MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

An Autonomous Institution

Department of Civil Engineering

Curriculum and Syllabus
(I - IV 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 – CIVIL ENGINEERING

I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: **Technical Proficiency and Innovation**
Graduates will possess strong technical knowledge and skills in **Civil 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 **Civil Engineering** domain by using innovation, technical knowledge acquired, modern equipment and software tools.

PSO2: Adapt and excel in **Civil 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 Civil 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	24PY111	Engineering Physics	3	0	2	4	5	BSC
5	24CH111	Engineering Chemistry	3	0	2	4	5	BSC
6	24CS112	Computational Thinking	1	0	2	2	3	ESC
7	24GE121	Engineering Visualization	1	0	4	3	5	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	24GE122	Product Tinkering Laboratory	0	0	2	1	2	ESC
			15	**1**	**16**	**24**	**32**	

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	24PY201	Physics for Civil Engineering	3	0	0	3	3	BSC
5	24ME202	Engineering Mechanics	3	0	0	3	3	ESC
6	24CS211	Python Programming	2	0	4	4	6	ESC
7	24EE211	Basic Electrical and Electronics Engineering	3	0	2	4	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
10	24GE124	Electrical and Electronics Workshop Practice	0	0	2	1	2	ESC
			18	**1**	**12**	**25**	**31**	
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							

SEMESTER III								
S.No	**Subject Code**	**Subject**	**L**	**T**	**P**	**Contact Periods**	**Credits**	**Category**
1	24CE301	Construction Materials and Technology	3	0	0	3	3	PCC
2	24CE302	Fluid Mechanics	2	1	0	3	3	PCC
3	24MA311	Fourier Analysis and Partial Differential equations	2	1	2	5	4	ESC
4	24ME312	Strength of Materials	2	1	2	5	4	PCC
5	24CE311	Surveying	2	1	2	5	4	PCC
6	24ES321	Innovation and Design Thinking	1	0	2	3	2	ESC
7	24GE311	Universal Human Values and Ethics	1	0	2	3	2	HSMC
8	24CE321	Computer Aided Drawing Laboratory (Auto CAD)	0	0	4	4	2	PCC
9		Language Elective - I	0	0	2	2	0	MC
10	24MC321	NSS / NSO / YRC - Level II	0	0	2	2	0	MC
11	24CE321	Industry Oriented Course / Summer Internship - I / Survey camp	0	0	0	0	0	PCC
Total						**35**	**24**	

Language Elective (Non-Credit Mandatory Course): Student can select any one and submit the certificate

1. Advanced English Communication-Level I and Level II–Certified by Cambridge University Press & Assessment
2. Hindi - Level I (Parichaya) and Level II (Prathmic) Certified by Dakshina Bharat Hindi Prachar Shaba
3. Japanese – Level N5 and N4 Certified by JLPT / NPTEL / SWAYAM
4. German – Level A1 and A2 Certified by Goethe / NPTEL / SWAYAM
5. French - Level A1 and A2 Certified by Goethe / NPTEL / SWAYAM

SEMESTER IV								
S.No	**Subject Code**	**Subject**	**L**	**T**	**P**	**Contact Periods**	**Credits**	**Category**
1	24CE401	Applied Strength of Materials	2	1	0	3	3	PCC
2	24MA413	Statistics, Probability and Linear Algebra	2	1	2	5	4	BSC
3	24CH416	Environmental Studies and Sustainable Development	2	0	2	4	3	ESC
4	24CE413	Applied Hydraulic Engineering	2	1	2	5	4	PCC
5	24CE411	Concrete Technology	2	0	2	4	3	PCC
6	24CE412	Soil Mechanics	2	1	2	5	4	PCC
7	24PC411	Idea to product	1	0	2	3	2	PCC
8	24CE421	Building Drawing and Detailing Lab	0	0	2	2	1	PCC
9		Language Elective - Level I*	0	0	2	2	0	MC
10		Audit Course - II	0	0	2	2	0	MC
Total						**35**	**24**	

Audit Course-II (Non-Credit Mandatory Course): Student can select any one of the following and Complete the same to get the degree certificate

1. Disaster Management
2. Industrial Safety
3. Gender Sensitisation

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

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

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

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 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															

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

PHYSICS FOR CIVIL ENGINEERING

Course Code	24PY201	**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	Physics		

Course Objectives:

1. To teach about the heat transfer through different materials, the thermal performance of buildings and various thermal applications
2. To familiarize the principles of building ventilation and air conditioning to the students.
3. To introduce the concepts of sound insulation and lighting designs to the learners.
4. To equip students with knowledge of processing and applications of new engineering materials.
5. To create awareness on natural disasters and safety measures to the learners.

Unit: I THERMAL APPLICATIONS 9

Principles of heat transfer, steady state of heat flow, conduction through compound media-series and parallel-conductivity of rubber tube and powder materials - heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings, thermal measurements, thermal comfort, indices of thermal comfort, climate and design of solar radiation, shading devices - central heating.

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

RBT Level: L1, L2, L3

Unit: II VENTILATION AND AIRCONDITIONING 9

Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems -water piping - cooling load - Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems.

