatting, List, Header, Table, insert image Using help and resources.

Task 1: Create a simple webpage with a title, header, paragraph, and footer for institution.

Task 2: Create a form with fields for name, email, password, and a submit button Include radio buttons, checkboxes, and a dropdown menu.

Task 3: Create and Apply an External CSS to an HTML Document for your profile.

System Requirement

Sl. No.	Description of Equipment	Required numbers (for batch of 30 students)
1.	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse	30
2.	Office tools – Word processor, Spread sheet, Presentation tool	30
3.	AI TOOLS: Chat GPT	30
4.	Mozilla Firefox / Chrome / Microsoft Edge, Notepad ++	30

Course Outcomes:

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

CO1:	Identify the components of a PC and troubleshoot PC malfunctions.
CO2:	Develop essential skills in PowerPoint and Word to create engaging presentations and professional documents with advanced formatting, multimedia integration, and layout techniques.
CO3:	Acquire the ability to create, manage, and analyze data using spreadsheets for various tasks.
CO4:	Attain knowledge in using Chat GPT for prompt engineering, creative writing, and language translation, enhancing interaction and content generation capabilities.
CO5:	Build foundational skills in HTML and CSS to create structured, styled, and interactive web pages

References

R1: Kate J. Chase , PC Hardware - A Handbook, , PHI (Microsoft)

R2: David Anfins on and Ken Quamme, IT Essentials PC Hardware and Software Companion Guide, CISCO Press, Pearson Education, 3rd edition

R3: Patrick Regan, IT Essentials PC Hardware and Software Labs and Study Guide, CISCO Press, Pearson Education, 3rd edition

R4: Vikas Gupta, Comdex Information Technology course tool kit, WILEY Dream tech, 2003

R5: Cheryl A Schmidt, The Complete Computer upgrade and repair book, WILEY Dream tech, 2013, 3rd edition

R6: Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition

R7: Prashant Joshi Introduction to IT Systems, Khanna Book Publishing Co.(P) Limited, New Delhi, 2021 First Edition

CO-PO & PSO Mapping:															
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
2	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
3	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
4	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
5	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
AVG	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
'1' – Low, '2' – Medium, '3'- High, '-' – No correlations															

ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE

(Common to all branches)

Course Code	24GE221	**Course Type**	Practical
Teaching Periods/Week (L:T:P)	0:0:2	**Credits**	1
Total Teaching Periods	30	**IAT + ESE Marks**	60 +40
Teaching Department	Electrical and Electronics Engineering		

Course Objectives:

1. To equip students with a comprehensive understanding of electronic equipment and practical soldering skills.
2. To develop students' proficiency in making electrical wiring connections using appropriate techniques and perform energy audit.
3. To provide students with practical exposure in installation and maintenance of household electrical appliances.

PRACTICAL **30**

1. Study of components - R, L, C, Diode, Transistor and IC's.
2. Study of equipment's – RPS, Function Generator, CRO, Multimeter, Ammeter, Voltmeter, Wattmeter and Energy meter.
3. Measurement of voltage, current, frequency, time period for sine, square and triangular waves.
4. Soldering practice and breadboard practice.
5. Study of wires and cables.
6. Basic switchboard wiring with lamp, fan and three pin socket.
7. Fluorescent Lamp Wiring and Staircase Wiring.
8. Residential House wiring using Switches, Fuse, Indicator, Lamp and Energy meter.
9. Measurement of Energy and Earth Resistance.
10. Energy Audit.
11. Installation and Maintenance of Electrical Appliances –I Iron box, Emergency Lamp, Fan regulator.
12. Installation and Maintenance of Electrical Appliances –II Water heater, Stabilizer and UPS.

List of Equipment:

S.No	Name of the Equipment	Quantity
1	Single phase house wiring setup (Fuse, Lamp, Socket, Switch, PVC Pipe, Lamp Holder, Energy Meter)	2
2	Staircase wiring setup (Lamp, Two-way Switch, Socket, Switch, PVC Pipe, Lamp Holder)	2
3	Fluorescent lamp wiring setup (Fluorescent Lamp, Socket, Switch, PVC Pipe, Fluorescent Lamp Holder, Choke, Starter)	2
4	Water heater (1500W, 230V)	2
5	Stabilizer (500W, 160 – 290V)	2
6	UPS (600 VA)	2
7	Fan regulator	2
8	Iron box setup	2
9	Emergency lamp setup	2
10	Soldering Iron, Lead	15
11	Multi meter (0-600V, 10A)	15

12	Continuity tester	2
13	Resistors	Adequate Number
14	Capacitors	Adequate Number
15	Diodes	Adequate Number
16	Transistors	Adequate Number
17	Inductors	Adequate Number
18	IC's	Adequate Number
19	RPS (0-30V)	5
20	Function Generator (0-1MHz)	5
21	CRO (20MHz)	5
22	Ammeter (0-10A) MI	10
23	Voltmeter (0-300V) MI	10
24	Wattmeter (300V,10A, UPF)	5
25	Energy meter (single phase, two wire, (5-30A)/240V, 50Hz)	5
26	Wires, Cables	Adequate Number
27	Clamp meter (0-1000A), (0-750V)	2
28	Megger (500V, 100Mohms)	1

Course Outcomes:

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

CO1: Identify various electronic components and assemble simple electronic circuits using soldering.

CO2: Make wiring connections for household and conduct energy audit.

CO3: Install and maintain household electrical appliances.