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

RBT Level: L1, L2, L3

Unit: III ACOUSTICS AND LIGHTING DESIGNS 9

Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multistoried buildings. Visual field glare, color - day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

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

RBT Level: L1, L2, L3

Unit: IV NEW ENGINEERING MATERIALS **9**

Composites - Definition and Classification - Fiber reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline - Non-Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing – Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibers -ferroelectric and ferromagnetic ceramics - High Aluminum ceramics

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

RBT Level: L1, L2, L3

Unit: V NATURAL DISASTERS **9**

Seismology and Seismic waves - Earth quake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

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

RBT Level: L1, L2, L3

Total **45**

Pedagogical Methods:

Unit 1:	Chart-Based thermal comfort.
Unit 2:	Case Study- Air conditioning systems for different types of buildings.
Unit 3:	Model-Sound insulation and its measurements.
Unit 4:	Presentation-Metallic glasses.
Unit 5:	Case Study-Based on current natural disasters in India

Course Outcomes:

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

CO1:	Discuss about heat transfer through different materials, thermal performance of building and thermal applications
CO2:	Explain the different types of ventilation and air conditioning of buildings
CO3:	Discuss the concepts of sound absorption, noise insulation and lighting designs
CO4:	Summarize the processing, properties and applications of composites, metallic glasses, shape memory alloys and ceramics
CO5:	Discuss the various types of natural disasters such as earthquake, cyclone, fire and their safety measures.

Text Books:

T1: D.S.Mathur. “Elements of Properties of Matter”, S Chand & Company, 2010. ISBN 978-8121908153

T2: Hugo Hens, “Building Physics: Heat, Air and Moisture”, Wiley, 2017. ISBN:978-3-433-03199-5

References

R1: W.R.Stevens. "Building Physics: Lighting", Pergamon Press, 2013. ISBN: 978-1-483-14832-8

R2: Hugo Hens, "Applied Building Physics", Wiley, 2016. ISBN:978-3-433-03147-6

R3: K.G.Budinski and M.K.Budinski. "Engineering Materials: Properties and Selection", Pearson Education, 2016. ISBN: 978-0-137-12842-6

R4: Peter A. Claisse, "Civil Engineering Materials", Elsevier, 2016. ISBN: 978-0-128-02751-6

R5: Patrick L. Abbott, "Natural Disasters", McGraw-Hill, 2017. ISBN: 978-0-078-02298-2

Web links and Video Lectures (e-Resources):

1. https://youtu.be/YR_uUar-z2w?si=qJlMxIG-9rcp6ywP - Unit-1
2. https://youtu.be/FEWF9N1LE6g?si=fNbL8FJLrInS8C8f - Unit-2
3. https://youtu.be/ob-9i3obgjc?si=dyUrdGi5mJl-A9yv - Unit-3
4. https://youtu.be/szkERUMtVIw?si=uSQscG2cjX8oBWv_ - Unit-4
5. https://youtu.be/NnmsHMf81BA?si=A2RqL3k0i1LtiBYV - Unit-5

CO-PO & PSO Mapping:

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

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

ENGINEERING MECHANICS

(Common to Civil and Mechanical)

Course Code	24ME202	**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	Mechanical Engineering		

Course Objectives: To Equip the students with the knowledge in

1. Scalar and vector analytical techniques for analyzing forces in statically determinate structures.
2. Equilibrium of rigid bodies, vector methods, and free body diagram
3. Distributed forces, surface, loading on beam, and intensity
4. Principles of friction, and forces and to determine the apply the concepts of frictional forces at the contact surfaces of various engineering systems
5. Basic dynamics concepts -force, momentum, work, and energy.

Unit: I STATICS OF PARTICLES 9

Fundamental Concepts and Principles, Systems of Units, Law of Mechanics, System of forces, Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space.

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

RBT Level: L1, L2, L3

Unit: II EQUILIBRIUM OF RIGID BODIES 9

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two Dimensions - Reactions at Supports and Connections.

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

RBT Level: L1, L2, L3

Unit: III PROPERTIES OF SURFACES AND SOLIDS 9

Centroids and centre of mass– Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section– Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section – Parallel axis theorem and perpendicular axis theorem –Mass moment of inertia –mass moment of inertia for thin plates

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

RBT Level: L1, L2, L3

Unit: IV FRICTION **9**

The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.

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

RBT Level: L1, L2, L3

Unit: V DYNAMICS OF PARTICLES **9**

Kinematics - Rectilinear Motion & Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion - Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force, Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact of bodies

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

RBT Level: L1,L2,L3

Total **45**

Pedagogical Methods:

Unit 1: Group Approach.

Unit 2: Tutorial problems

Unit 3: Case Study

Unit 4: Model Preparation

Unit 5: Case study

Course Outcomes:

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

CO1: Illustrate the vector and scalar representation of forces and moments to find the resultant forces

CO2: Analyze the forces of a rigid body in equilibrium by various methods.

CO3: Evaluate the distributed forces, on the surface, loading on the beam, and intensity

CO4: Determine the friction and the effects by the laws of friction.

CO5: Calculate dynamic forces exerted in rigid body

Text Books:

T1: Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2019

T2: Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 12thEdition, 2019

References

R1: Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 14th edition, Pearson, 2015

R2: Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, Cengage learning, 2008

R3: Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Ltd., 2004

R4: Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4thEdition, Pearson Education, 2006

R5: D.S. Mathur and P.S.Hemne, "Mechanics", S Chand and Company Limited, 2020

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=uqnXfWDRXLA – Unit 1
2. https://www.youtube.com/watch?v=ljDIIMvx-eg&list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1NLfs&index=6 – Unit 2
3. https://www.youtube.com/watch?v=Fg4LVBPheK4&t=129s – Unit 3
4. https://www.youtube.com/watch?v=ZwuwzE1qAi4 – Unit 3
5. https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1N Lfs&index=19 – Unit 4
6. https://www.youtube.com/watch?v=LBMHPeJNB4E&list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1N Lfs&index=22 – 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	3	-	-	-	-	-	-	-	1	2	-	3
2	3	2	1	1	-	-	-	-	-	-	-	1	2	-	3
3	3	2	1	1	-	-	-	-	-	-	-	1	2	-	3
4	3	2	1	1	-	-	-	-	-	-	-	1	2	-	3
5	3	2	1	1	-	-	-	-	-	-	-	1	2	-	3
AVG	3	2	1	1.4	-	-	-	-	-	-	-	1	2	-	3

'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

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to Mechanical and Civil Engineering)

Course Code:	24EE211	**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 Electrical circuits
2. To educate in basics of Transformer
3. To impart fundamental knowledge of three phase circuits
4. To introduce semiconductor devices and its characteristics
5. To introduce the working principle of sensors
6. To introduce the working of Biomedical Instruments

UNIT I ELECTRICAL FUNDAMENTALS **9**

Types of network elements – Ohm's Law – Kirchhoff's Laws – Star and Delta transformations-- Simple RL, RC, RLC series and parallel circuits -- Numerical Problems (Qualitative)

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

UNIT II TRANSFORMER AND 3 PHASE CIRCUITS **9**

Transformers: Basic Principle - Ideal Transformer -- EMF Equation –Losses and Efficiency – All day Efficiency - Applications – Advantages-3 phase circuits: Introduction – Line Current and Voltage – Phase Voltage and Current – Measurement of Power in balanced and unbalanced Loads – Measurement of power using two-watt meter method

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

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
RBT Level: L1, L2, L3

UNIT IV SENSORS AND TRANSDUCERS **9**

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
RBT Level: L1, L2, L3

Total **45**

Pedagogical Methods:

Unit 1: Problems in Kirchhoff's Law Unit 2: Problems on Transformer efficiency Unit 3: Electronics in mechanical or civil Unit 4: Review on Electronics sensors Unit 5: Review on ways of interpreting ECG

Practical Exercises: **30**

1. Verification Kirchhoff's Law.
2. Study of RL, RC and RLC circuits.
3. Characteristics of PN junction Diode and Zener Diode
4. Measurement of Power by two wattmeter method.
5. Load test on single phase transformer
6. Measurements of Pressure, Displacement, Temperature and Flow.
7. Measurements of Liquid level, Humidity, Acceleration.
8. Study of biomedical instruments.
9. Study of components and Equipment
10. Energy Audit

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	Transformer 3KVA 230 / 110 V	2 nos.
10	Resistive load	2 nos.
11	Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box	6 nos. each
12	Circuit Connection Boards	10 nos.
13	Pressure, Displacement, Temperature and Flow measurement kit	2 nos. each
14	Liquid level, Humidity, Acceleration measurement kit	2 nos. each
15	Necessary quantities of PN Junction diode, Zener diode and BJT	Adequate quantity
16	Necessary Quantities of connecting wires, Resistors, Inductors, Capacitors of various capacities.	Adequate quantity
17	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 transformer

CO3: Discuss the method of measurement of three phase power.

CO4: Describe the working and characteristics of semiconductor devices

CO5: Discuss the working principle of various sensors and transducers

CO6: Summarize 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", Second Edition, Pearson Education, 2020

T3:A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, 2020

References

R1: Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019

R2: Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2015

R3: H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

R4: Thomas. G. Bekwith and Lewis Buck.N, Mechanical Measurements, Oxford and IBH publishing Co. Pvt. Ltd.,

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/108/102/108102185/ - Unit 1
2. https://archive.nptel.ac.in/courses/108/105/108105155/ - Unit 2
3. https://archive.nptel.ac.in/courses/108/105/108105188/ - Unit 3
4. https://archive.nptel.ac.in/courses/108/105/108105053/ - Unit 3
5. https://archive.nptel.ac.in/courses/108/105/108105153/ - Unit 4
6. 6.https://www.youtube.com/watch?v=iK6q4nnmtA&list=PLVsrfTSlZ_42OoOyhzWoDgZrL9iineZx_Q&index=1 – Unit 5
7. 7.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

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															

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

CONSTRUCTION MATERIALS AND TECHNOLOGY

Course Code	24CE301	Course Type		THEORY	
Course Offered to	CIVIL				
Total Teaching Periods	45	L:T:P	3:0:0	Credits	3
Handled by	CIVIL	Assessment Methods		IAT	ESE
				40 Marks	60 Marks

Prerequisite : Basic knowledge of construction activities, engineering materials, and fundamental concepts of civil engineering

Course Objectives: To provide knowledge of

1. Different types of building stones and bricks, their classification, manufacturing process, properties, and testing methods used in construction.
2. Lime, cement, aggregates, and mortar including their ingredients, manufacturing process, properties, and quality tests.
3. Concrete technology including ingredients, batching, mixing, transporting, placing, compaction, curing, and ready-mix concrete..
4. Timber and other construction materials such as plywood, veneer, steel, aluminium, paints, varnishes, distempers, and bitumen used in building construction..
5. The basic concepts of construction planning including work breakdown structure, precedence relationships, CPM, and PERT network analysis.

Unit: I STONES AND BRICKS **9**

Stone as building material – Selection criteria – Tests on stones – Bricks Classification– Manufacturing of Clay Bricks – Tests on Bricks – Compressive Strength – Water absorption – Efflorescence – Bricks for special application

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L3

Unit: II **LIME–CEMENT–AGGREGATES–MORTAR** **9**

Lime – Preparation of lime mortar – Cement – Ingredients – Manufacturing Process – Types and Grades – Properties of cement and Cement Mortar – Hydration – Compressive strength – Fineness – Soundness and consistency – Setting time – Fine aggregates – Properties – Coarse aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation index – Abrasion resistance – Grading.