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	2	1	1	1	-	-	-	-	1	2	1	1
2	3	2	1	2	1	1	1	-	-	-	-	1	2	1	1
3	3	2	1	2	1	1	1	-	-	-	-	1	2	1	1
AVG	3	2	1	2	1	1	1	-	-	-	-	1	2	1	1

1 –„Low“ , 2 – „Medium“ , 3- „High“, „-„ – No correlations

PRODUCT TINKERING LAB
(Common to all)

Course Code	24GE122	**Course Type**	Practical
Teaching Periods/Week (L: T:P)	0:0:2	**Credits**	1
Total Teaching Periods	30	**IAT + ESE Marks**	60 + 40
Teaching Department	Civil Engineering and Mechanical Engineering		

Course Objectives: To equip the students with

1. Hands-on experience in Mechanical Equipments.
2. Design of simple components using computer-aided design.
3. Basic concept of 3D Printing.
4. Hands-on training on basic plumbing works

Practical Exercises **30**

1. Exercise on the usage of a hand-drilling machine
2. Demonstration of Centrifugal pumps.
3. Demonstration of two-wheeler and four-wheeler maintenance and repairs,
4. 3D Modelling of a single component.
5. Exercise on CAD Data Exchange and Generation of .stl files.
6. Identification of a product for Additive Manufacturing and its AM process plan
7. Printing of identified product on an available AM machine.
8. Demonstration on how to change the Tap fittings.
9. Preparing plumbing line sketches.
10. Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows, and other components that are commonly used in households.
11. Laying pipe connection to the suction and delivery side of a pump
12. Connecting pipes of different materials: Metal, plastic, and flexible pipes used in household appliances.

Equipment required

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	Hand Drilling Machine	5 nos.
2.	Centrifugal pump Assembly	1 no.
3.	Two-Wheeler (Four Stroke Petrol Engine)	1 no.
4.	Four-Wheeler (Four Stroke Diesel Engine)	1 no.
5.	Pipe Vice	5 nos.
6.	Die Holder with Die set	5 nos.
7	Valves, Taps, Coupling, Unions, Reducers, and Elbows (Metal and Plastics)	5 nos. each
8	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17” or higher TFT Monitor, Keyboard and mouse	5 Nos
9	3D Printer	2 Nos

Course Outcomes:

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

CO1:	Perform the basic maintenance and servicing of mechanical equipments.
CO2:	Design simple components using computer-aided design.
CO3:	Develop a 3D component using additive manufacturing.
CO4:	Sketch and perform the plumping for the house's different connections.

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	-	-	-	2	-	-	-	-	-	-	1	2	-	1
2	2	-	-	-	3	-	-	-	-	-	-	1	2	-	1
3	2	-	-	-	3	-	-	-	-	-	-	1	2	1	1
4	2	-	-	-	2	-	-	-	-	-	-	1	2	-	1
AVG	2	-	-	-	2.5	-	-	-	-	-	-	1	2	1	1

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

TAMILS AND TECHNOLOGY

(Common to all branches)

Course Code	24TA201	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	1:0:0	**Credits**	1
Total Teaching Periods	15	**IAT + ESE Marks**	40 + 60
Teaching Department	Tamil		

Course Objectives:

1. To familiarize about the Pottery, Weaving Technology in sangam age.
2. To teach about the Construction Technology of Ancient Tamils
3. To impart knowledge of ship building and manufacturing Technologies in ancient Tamil culture.
4. To teach about main features of ancient Tamils Agriculture, Agro-Processing and irrigation technology
5. To provide insight about the Tamil Software Development.

Unit: I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Unit: II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Unit: III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads - Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Unit: IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

Unit: V **SCIENTIFIC TAMIL & TAMIL COMPUTING** **3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

Teaching-Learning Process **Pedagogy:** Lecture, PPT

RBT Level: L1, L2, L3

Total **15**

Pedagogical Methods:

Unit 1:	Clay Modal Task
Unit 2:	Sculptures and Heritage Symbols Drawing task
Unit 3:	Group Discussion
Unit 4:	Debate about Ancient Irrigation Technology
Unit 5:	Thorough analysis of Scientific Tamil

Course Outcomes:

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

CO1: Describe the weaving technology and pottery making in sangam age
CO2: Explain the construction technologies used in ancient times
CO3: Discuss the technologies used by ancient Tamils in minting coins, ship, metallurgical areas.
CO4: Describe the methods used in our ancient Tamils agriculture and irrigation technologies
CO5: Summarize the development of scientific Tamil and Tamil computing

Text Books:

T1: Keeladi - 'Sangam City Civilization on the banks of river Vaigai" (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

T2: Dr.K.K.Pillay "Studies in the History of India with Special Reference to Tamil Nadu"

References

R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies)

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Web links and Video Lectures (e-Resources):

1. https://youtu.be/fecWlhoPPYY?feature=shared – Unit V
2. https://youtu.be/vsLuw8Q3vA?feature=shared – Unit III

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	3	-	3	-	3	-	-	-	-	-
2	-	-	-	-	-	3	-	3	-	3	-	-	-	-	-
3	-	-	-	-	-	3	-	3	-	3	-	-	-	-	-
4	-	-	-	-	-	3	-	3	-	3	-	-	-	-	-
5	-	-	-	-	-	3	-	3	-	3	-	-	-	-	-
AVG	-	-	-	-	-	3	-	3	-	3	-	-	-	-	-

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

தமிழரும் தொழில்நுட்பமும்

(Common to all branches)

Course Code	24TA201	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	1:0:0	**Credits**	1
Total Teaching Periods	15	**IAT + ESE Marks**	40 + 60
Teaching Department	Tamil		

Course Objectives:

1. பழந்தமிழரின் பானை மற்றும் நெசவுத் தொழில் நுட்பம் குறித்து விளக்குவது
2. பண்டைய தமிழர்களின் கட்டுமான தொழில்நுட்பம் பற்றி தெரியப்படுத்துவது
3. பண்டைய நாட்களில் கப்பல் கட்டுதல் மற்றும் உற்பத்தி தொழில்நுட்பங்கள் பற்றிய அறிவை வழங்குதல்.
4. பண்டைய தமிழர்களின் விவசாயம் மற்றும் நீர்ப்பாசனத் தொழில்நுட்பத்தின் முக்கிய அம்சங்களைப் பற்றி கற்பித்தல்
5. தமிழ் மென்பொருள் மேம்பாடு பற்றிய நுண்ணறிவை வழங்குதல்.