Teaching-Learning Process Pedagogy: BB & PPT

RBT Level: L1- L3

Unit: III CONCRETE **9**

Concrete – Ingredients– Manufacturing Process – Batching Plants – Mixing – Transporting – Placing – Compaction of concrete – Curing and Finishing – Ready Mix concrete – Mix Specifications.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L3

Unit: IV TIMBER AND OTHER MATERIALS **9**

Timber— Market forms — Industrial timber– Plywood — Veneer — Thermocol — Panels of laminates — Steel — Aluminium and Other Metallic Materials — Composition — Aluminium composite panel — Market forms — Mechanical treatment — Paints — Varnishes — Distempers — Bitumen.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L3

Unit: V CONSTRUCTION PLANNING **9**

Introduction to construction planning – Work breakdown structure – Precedence relationships among activities – Introduction to networks- Critical Path method and PERT network analysis.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L3

Total **45**

Suggested Activities:

Material identification, process explanation through PPT, case study discussion, visual comparison of construction materials, and basic CPM/PERT problem-solving.

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Explain the properties, classification, and testing of stones and bricks.

CO2: Describe the manufacturing process, properties, and testing of lime, cement, aggregates, and mortar.

CO3: Explain the production, handling, and specifications of concrete and ready-mix concrete.

CO4: Identify timber, metallic materials, finishing materials, and their applications in construction.

CO5: Understand basic concepts of construction planning, WBS, CPM, and PERT networks.

Text Books:

T1: Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015.
T2: Rajput. R.K., "Engineering Materials", S. Chand and Company Ltd., 2008.
T3: Gambhir.M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education,2004.
T4: Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2008.

References

R1: Jagadish.K.S, "Alternative Building Materials Technology", New Age International,2007.
R2: Gambhir. M.L., & Neha Jamwal., "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
R3: IS456 – 2000: Indian Standard specification for plain and reinforced concrete,2011
R4: IS4926 – 2003: Indian Standard specification for ready–mixed concrete, 2012
R5: Srinath L.S., Pert & CPM Principles and applications, Affiliated East West Press, 2001.

Web links and Video Lectures (e-Resources):

1. **https://nptel.ac.in/courses/105102088**
2. **https://www.youtube.com/@nptel-nociitm9240/videos**
3. **https://www.youtube.com/watch?v=4tgkRcLvQFc**
4. **https://www.youtube.com/watch?v=AkmLlnxKtyM**
5. **https://www.youtube.com/watch?v=cTykcwvECJU**

CO-PO & PSO Mapping:

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

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

FLUID MECHANICS

Course Code	24CE302	Course Type		THEORY	
Course Offered to	CIVIL				
Total Teaching Periods	45	L:T:P	2:1:0	Credits	3
Handled by	CIVIL	Assessment Methods		IAT	ESE
				40 Marks	60 Marks

Prerequisite: Basic knowledge of mathematics and physics**.**

Course Objectives: To impart the knowledge of

1. Fundamental properties of fluids and principles of fluid statics.
2. Fluid flow kinematics and dynamics, including continuity, momentum, and energy equations.
3. Dimensional analysis and model studies for fluid flow problems.
4. Viscous flow behavior in pipes, including laminar and turbulent flow characteristics and losses.
5. Boundary layer concepts and their applications in engineering problems such as drag and lift.

Unit: I FLUIDS PROPERTIES AND FLUID STATICS 10

Scope of fluid mechanics – Definitions of a fluid – Fluid properties- Methods of analysis –System and Control volume approach – Fluid statics – Manometry – Forces on plane and curved surfaces – Buoyancy and floatation – Stability of floating bodies.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1-L2

Unit: II BASIC CONCEPTS OF FLUID FLOW 10

Kinematics: Classification of flows – Streamline, streak-line and path-lines – Stream function and velocity potentials – Flow nets; Dynamics : Application of control volume to continuity, energy and momentum – Euler's equation of motion along a stream line – Bernoulli's equation – Applications to velocity and discharge measurements – Linear momentum equation – Application to Pipe bends.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: III DIMENSIONAL ANALYSIS AND MODEL STUDIES 7

Fundamental dimensions – Dimensional homogeneity – Rayleigh's method and Buckingham Pi theorem – Dimensionless parameters – Similitude and model studies – Distorted and undistorted models.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1-L2

Unit: IV INCOMPRESSIBLE VISCOUS FLOW 10

Reynolds experiment – Laminar flow in pipes and between parallel plates – Development of laminar and turbulent flows in pipes – Darcy-Weisbach equation – Moody diagram – Major and minor losses of flow in pipes –Siphon – Pipes in series and parallel –Equivalent pipes.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1-L2

Unit: V BOUNDARY LAYERS **8**

Definition of boundary layers – Laminar and turbulent boundary layers – Displacement, momentum and energy thickness – Momentum integral equation – Applications – Separation of boundary layer– Drag and Lift forces.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Total **45**

Suggested Activities : Numerical problem-solving, flow diagram visualization, laboratory demonstration videos, case-based discussion, and PPT-based concept explanation, Case study, Review of GATE questions.

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Explain fluid properties, fluid statics, pressure measurement, buoyancy, and stability of floating bodies.

CO2: Describe fluid kinematics and apply continuity, energy, and momentum equations to simple flow problems.

CO3: Apply dimensional analysis techniques and explain similitude and model studies.

CO4: Explain viscous flow behavior in pipes, losses, and pipe flow systems.

CO5: Describe boundary layer concepts, separation, and drag and lift forces.

Text Books:

T1: Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines Standard Book House New Delhi. 2015.

T2: Streeter, V.L. Wylie, E. B. and Bedford K.W, Fluid Mechanics. (9th Ed.) Tata McGraw Hill, New Delhi, 1998.

References

R1: S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2012.

R2: Pani B S, Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.

R3: Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2014.

R4: Narayana Pillai N. Principles of Fluid Mechanics and Fluid Machines, (3rd Ed.) University Press (India) Pvt. Ltd. 2009.

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/112105171
2. https://ocw.mit.edu/courses/mechanical-engineering/
3. https://www.khanacademy.org/science/physics/fluids
4. https://www.youtube.com/@LearnEngineering

CO-PO & PSO Mapping:

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

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

FOURIER ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS

Course Code	24MA311	Course Type		INTEGRATED	
Course Offered to	MECH, CIVIL & EEE				
Total Teaching Periods	75	L:T:P	2:1:2	Credits	4
Handled by	Mathematics	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite : Basic knowledge of Calculus, including differentiation and integration**.**

Course Objectives: To impart knowledge of

1. Fourier series for representing periodic functions and determining Fourier coefficients..
2. Fourier transforms and their properties for analyzing functions and solving mathematical problems.
3. First order partial differential equations and the methods used to obtain their solutions.
4. Higher order partial differential equations and techniques for solving homogeneous and non-homogeneous equations.
5. The applications of partial differential equations in solving physical problems such as wave motion and heat conduction..

Unit 1 FOURIER SERIES 9

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine and cosine series - Parseval's identity - Harmonic analysis.

PRACTICALS:

1. Find the Fourier Series co-efficient for the given function.
2. Compute the half-range sine and cosine series for the given functions
3. Evaluate the Harmonic Analysis Using Fourier Series

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

RBT Level: L1- L3

Unit 2 FOURIER TRANSFORMS 9

Statement of Fourier integral theorem - Fourier transform pair - Fourier sine and cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

PRACTICALS:

1. Find the convolution between two functions using Fourier Transform
2. Compute the Fourier sine transform for a given function.
3. Compute the Fourier cosine transform for a given function

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

RBT Level: L1- L3

Unit 3 **FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS** **9**

Introduction - Formation of partial differential equations by eliminating arbitrary constants and functions - Solutions of first order equations - Standard types and equations reducible to standard types - Singular solutions - Lagrange‘s linear equation.

PRACTICALS:

1. Solving first order equations in standard type.
2. Solving first order equations in reducible to standard type.
3. Solving Lagrange’s Linear Equation

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

RBT Level: L1- L3

Unit 4 **HIGHER ORDER PARTIAL DIFFERENTIAL EQUATIONS** **9**

Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types. Classification of PDE - Method of separation of variables.

PRACTICALS:

1. Find the general solution of second order linear partial differential equation
2. Find the general solution of higher order linear partial differential equation
3. Find the general solution of homogeneous differential equation.

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

RBT Level: L1- L3

Unit 5 **APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS** **9**

Solutions of one-dimensional wave equation - One dimensional equation of heat conduction - Steady state solution of two-dimensional equation of heat conduction (excluding insulated edges).

PRACTICALS:

1. Solving the One-Dimensional Wave Equation
2. Solving the One-Dimensional Heat Conduction Equation
3. Solving the Two-Dimensional Heat Conduction Equation

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

RBT Level: L1- L3

Total **45**

Suggested Activities : Lectures & Problem Solving, Tutorials & Assignments, Sci Lab Practical Sessions, Case Studies / Mini Projects, NPTEL Videos & Seminars, Review of GATE questions

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Compute Fourier series expansions for given functions and analyze harmonic components using appropriate conditions.

CO2: Apply Fourier transform techniques, including convolution and Parseval's identity, to solve mathematical and engineering problems.

CO3: Form and solve **first-order partial differential equations**, including Lagrange's linear equations and reducible types.

CO4: Solve **higher-order linear PDEs** using methods such as separation of variables and auxiliary equations.

CO5: Model and solve **one-dimensional and two-dimensional physical systems** involving wave motion and heat conduction.

Text Books:

T1: Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.

T2: Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.

T3: Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt. Ltd.1998.

References

R1: Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007.

R2: Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill Publishing Company Limited,NewDelhi, 2008.

R3: Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

R4: Datta.K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd, Delhi, 2013.

Web links and Video Lectures (e-Resources):

1. **https://archive.nptel.ac.in/courses/111/101/111101164/**
2. **https://archive.nptel.ac.in/courses/111/102/111102129/**
3. **https://archive.nptel.ac.in/courses/111/108/111108144/**
4. **https://archive.nptel.ac.in/courses/111/107/111107111/**
5. **https://hits.digimat.in/nptel/courses/video/111101153/L59.html**

CO-PO & PSO Mapping:

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

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

STRENGTH OF MATERIALS

Course Code	24ME312	Course Type		INTEGRATED	
Course Offered to	MECH, CIVIL & EEE				
Total Teaching Periods	75	L:T:P	2:1:2	Credits	4
Handled by	Mathematics	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite : Basic knowledge of engineering mathematics and physics, including vectors, forces, and motion.