அலகு 1 நெசவு மற்றும் பானைத் தொழில்நுட்பம் **3**

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பமும் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

அலகு - II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் **3**

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்த தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசோனிக் கட்டிடக் கலை

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

அலகு – III உற்பத்தித் தொழில் நுட்பம் **3**

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எ..கு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாகும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள், - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1, L2, L3

அலகு – IV வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம் **3**

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக்கு முழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைக்களுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

Teaching-Learning Process **Pedagogy:** Lecture, PPT

RBT Level: L1, L2, L3

அலகு – V அறிவியல் தமிழ் மற்றும் கணித்தமிழ் **3**

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

Teaching-Learning Process **Pedagogy:** Lecture, PPT

RBT Level: L1, L2, L3

Total **15**

Pedagogical Methods:

Unit 1:	Clay Modal Task
Unit 2:	Sculptures and Heritage Symbols Drawing task
Unit 3:	Group Discussion
Unit 4:	Debate about Ancient Irrigation Technology
Unit 5:	Thorough analysis of Scientific Tamil

Course Outcomes:

இந்த பாடத்திட்டத்தை வெற்றிகரமாக முடித்த பிறகு, மாணவர்களால்

CO1: சங்க காலத்தில் நெசவுத் தொழில்நுட்பம் மற்றும் மட்பாண்டங்கள் செய்தல் ஆகியவற்றை விவரிக்க முடியும்

CO2: பண்டைய காலத்தில் பயன்படுத்தப்பட்ட கட்டுமான தொழில்நுட்பங்களை பற்றி விளக்க முடியும்

CO3: பண்டைய தமிழர்களின் மணிகள், கப்பல்கள், உலோகவியல் பகுதிகளில் பயன்படுத்தப்பட்ட தொழில்நுட்பங்களைப் பற்றி விவாதிக்க முடியும்.

CO4: பண்டைய தமிழர்களின் விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பங்களில் பயன்படுத்தப்பட்ட முறைகளை விவரிக்க முடியும்

CO5: அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறியின் வளர்ச்சியை கூற முடியும்

Text Books:

T1: Keeladi - 'Sangam City Civilization on the banks of river Vaigai" (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

T2: Dr.K.K.Pillay "Studies in the History of India with Special Reference to Tamil Nadu"

References

R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies)

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Web links and Video Lectures (e-Resources):

1. https://youtu.be/fecWlhoPPYY?feature=shared – Unit V
2. https://youtu.be/vsLuw8Q3vA?feature=shared – Unit III

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
2	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
3	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
4	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
5	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-
AVG	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

TECHNICAL COMMUNICATION -II

(Common to all branches)

Course Code	24EN201	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	3:0:0	**Credits**	3
Total Teaching Periods	45	**IAT + ESE Marks**	40+60
Teaching Department	English		

Course Objectives:

1. To facilitate students to improve vocabulary for a better communication.
2. To enable learners to understand and reproduce language.
3. To aid students to write technical reports using appropriate formats and terminologies.
4. To expose students to different sentence structures.
5. To equip learners to present ideas in a required manner.

Unit: I VOCABULARY FOR BETTER COMMUNICATION 9

Listening: Telephonic Conversation and Telephonic Etiquette **Reading:** Newspapers and Magazines-Articles **Speaking**: Conversational Practice: Speaking in a given situation-Short Presentation **Writing:** Response to complaints / Complaints Letter, Permission Letter **Grammar:** Mixed Tenses- Use of Preposition **Vocabulary:** Guessing meanings of words in different contexts.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: II FUNCTIONAL LANGUAGE ASPECTS 9

Listening: Listening – Listening to Longer Dialogues / TED Talks **Reading**: Introduction to Reading Reports - Newspaper, Technical Journal **Speaking**: Using Polite Expressions Writing: Precis Writing - Summary Writing-Internship application, Essay **Grammar**: Subject and Verb Agreement, Regular and Irregular Verbs, Degrees of Comparison **Vocabulary**: Numerical Adjectives

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: III TECHNICAL REPORT WRITING 9

Listening: Listening to Speeches– Giving Solutions to Problems **Reading:** Deductive – Inductive Reading **Speaking:** Interviewing Celebrities / Leaders / Sports persons, Introduction to Small GD **Writing:** Job Application Letter and Resume , Email Writing- Email Etiquette, letter to Editor, Essay **Grammar:** Infinitives , Gerund, If conditionals **Vocabulary:** Modal Verbs

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: IV STRUCTURAL GRAMMAR 9

Listening: Listening for Comprehension **Reading:** Intensive Reading for specific information – Reading Technical Reports **Speaking:** Presenting oral report **Writing:** Report Writing-Survey, Accident report, Recommendations **Grammar:** Reported speech, Embedded Sentences **Vocabulary:** Synonyms and Antonym, Connotative and Denotative Words.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: V **PRESENTATION SKILLS** **9**

Listening: Listening – Types **Reading:** Short Stories-Role Play **Speaking:** Paired Presentation **Writing:** Checklists**,** Data Interpretation- Picture, Chart, Graphs, Minutes of the meeting-Memos-Notices **Grammar:** Error Correction, Punctuation **Vocabulary:** Numerical Adjectives, Relative Clause **,** Conjunction

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT

RBT Level: L1, L2, L3

Total **45**

Pedagogical Methods:

Unit 1:	Speaking task
Unit 2:	Reading task
Unit 3:	Speaking task
Unit 4:	Speaking task
Unit 5:	Speaking task

Course Outcomes:

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

CO1:	Communicate using appropriate vocabulary in different situations.
CO2:	Use the acquired language skills to comprehend various types of language contents.
CO3:	Evaluate different texts and write effective technical content.
CO4:	Use appropriate sentence structures to convey thoughts in varied contexts.
CO5:	Express the concepts and ideas in a skillful manner

Text Books:

T1: Anna University English Department, "English for Engineers and Technologists", Orient Black Swan, ISBN-978-93-5442-067-2, Third Edition, 2022 –Vol-II.

T2: M.Raman & Sangeeta S., "Technical Communication" Third Edition, Oxford University Press, 2015

T3: Anne Burns and Christine ChuenMeng Goh, "Teaching Speaking: A Holistic Approach", Cambridge University Press 2012; ISBN-110701123X, 9781107011236; Length, 301 pages. 2012

References

R1: Addison Wesley Longman, "Technical English", Pearson, ISBN:978-1292042862, 8th Edition 2013.

R2: Dale Carnegie, "The Art of Public Speaking", Prabhat Prakashan Pvt. Ltd.; ISBN-978-8184302615, First Edition 31st December 2020

R3: Jack C. Richards & Theodore S. Rodgers, " Approaches and Methods in Language Teaching", Second Edition, Cambridge University Press, ISBN: 978-1107675964, 2017.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=Y4TbGPhQ7Ik&list=PLp02GGDX5DIoMkblgrYhq91rF7_JZsf4- - Unit I & Unit II
2. https://www.youtube.com/watch?v=nyXeDFq8&list=PLAyDjaXmCbog1yZWhMx0OdsUya_6YTfTG – Unit IV

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	-	1	3	-	2	1	1	1
2	-	-	-	-	-	-	-	-	1	3	-	2	1	1	1
3	-	-	-	-	-	-	-	-	1	3	-	2	1	1	1
4	-	-	-	-	-	-	-	-	1	3	-	3	1	1	1
5	-	-	-	-	-	-	-	-	1	3	-	3	1	1	1
AVG	-	-	-	-	-	-	-	-	1	3	-	2.4	1	1	1

‘1’ – Low , ‘2’ – Medium , ‘3’- High, ‘-‘ – No correlations

TRANSFORMS AND NUMERICAL METHODS

(Common to - CSE, IT, AIDS, CSBS, AIML, CYB, EEE, CIVIL, MECH)

Course Code	24MA201	**Course Type**	Theory
Teaching Periods/Week (L: T:P)	3:1:0	**Credits**	4
Total Teaching Periods	60	**IAT + ESE Marks**	40 + 60
Teaching Department	Mathematics		

Course Objectives:

1. To introduce the concepts of Laplace transforms and inverse Laplace transforms.
2. To familiarize the concepts of Z-transform and its properties.
3. To illustrate the application of transforms in solving differential equations.
4. To explain Numerical methods for handling ordinary differential equations.
5. To acquaint the students with the knowledge of numerical techniques for interpolation, differentiation and integration.

Unit: I LAPLACE TRANSFORMS **12**

Laplace transforms – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions – Derivatives and integrals of transforms –Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (Statement only). Solution of linear ordinary differential equation of second order with constant coefficients and first order simultaneous equations with constant coefficients using Laplace transform

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1 **-** L3

Unit: II Z – TRANSFORMS **12**

Z-transforms – Elementary properties – Inverse Z-transforms – partial fractions method – residues method – Convolution theorem. Solution of first and second order difference equations with constant coefficients using Z-transform.

Teaching-Learning Process **Pedagogy:** Lecture, NPTEL Videos
RBT Level: L1 **-** L3

Unit: III SOLUTION OF DIFFERENTIAL EQUATIONS **12**

Higher order linear differential equations with constant coefficients - Method of variation of parameters –Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

Teaching-Learning Process **Pedagogy:** Lecture, NPTEL Videos
RBT Level: L1 **-** L3

Unit: IV SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS **12**

Solution of algebraic and transcendental equations by Newton Raphson method - Solution of linear system of equations – Gauss elimination method – Gauss Jordan method – Gauss Seidel Iterative method– Eigenvalues of a matrix by Power method.

Teaching-Learning Process **Pedagogy:** Lecture, PPT
RBT Level: L1 **-** L3

Unit: V NUMERICAL DIFFERENTIATION AND INTEGRATION **12**

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

Teaching-Learning Process **Pedagogy:** Lecture, NPTEL Videos

RBT Level: L1 - L3

Total **60**

Pedagogical Methods:

Unit 1:	Apply Laplace transforms to a real-world problem
Unit 2:	Apply Z-transform in real-world problem
Unit 3:	Present a real-world problem involving differential equations with solution.
Unit 4:	Analyze the significance of eigenvalues and eigenvectors in the context of the applications
Unit 5:	Visualizing the numerical differentiation and integration problem in real time applications.

Course Outcomes:

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

CO1:	Apply Laplace transform, and inverse Laplace transform to solve linear ordinary differential equation and first order simultaneous equations with constant coefficients.
CO2:	Apply Z- transform and its properties to solve difference equations.
CO3:	Solve a variety of differential equation.
CO4:	Compute the solutions to algebraic, transcendental equations and systems of linear equations using numerical techniques.
CO5:	Apply numerical method techniques to differentiate and integrate a given function.

Text Books:

T1: Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2015. ISBN: 9789385509183

T2: Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015. ISBN: 9788174091956

T3: Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2016. ISBN: 9789382332300

References

R1: Jain R.K. & Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, NewDelhi, 4th Edition, 2007.ISBN : 9788173198059.

R2: Erwin.K, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016. ISBN: 9788126567880

R3: Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012. ISBN: 9781259064917

R4: Mathews. J. H. "Numerical Methods for Mathematics, Science & Engineering", 2nd Edition, Prentice Hall,1992. ISBN: 9780136249904

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/111/106/111106139/ - Unit I
2. https://archive.nptel.ac.in/courses/111/106/111106111/ - Unit II
3. https://archive.nptel.ac.in/courses/111/106/111106100/ - Unit III
4. https://archive.nptel.ac.in/courses/111/107/111107105/ - Unit IV & Unit V
5. http://acl.digimat.in/nptel/courses/video/111107105/L01.html - Unit V

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	-	-	-	-	-	-	-	-	1	2	1	-
2	3	2	1	-	-	-	-	-	-	-	-	1	2	1	-
3	3	2	1	-	-	-	-	-	-	-	-	1	2	1	-
4	3	2	1	-	-	-	-	-	--	-	-	1	2	1	-
5	3	2	1	-	-	-	-	-	-	-	-	1	2	1	-
AVG	3	2	1	-	-	-	-	-	-	-	-	1	2	1	-

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

ENGINEERING PHYSICS
(Common to all branches)

Course Code	24PY111	**Course Type**	Integrated
Teaching Periods/Week (L: T:P)	3:0:2	**Credits**	4
Total Teaching Periods	75	**IAT + ESE Marks**	50+50
Teaching Department	Physics		

Course Objectives:

1. To impart knowledge on physical properties of materials and inculcate interest in students in observing facts experimentally.
2. To teach various types of oscillations.
3. To teach the acoustic properties and its applications.
4. To equip the students with understanding the importance of thermal physics and its applications
5. To impart the basics of optics, lasers, and their applications.
6. To introduce the importance and applications of quantum mechanics.