Course Objectives: To impart the knowledge of

1. Basic concepts of mechanics and analysis of force systems and equilibrium.
2. Centroid, center of gravity, and moment of inertia of various sections..
3. Stress–strain behavior and analysis of simple and composite members.
4. Shear force and bending moment in beams under different loading conditions.
5. Flexural stresses and design of simple beam sections.

Unit: I INTRODUCTION TO MECHANICS 9

Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant - Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems- Analysis of trusses by Method of Joints & Sections- **Friction:** Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions -Motion of Bodies.

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

RBT Level: L1- L3

Unit: II CENTROID AND CENTER OF GRAVITY 9

Introduction - Centroids of rectangular, circular, I, L and T sections - Centroids of built-up sections. **Area moment of Inertia:** Introduction - Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of Composite sections.

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

RBT Level: L1- L3

Unit: III SIMPLE STRESSES AND STRAINS 9

Types of stresses and strains – Hooke's law - Stress- strain diagram for mild steel - working stress Factor of safety- lateral strain, Poisson's ratio and volumetric strain - Elastic moduli and the relationship between them — Bars of Varying section - Composite bars - Temperature stresses. Strain energy - Resilience - Gradual, Sudden, impact and shock loadings- simple applications.

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

RBT Level: L1- L3

Unit: IV SHEAR FORCE AND BENDING MOMENT **9**

Definition of beam - types of beams - Concept of Shear force and bending moment - S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads - point of contra flexure - Relation between S.F, B.M and rate of loading at section of a beam.

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

RBT Level: L1- L3

Unit: V FLEXURAL STRESSES **9**

Theory of simple bending- Assumptions- Derivation of bending equation: M/I = f/Y = E/R - Neutral axis- Determination of bending stresses- Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections- Design of simple beam sections.

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

RBT Level: L1- L3

Total **45**

Suggested activities: Group Approach, Tutorial problems, Case Study, Model Preparation, Case study, Review of GATE questions

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

PRACTICALS:

1. Compression test on wood,
2. Impact test on metal specimen by Izod method.
3. Impact test on metal specimen by and Charpy method.
4. Hardness test on metals by Rockwell Hardness Test.
5. Hardness test on metals by Brinell Hardness Test.
6. Torsion test on mild steel rod
7. Double shear test on metal
8. Compression test on helical spring
9. Tension test on mild steel rod
10. Tension test on steel rod
11. Deflection test on metal beam.
12. Deflection test on wooden beam.

Total **30**

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

CO1: Apply principles of forces, equilibrium and friction to solve engineering problems.

CO2: Compute centroid, center of gravity and moment of inertia for simple and composite sections.

CO3: Analyze simple stress–strain relations and axially loaded members.

CO4: Determine shear force and bending moment diagrams for statically determinate beams.

CO5: Evaluate flexural stresses and design simple beam sections using bending theory.

Text Books:

T1: R.K Bansal, Engineering Mechanics, Lakshmi Publications.

T2: R. Subramanian, Strength of Materials, Oxford University Press Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 2018.

T3: Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2017.

T4: Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures" (SMTS) Vol -II, Laxmi Publishing Pvt Ltd, New Delhi 2017.

References

R1: Shesagiri Rao, Engineering Mechanics, Universities Press, Hyderabad.

R2: S. Timoshenko, D.H. Young and J.V. Rao, Engineering Mechanics, Tata McGraw-Hill Company.

R3: R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.

R4: Sadhu Singh, Strength of Materials, Khanna Publishers 11th edition 2015.

Web links and Video Lectures (e-Resources):

1 https://archive.nptel.ac.in/courses/105/105/105105108/
2 https://archive.nptel.ac.in/courses/112/107/112107147/
3 https://onlinecourses.nptel.ac.in/noc23_me140/preview
4 https://www.coursera.org/learn/mechanics-of-materials-1
5 https://www.coursera.org/learn/mechanics-of-materials-2

CO-PO & PSO Mapping:

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

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

SURVEYING

Course Code	24CE311	Course Type		INTEGRATED	
Course Offered to	CIVIL				
Total Teaching Periods	75	L:T:P	2:1:2	Credits	4
Handled by	CIVIL	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite : Basic knowledge of mathematics, geometry, and fundamental engineering concepts.

Course Objectives: To impart the knowledge of

1. Fundamental principles and instruments used in conventional surveying.
2. Levelling methods and determination of elevations and contours.
3. Theodolite surveying and tacheometric methods for distance and height measurement.
4. Control surveying techniques and error analysis methods**.**
5. Modern surveying tools such as total station, remote sensing, and GIS applications.

Unit: I FUNDAMENTALS OF CONVENTIONAL SURVEYING 9

Definition - Classifications - Basic principles - Equipment and accessories for ranging and chaining - Methods of ranging - Well conditioned triangles - Chain traversing - Compass - Basic principles - Types - Bearing - System and conversions - Sources of errors and Local attraction - Magnetic declination - Dip - compass traversing - Plane table and its accessories - Merits and demerits - Radiation - Intersection - Resection – Plane table traversing.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: II LEVELLING 9

Level line - Horizontal line - Datum - Benchmarks - Levels and staves - Temporary and permanent adjustments - Methods of leveling - Fly leveling - Check leveling - Procedure in leveling - Booking- Reduction -Curvature and refraction-Reciprocal leveling - Precise leveling - Contouring.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: III THEODOLITE SURVEYING 9