Unit: I MECHANICS OF MATERIALS 9

Rigid Body - Centre of mass - Rotational Energy - Moment of inertia (M.I) - Moment of Inertia for uniform objects with various geometrical shapes. Elasticity - Hooke's law - Poisson's ratio - stress-strain diagram for ductile and brittle materials - uses- Bending of beams - Cantilever - supported beams - uniform and non-uniform bending - Young's modulus determination - I shaped girders -Twisting couple

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: II OSCILLATIONS AND ACOUSTICS 9

Simple harmonic motion – Torsional pendulum – Damped oscillations – Shock Absorber – Forced oscillations and Resonance – Applications of resonance.- Waves and Energy Transport – Sound waves – Intensity level – Standing Waves – Doppler effect and its applications – reverberation – Sabine's Reverberation formula- Speed of blood flow. Ultrasound – applications – Echolocation and Medical Imaging.

Teaching-Learning Process **Pedagogy:** Lecture Method, NPTEL
RBT Level: L1, L2, L3

Unit: III THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints – bimetallic strips – thermal conduction, convection and radiation – heat conductions in solids – 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.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: IV OPTICS AND LASERS **9**

Interference – Thin film interference – Air wedge – Applications – Interferometers – Michelson Interferometer – Polarization – polarizers – Laser – characteristics – Spontaneous and Stimulated emission- population- inversion – Metastable states – optical feedback – Nd-YAG laser, CO2 laser, Semiconductor laser – Industrial and medical applications – Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic
communication – Fiber sensors – Fiber lasers.

Teaching-Learning Process **Pedagogy:** Lecture Method, NPTEL
RBT Level: L1, L2, L3

Unit: V QUANTUM PHYSICS **9**

Black body radiation (Qualitative) – Planck's hypothesis – Einstein's theory of Radiation – Matter waves – de Broglie hypothesis – Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Physical significance of wave function – Normalization – Particle in an infinite potential well-particle in a three-dimensional box – Degenerate energy states – Barrier penetration and quantum, tunneling – Tunneling microscope.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2

Total **45**

Pedagogical Methods:

Unit 1:	Models- Based on Moment of Inertia, cantilever and center of mass
Unit 2:	Case Studies – Based on the intensity of different animals, birds, and mammals.
Unit 3:	Chart – Based on the difference between Forbes and Lee's disc apparatus
Unit 4:	Presentation- Application of Laser and different types of Lasers
Unit 5:	Problems Assignment – problems DeBroglie, Schrodinger

PRACTICAL (Any seven experiments) **30**

1. Torsional Pendulum-Determination of rigidity modulus of wire and moment of inertia of the disc
2. Non-uniform bending -Determination of Young's modulus of the material of the beam.
3. Uniform bending–Determination of Young's modulus of the material of the beam.
4. Lee's Disc Experiment - Determination of thermal conductivity of bad conductors.
5. Laser-Determination of the wavelength of the laser using grating - Determination of the width of the groove of the compact disc using laser. - Estimation of laser parameters
6. Optical fibre -Determination of Numerical Aperture and acceptance angle
7. Simple harmonic oscillations of cantilever
8. Air wedge - Determination of thickness of a thin sheet/wire
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
10. Melde's string experiment

Equipments required

S.No	Name of the Equipment and Accessories	Required numbers for batch of 30 students
1	Torsional Pendulum Kit	5
2	Simple harmonic oscillations of cantilever	5
3	Travelling Microscope (Non-Uniform / Uniform)	5
4	He-Ne/Diode laser (red), Grating	5
5	Air Wedge Apparatus	5
6	Diode laser (green or red), fiber optic Kit	5
7	Ultrasonic interferometer apparatus with high-frequency wave generator	5
8	Lee's Disc Apparatus	2
9	Vernier Calliper, Screw Gauge	5
10	Melde's String Kit	1

Course Outcomes:

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

CO1: Explain the mechanical properties of materials like brittle and ductile.

CO2: Discuss different types of oscillation and its applications.

CO3: Summarize the acoustic properties and its applications.

CO4: Discuss the thermal properties of materials and their applications.

CO5: Summarize the principle of operation, characteristics, and application of laser and optics.

CO6: Explain the concepts of quantum physics and its applications.

Text Books:

T1: D. Halliday, R. Resnick and J. Walker, "Principles of Physics" John Wiley & Sons, 2012 ISBN 978-1-118-23072-5

T2: N. Garcia, A. Damask and S. Schwarz, "Physics for Computer Science Students", Springer Verlag, 2012. ISBN-13: 978-0-387-97656-3

References

R1: D. Kleppner and R. Kolenkow. "An Introduction to Mechanics", McGraw Hill Education, 2014. ISBN: 978-0-521-19811-0

R2: K. Thyagarajan and A. Ghatak. "Lasers: Fundamentals and Applications". Springer, 2012 ISBN: 978-1-4419-6441-0

Web links and Video Lectures (e-Resources):

1. https://youtu.be/aQf6Q8t1FQE?si=HKYtEGMgu-y7WnLB - Unit-1
2. https://youtu.be/yBC-PuCMMWw?si=lZ4sz88U33vD55To - Unit-2
3. https://youtu.be/DPK1z3QSY_8?si=J04HysWSvmQJwRFo - Unit-3
4. https://youtu.be/PK4yFaGHSFc?si=rrPgMVbD6fMPAPql - Unit-4
5. https://youtu.be/TcmGYe39XG0?si=hBMV6uBRAIa3eHE3 - Unit-5

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	2	-	-	-	-	-	-	-	1	1	1	1
2	3	2	1	2	-	-	-	-	-	-	-	1	1	1	1
3	3	2	1	2	-	-	-	-	-	-	-	1	1	1	1
4	3	2	1	2	-	-	-	-	-	-	-	1	1	1	-
5	3	2	1	2	-	-	-	-	-	-	-	1	1	1	-
6	3	1	-	-	-	-	-	-	-	-	-	1	1	1	-
AVG	3	1.83	1	2	-	-	-	-	-	-	-	1	1	1	1

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

ENGINEERING CHEMISTRY
(Common to all branches)

Course Code	24CH101	**Course Type**	Integrated
Teaching Periods/Week (L:T:P)	3:0:0	**Credits**	3
Total Teaching Periods	75	**IAT + ESE Marks**	50 + 50
Teaching Department	Chemistry		

Course Objectives:

1. To impart knowledge on treatment of water for potable and industrial purposes.
2. To introduce the basic concepts and applications of phase rule and composites.
3. To explain the applications of energy sources and storage devices.
4. To facilitate the understanding of different types of fuels, their properties and combustion characteristics.
5. To acquaint the students with the basics of nanomaterials, their properties, and applications.

Unit: I WATER TECHNOLOGY 9

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

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT & Demonstration
RBT Level: L1, L2, L3

Unit: II PHASE RULE AND COMPOSITE MATERIALS 9

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

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: III ENERGY SOURCES AND STORAGE DEVICES 9

Energy sources: Nuclear fission and nuclear fusion. Nuclear energy: Light water nuclear power plant and breeder reactor. Solar energy: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy – Geothermal energy. Storage devices: Batteries – types of batteries – primary battery (dry cell), secondary battery (lead acid battery, lithium–ion–battery), fuel cells – H2 –O2 fuel cell, microbial-fuel cell, and super capacitors. E-Vehicle

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT
RBT Level: L1, L2, L3

Unit: IV FUELS AND COMBUSTION **9**

Fuels: Introduction and Classification. Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking, octane number, cetane number; Power alcohol and biodiesel. Gaseous fuels – Natural gas, CNG and LPG.
Combustion of fuels: Introduction: Calorific value – higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis – ORSAT Method. CO2 emission and carbon footprint.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT

RBT Level: L1, L2, L3

Unit: V NANOMATERIALS **9**

Introduction–Distinction between molecules, nanomaterials, and bulk materials; Size–dependent properties of nanomaterials: optical, electrical, mechanical, and magnetic properties; Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Synthesis of nanomaterials: sol–gel, solvo thermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics, and catalysis.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT

RBT Level: L1, L2, L3

Total **45**

Pedagogical Methods:

Unit 1:	Model Making – Municipal Water treatment
Unit 2:	Poster Presentation – Composite Materials
Unit 3:	Pick one and Talk More
Unit 4:	Problems – Theoretical Calculation of Calorific Value
Unit 5:	Seminar on Applications of Nanomaterials

PRACTICAL (Any seven experiments) **30**

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Determination of strength of given hydrochloric acid using pH meter.
8. Determination of strength of acids in a mixture of acids using conductivity meter.
9. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
10. Estimation of iron content of the given solution using potentiometer.

Equipment required

S.No	Description of Equipment	Required Numbers for Batch of 30 students
1	pH Meter	15
2	Conductivity Meter	15
3	Potentiometer	15
4	Electronic balance (Four Digit)	1
5	Hot Plate with Magnetic Stirrer	1
6	Hot Air Oven	1
7	Muffle Furnace	1
8	Burette, Pipette, Conical Flask & Other glassware.	30

Course Outcomes:

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

CO1: Summarize the water quality parameters and explain various methods to produce soft water for industrial and potable use.
CO2: Apply the knowledge of phase rule and composites for material selection requirements.
CO3: Discuss various energy resources, storage devices and their uses in household and industrial applications.
CO4: Differentiate various types of fuels based on their state, characteristics and calorific value for Engineering processes and applications.
CO5: Differentiate the nano and bulk materials, their synthesis and its applications in various fields.

Text Books:

T1: P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.ISBN 9789383186773.
T2: Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008. ISBN 9780070669321.
T3: S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018. ISBN 9788121903592.
T4: S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT. LTD, New Delhi, 2013.ISBN 9788126543342.

References

R1: B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018. ISBN 9783642280290.
R2: O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017. ISBN 9789352605774.
R3: Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014. ISBN 9789381714522.
R4: Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019. ISBN 9781108724449.
R5: O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013. ISBN 9781461442615.
R6: Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015. ISBN 9788131526699.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=ugDRuS8dtY4 – Unit 1
2. https://www.youtube.com/watch?v=SaJ749CkypA – Unit 3
3. https://www.youtube.com/watch?v=YSRs3PuYT_k – Unit 5

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	-	-	2	-	2	2	-	-	-	-	2	-	-	1
2	3	1	-	-	-	1	2	-	-	-	-	1	-	-	1
3	3	2	-	1	-	-	1	-	-	-	-	-	-	-	1
4	3	1	-	-	-	2	2	-	-	-	-	-	-	-	1
5	3	1	-	-	-	2	2	-	-	-	-	1	-	-	1
AVG	3	1.2	-	1.5	-	1.8	1.8	-	-	-	-	1.4	-	-	1

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

PYTHON PROGRAMMING

(Common to CSE, IT, CSBS, AIDS, AIML, CSCS, CE, EEE, ECE, MECH, VLSI and ACT)

Course Code	24CS211	**Course Type**	Integrated
Teaching Periods/Week (L: T:P)	2:0:4	**Credits**	4
Total Teaching Periods	90	**IAT + ESE Marks**	50 + 50
Teaching Department	Computer Science and Engineering		

Course Objectives: To equip students with the knowledge in

1. Fundamentals of algorithmic problem solving.
2. Python conditionals and loops to solve problems
3. String manipulation, control flow, and functions in Python.
4. Python data structures, including lists, tuples, and dictionaries, for complex data representation.
5. Various file operations using Python.