Horizontal and vertical angle measurements - Temporary and permanent adjustments - Heights and distances - Tacheometric surveying - Stadia Tacheometry - Tangential Tacheometry - Trigonometric leveling - Single Plane method - Double Plane method.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: IV CONTROL SURVEYING AND ADJUSTMENT 9

Horizontal and vertical control - Methods - Triangulation - Traversing - Gale's table - Trilateration - Concepts of measurements and errors - Error propagation and Linearization - Adjustment methods - Least square methods - Angles, lengths and levelling network.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: V MODERN SURVEYING **9**

Total station –Digital theodolite– EDM –Parts and accessories – Advantages– Introduction to remote sensing – Remote sensing techniques – Applications - Introduction to GIS – Data input – Data verification – Editing – Manipulation & Analysis –Applications of GIS.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Total **45**

Suggested Activities : Interactive Lectures with Visual Aids, Hands-on Field Training / Lab Sessions, Flipped Classroom Approach, Problem-Based Learning (PBL), Technology-Integrated Learning ,Case study, Review of GATE questions.

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

PRACTICALS:

1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular
2. offset
3. Setting out works – Foundation marking using tapes single Room and Double Room
4. Compass Traversing – Measuring Bearings & arriving included angles Levelling - Study of levels and levelling staff
5. Fly levelling using Dumpy level &Tilting level
6. Check levelling
7. Measurements of horizontal angles by reiteration and repetition and vertical angles
8. Determination of elevation of an object using single plane method when base is Accessible/inaccessible.
9. Determination of Tacheometric Constants
10. Heights and distances by stadia Tacheometry / Tangential Tacheometry

Total **30**

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

CO1: Explain basic principles, methods and instruments used in conventional surveying.

CO2: Perform leveling operations and reduce levels using standard procedures.

CO3: Measure angles, heights and distances using theodolite and tacheometric methods.

CO4: Apply control surveying methods and adjustment techniques considering errors.

CO5: Describe modern surveying tools and interpret basic applications of Remote Sensing and GIS.

Text Books:

T1: Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016.

T2: T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2008.

References

R1: R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.

R2 James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2001.

R3 Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.

R4 S. K. Roy, Fundamentals of Surveying, Second Edition, Prenticeˆ Hall of India2010.

R5 K. R. Arora, Surveying Vol I & II, Standard Book house, Twelfth Edition 2013.

R6 C. Venkatramaiah, Textbook of Surveying, Universities Press, Second Edition, 2011.

Web links and Video Lectures (e-Resources):

1 **https://www.youtube.com/watch?v=Ak-j7hm2VPQ**

2 **https://www.youtube.com/watch?v=VngBkhvITgg&list=PLF-w7i-tlidcnIJsjRiQEeXJWBbc8K_Xn&index=1**

3 **https://www.youtube.com/watch?v=1gXWcRFq8f4**

4 **https://www.youtube.com/watch?v=cjTT4a-dg5s**

5 **https://www.youtube.com/watch?v=sEuHnjRMW1w**

CO-PO & PSO Mapping:

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

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

INNOVATION AND DESIGN THINKING

Course Code	24ES321	Course Type		INTEGRATED	
Course Offered to	Common to all				
Total Teaching Periods	45	L:T:P	1:0:2	Credits	2
Handled by	Training & Placement	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite : Basic problem-solving and creative thinking skills.

Course Objectives: To enhance knowledge on

1. The principles and stages of **Design Thinking** for identifying and solving real-world problems.
2. Empathetic research methods to understand user needs through observation, interviews, and fieldwork.
3. Problem definition techniques and framing design challenges using user insights.
4. Creative ideation methods to generate and evaluate innovative solutions.
5. Prototyping, testing, and presenting solutions effectively through project demonstrations and presentations.

Module: I THE DESIGNER'S MINDSET & PROBLEM SCOPING **9**

Objective: Cultivate a growth mindset and launch the real-world project.

1. Introduction to Design Thinking: From Problem to Solution.
2. Fixed vs. Growth Mindset for Innovators (Toolkit: Mindset Reflection Worksheet).
3. Launching the Capstone Project: Team Formation & Problem Context Selection (Local Panchayat, NGO, Small Industry, Campus Community).
4. Project Planning & Introduction to Field Research (Toolkit: Project Brief Canvas).

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

RBT Level: L1- L4

Module: II EMPATHISE — DEEP USER UNDERSTANDING **9**

Objective: Learn and apply empathetic methods in a real-world context.

1. The Art of Empathy and User-Centricity.
2. Planning Field Research (Toolkit: Research Plan Template).
3. Conducting Empathetic Interviews & Observations (Toolkit: Interview Guide, Observation Log).
4. FIELDWORK: Students conduct research in their chosen context. (Video recording of key interactions is encouraged).
5. Synthesising Data: Finding Insights (Toolkit: Empathy Map Canvas).
6. Visualising the User Experience (Toolkit: Journey Map Template).

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

RBT Level: L1- L4

Module: III DEFINE — FRAMING THE CORE PROBLEM **9**

Objective: Synthesise research findings into a powerful and focused problem statement.

1. From Insights to User Needs.
2. Creating User Personas (Toolkit: Persona Canvas).
3. Unpacking the Problem Root Cause (Toolkit: 5 Whys Worksheet).
4. Crafting a Point-of-View (POV) (Toolkit: POV Statement Template).
5. Framing the Design Challenge (Toolkit: "How Might We..." Questions

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

RBT Level: L1- L4

Module: IV IDEATE — GENERATING CREATIVE SOLUTIONS **9**

Objective: Generate a wide range of innovative solutions and select the most promising one.