Unit: I COMPUTATIONAL THINKING AND PROBLEM SOLVING 6

Fundamentals of Computing– Identification of Computational Problems Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flowchart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion)

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3,L4

Unit: II DATATYPES, EXPRESSIONS, STATEMENTS 6

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string and list; variables, expressions, statements, tuple assignment, precedence of operators, comments

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3, L4

Unit: III CONTROL FLOW, FUNCTIONS, STRINGS 6

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 array

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3, L4

Unit: IV LISTS, TUPLES, DICTIONARIES 6

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

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3,L4

Unit: V FILES, MODULES and PACKAGES **6**

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Multithreading, Thread Life Cycle, Creating Thread - Python Libraries – NumPy and Pandas

Teaching-Learning Process **Pedagogy:** Chalk and Talk, PPT
RBT Level: L1, L2, L3,L4

Total **30**

Pedagogical Methods:

Unit 1:	Developing Pseudocodes and flowcharts for real life activities such as railway ticket booking, admission process to undergraduate course, academic schedules during a semester etc.
Unit 2:	Developing algorithms for basic mathematical expressions using arithmetic operations: Swapping two numbers, circulate the values of n variables, distance between two points.
Unit 3:	Implementation of a simple calculator
Unit 4:	Implementing python program using lists, tuples, sets for the following scenario: Student Examination Report
Unit 5:	Developing modules using Python to handle files and apply various operations on files like word count, copy file etc.

Practical Exercises: **60**

1. Implement simple python programs using interactive and script mode.
2. Develop python programs using id() , type() and range() functions.
3. Implement various control statements in python.
4. Develop python programs to perform various string operations like concatenation, slicing, and indexing.
5. Demonstrate string functions using python.
6. Develop python programs to perform operations on a list
7. Develop programs to work with Tuples
8. Create programs to solve problems using various data structures in python.
9. Implement python programs using modules and packages.
10. Case study: Data science with Numpy, Pandas

System requirement

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17” or higher TFT Monitor, Keyboard and mouse	30
2.	Windows 8 or higher operating system / Linux Ubuntu 20 or higher	30
3.	Python 3.10 or later, Anaconda Distribution	30

Course Outcomes:

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

CO1: Analyze problems and devise algorithmic solutions using pseudocode and flowcharts
CO2: Implement Python conditionals effectively to control program flow.
CO3: Design and implement reusable functions to modularize code and improve maintainability
CO4: Employ lists, tuples, and dictionaries to store and manipulate data effectively.
CO5: Apply Python's file handling techniques to interact with files.

Text Books:

T1: Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
T2: Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017

References

R1: Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021
R2: Eric Matthes, "Python Crash Course, A Hands on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019
R3: G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021

Web links and Video Lectures (e-Resources):

1. https://www.python.org/ - Unit 3, 4 & 5
2. www.mhhe.com/kamthane/python - Unit 2 , 3 & 4
3. https://www.edx.org/course/introduction-to-python-fundamentals-1 - All Units
4. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview - All units

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	2	-	-	-	-	-	-	3	2	2	1
2	3	2	2	2	2	-	-	-	-	-	-	3	2	2	1
3	3	2	2	2	2	-	-	-	-	-	-	3	2	2	1
4	3	2	2	2	2	-	-	-	-	-	-	3	2	2	1
5	3	2	2	2	2	-	-	-	-	-	-	3	2	2	1
AVG	3	2	2	2	2	-	-	-	-	-	-	3	2	2	1

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

ENGINEERING VISUALIZATION

(Common to all branches)

Course Code	24GE121	**Course Type**	Integrated
Teaching Periods/Week (L:T:P)	1:0:4	**Credits**	3
Total Teaching Periods	75	**IAT + ESE Marks**	60 + 40
Teaching Department	Mechanical Engineering		

Course Objectives: To Equip the students with the knowledge in

1. BIS conventions and specifications for engineering drawing and constructing the conic curves, involutes, and cycloids
2. Projections of lines and planes.
3. Orthographic projection of solids and sections of solids.
4. Projection of sectioned solids and Development of surfaces
5. Isometric projections of simple solids.

Unit: I PLANE CURVES 3+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of Ellipse, Parabola & Hyperbola using eccentricity method – Construction of Cycloid – Construction of Involutes of circle, Square and polygons – Tangent and Normal to the above curves.

Practical component: AutoCAD – Solid modeling tool - Basics.

Teaching-Learning Process **Pedagogy:** Lecture, PPT, NPTEL
RBT Level: L1-L4

Unit: II PROJECTION OF POINTS, LINES AND PLANE SURFACE 3+12

Orthographic projection - First angle projection –Principal planes - Projection of points – Projection of Lines (Only First angle projection) inclined to both principal planes – Determination of true length and true inclinations by rotating line method – Projection of planes (Circle and polygons) inclined both principal planes by rotating object method.

Practical component: AutoCAD – Lines and Plane.

Teaching-Learning Process **Pedagogy:** Lecture, PPT, NPTEL
RBT Level: L1-L4

Unit: III PROJECTION OF SOLIDS 3+12

Projection of simple solids like prisms, pyramids, cones and cylinders, and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

Practical component: AutoCAD – Projection of simple solids

Teaching-Learning Process **Pedagogy:** Lecture, PPT, NPTEL
RBT Level: L1-L4

Unit: IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 3+12

Sectioning of solids in the simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – Obtaining the true shape of the section. Development of the lateral surfaces of simple sectioned solids – Prisms, Pyramid, Cylinder, and Cone.

Practical component: AutoCAD – Section of simple solids and surfaces

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT, NPTEL
RBT Level: L1, L2, L3, L4

Unit: V **ISOMETRIC PROJECTIONS** **3+12**

Principles of isometric projection – isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones – combination of two solid objects in simple vertical positions.

Practical component: AutoCAD – Isometric projections of simple solids and truncated solids

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT, NPTEL

RBT Level: L1,L2,L3,L4

Total **75**

System requirement

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	INTEL-based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse	30
2.	Windows 8 or higher operating system	30
3.	Auto-CAD	30

Course Outcomes:

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

CO1: Use BIS conventions and specifications for engineering drawing and constructing the conic curves, involutes, and cycloid

CO2: Solve practical problems involving the projection of lines and Planes.

CO3: Sketch the orthographic projection of simple solids.

CO4: Draw the Sectional view of solids and development of simple surfaces.

CO5: Sketch the isometric projections of simple solids.

Text Books:

T1: Gopalakrishna K. R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27thEdition, 2017. ISBN – 9788184245686

T2: Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019. ISBN - 978-9380358963

References

R1: Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019. ISBN - 978-1259062889

R2: Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015. ISBN - 9780199455397

R3: Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 15th Edition, 2018.ISBN - 9788122430422

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/112103019 - Unit 1
2. https://www.youtube.com/watch?v=72EGcYdx7sA&t=16s - Unit 2
3. https://www.youtube.com/watch?v=8w--gcrCsuY – Unit 3
4. https://www.youtube.com/watch?v=yKYivtPembM – Unit 4
5. https://www.youtube.com/watch?v=qhOffFTIsV0 – Unit 5

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	2	2	-	-	-	-	1	-	2	2	1	-
2	3	2	1	2	2	-	-	-	-	1	-	2	2	1	-
3	3	2	1	2	2	-	-	-	-	1	-	2	2	1	-
4	3	2	3	2	2	-	-	-	-	1	-	2	2	1	-
5	3	2	1	2	2	-	-	-	-	1	-	2	2	1	-
AVG	3	2	1.4	2	2	-	-	-	-	1	-	2	2	1	-
'1' – Low , '2' – Medium , '3'- High, '-' – No correlations															

ENGLISH FOR PROFESSIONAL COMPETENCE

(Common to all branches)

Course Code	24EN221	**Course Type**	Practical
Teaching Periods/Week (L: T:P)	0:0:2	**Credits**	1
Total Teaching Periods	30	**IAT + ESE Marks**	60 + 40
Teaching Department	English		

Course Objectives:

1. To enhance employability and career skills.
2. To develop confidence and provide adequate soft skills required for work place.
3. To inculcate professional and corporate skills to compete with workplace challenges.

Unit: I RECEPTIVE SKILLS **6**

Listening – Comprehensive Listening – Watching the news – Listening to a peer giving presentation – Critical Listening – Watching a televised debate – Reading – Extensive Reading – One- act Plays – Intensive Reading – Articles, Blog posts on topics like science and technology, arts, etc.

Teaching-Learning Process **Pedagogy:** PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: II PRODUCTIVE SKILLS **6**

Speaking – Demonstrative Speaking – Process description through visual aids – Persuasive Speaking – Writing – Descriptive Writing - Subjective Writing – Autobiography, Opinion Essay – Describing a Product or Mechanisms and interpretations.

Teaching-Learning Process **Pedagogy:** PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: III ENGLISH FOR COMPETITIVE EXAMS **6**

Verbal aptitude- Close test- Error correction- Homonyms and homophones- Spelling British and American words-word order.

Teaching-Learning Process **Pedagogy:** PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: IV CORPORATE SKILLS **6**

Critical Thinking and Problem Solving – Brainstorming, Q & A Discussion – Team work and Collaboration – Activities like Office Debates, Group discussion – Professionalism and Strong Work Ethics –Soft Skills, Teamwork, Adaptability, Empathy and Growth Mind set.

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT, YouTube videos

RBT Level: L1, L2, L3

Unit: V PROJECT WORK **6**

Project Writing- Methodology- Bibliography- Reference- Presentation Techniques- Mini Project

Teaching-Learning Process **Pedagogy:** Lecture Method, PPT, YouTube videos

RBT Level: L1, L2, L3

Total **30**

System requirement

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse	30
2.	Windows 8 or higher operating system	30
3.	Hot Potatoes / Globarina	30

Course Outcomes:

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

CO1: Interpret and respond appropriately in listening and reading contexts.

CO2: Express proficiently in spoken and written communication.

CO3: Apply acquired language skills in professional and corporate discussions.

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	-	2	3	-	2	1	1	1
2	-	-	-	-	-	-	-	-	2	3	-	3	1	1	1
3	-	-	-	-	-	-	-	-	2	3	-	2	1	1	1
AVG	-	-	-	-	-	-	-	-	2	3	-	2.4	1	1	1
"1" – Low, "2 " – Medium, "3" - High, "-" – No correlation															

ENGINEERING MATHEMATICS LABORATORY
(Common to CSE, IT, AIDS, CSBS, CYS, AIML, EEE, MECH, CIVIL)

Course Code:	24MA221	**Course Type:**	Practical
Teaching Periods/Week (L:T:P):	0:0:2	**Credits:**	1
Total Teaching Periods:	30	**IAT + ESE Marks:**	60 + 40
Teaching Department:	Mathematics		

Course Objectives:

1. To demonstrate basic and advanced matrix operations using Sci Lab.
2. To demonstrate basic and advanced differentiation and integration techniques using Sci Lab.
3. To demonstrate transforms and to solve ordinary differential equations using various numerical methods in Sci Lab.

PRACTICAL **30**

1. Introduction to SCI LAB through matrices and general syntax.
2. Finding the Eigenvalues and Eigenvectors.
3. Plotting the graph of a quadratic form.
4. Evaluating area using double integral.
5. Evaluating Volume using Triple Integral
6. Evaluating gradient, directional derivative, divergent and curl
7. Finding the Laplace transform and its inverse of a given function.
8. Expand F(s) into linear fraction by partial fraction method by using Laplace Transform
9. Expand F(s) into linear fraction by partial fraction method by using Z-Transform
10. Finding the convolution between two functions using Laplace transform and Z-transform
11. Finding the real roots of algebraic and transcendental equations using Newton Raphson method.
12. Finding the largest Eigenvalue by power method.
13. Solving system of linear equations using Gauss Seidel Method.
14. Finding approximately the missing value using Lagrange interpolation.
15. Evaluating line integrals by trapezoidal rule and Simpson's rule.

System requirement

Sl. No.	Description of Equipment	Required numbers for batch of 30 students
1.	INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse	30
2.	Windows 8 or higher operating system / Linux Ubuntu 20 or higher	30
3.	Scilab 6.0 or later	30

Course Outcomes:

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

CO1: Solve complex problems involving matrices using Sci lab.
CO2: Utilize Sci lab to solve integration and differentiation problems.
CO3: Apply Sci lab to calculate transforms and verify the solutions of ordinary differential equations in numerical methods.

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	2	2	-	-	-	-	-	-	-	2	1	1
2	3	2	1	2	2	-	-	-	-	-	-	-	2	1	1
3	3	2	1	2	2	-	-	-	-	-	-	-	2	1	1
AVG	3	2	1	2	2	-	-	-	-	-	-	-	2	1	1
1 – 'Low', 2 – 'Medium', 3- 'High', '-' – No correlation															