1. Principles of Divergent and Convergent Thinking.
2. Brainstorming for Quantity and Creativity (Toolkit: Brainstorming Rules).
3. Structured Ideation Techniques (Toolkit: SCAMPER, Crazy 8s).
4. Clustering and Evaluating Ideas (Toolkit: Affinity Clustering).
5. Selecting the Winning Idea (Toolkit: Feasibility-Impact Matrix).

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

RBT Level: L1- L4

Module: V PROTOTYPE & TEST — LEARNING BY MAKING **9**

Objective: Build tangible representations of the idea and learn from user feedback.

1. The Purpose of Prototyping: To Learn, Not to Perfect.
2. Building Low-Fidelity Prototypes (Toolkit: Paper Prototyping, Storyboarding).
3. Planning and Conducting User Tests (Toolkit: User Test Script).
4. Gathering and Interpreting Feedback (Toolkit: Feedback Capture Grid).
5. The Iteration Cycle: Using feedback to refine the solution.

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

RBT Level: L1-L3

Module: VI INTEGRATE & PITCH — FROM IDEA TO IMPACT

Objective: Prepare for implementation and communicate the solution persuasively.

1. Storytelling for Innovation: Crafting a Compelling Narrative.
2. Building a Persuasive Pitch (Toolkit: Pitch Deck Structure).
3. Ethical, Societal, and Sustainability Check (Toolkit: Ethics & Sustainability Checklist).
4. Introduction to Scalability and Intellectual Property (Overview only).
5. Capstone Project Consolidation & Presentation Rehearsal.

Assessment Framework :

a) Formative Assessments (Continuous)

1.Field Research & Deliverable: **20 Marks**

- A documented research report including Empathy Maps, Journey Maps, and supporting evidence (e.g., key quotes, photos, short video clips).
- Focus: Depth of user understanding, quality of research, and synthesis of insights.

2.Ideation & Concept Selection Assessment : 20 Marks

- Deliverable: An "Ideation Logbook" showing the breadth of ideas generated (using SCAMPER, Crazy 8s, etc.) and a rationale for the final selected concept using the Feasibility-Impact Matrix.
- Focus: Creativity, diversity of ideas, and logical selection process.

b) Summative Assessment (End-of-Term)

3.Capstone Project Portfolio & Viva Voce : 60 Marks

This is the core of the course evaluation, assessing the end-to-end project.

- **Comprehensive Project Portfolio - 30 Marks**: A single document walking through the entire process for the team's real-world problem—from initial research and POV to final prototype and iteration plan.
- **Final Pitch Presentation & Demo - 20 Marks:** A compelling live presentation (10-12 mins per team) of their solution, including a demo of their prototype and their proposed implementation plan.
- **Viva Voce - 10 Marks:** A brief individual interview to assess personal contribution, understanding of the process, and ability to reflect on the learning journey.

Total 45

Suggested Activities : Case Study, Quiz, Coding Task, Group Task, Coding Challenge

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Explain the principles of design thinking and identify real-world problems using a designer's mindset.

CO2: Apply empathy-based research methods to collect user insights through interviews, observations, and field studies.

CO3: Analyze research findings and formulate clear problem statements using design thinking tools.

CO4: Generate and evaluate innovative ideas using structured ideation techniques to select feasible solutions.

CO5: Develop prototypes, test solutions with users, and present innovative solutions through demonstrations and project presentations.

Text Books:

T1: Jain, A. The science and art of design thinking. Penguin Enterprise, 2021

T2: Jain, A. From teenager to achiever: The power of 5 minds. Penguin Enterprise,2022

References

R1: Liedtka, J., Ogilvie, T., & Brozenske, R. Designing for growth: A design thinking toolkit for managers. Columbia Business School Publishing, 2020

R2: Lewrick, M., Link, P., & Leifer, L. The design thinking toolbox: A guide to mastering the most popular and valuable innovation methods. Wiley, 2020

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses
2. https://designthinking.ideo.com/
3. https://www.interaction-design.org/literature/topics/design-thinking
4. https://dschool.stanford.edu/resources/design-thinking-bootleg

CO-PO & PSO Mapping:

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

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

UNIVERSAL HUMAN VALUES AND ETHICS

Course Code	24GE311		Course Type		INTEGRATED
Course Offered to	Common to All				
Total Teaching Periods	45	L:T:P	1:0:2	Credits	2
Handled by	MECH	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite: Basic awareness of human values, ethical behavior, and social responsibility**.**

Course Objectives: To enhance knowledge of

1. Universal human values and develop the ability for self-exploration and right understanding.
2. Harmony within the human being, including the relationship between the self ('I') and the body.
3. Harmony in family and society through values such as trust, respect, justice, and cooperation.
4. Harmony in nature and existence, promoting sustainable and responsible living.
5. Applying human values and ethical principles in professional life for socially responsible and environmentally conscious decision-making.

Unit: I INTRODUCTION 3+6

Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self-Exploration – Its content and process; 'Natural acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

PRACTICALS:

- Include sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

  PS-1: Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcomings in your life? Observe and analyze them.

  PS-2: Now-a-days, there is a lot of voice about many techno-genic maladies such as energy and natural resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. — all these seem to be man-made problems threatening the survival of life on Earth — What is the root cause of these maladies & what is the way out in your opinion?

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression & suicidal attempts, etc — what do you think, is the root cause of these threats to human happiness and peace — what could be the way out in your opinion?

PS 3: Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of

- What is Naturally Acceptable to you in relationship- Feeling of respect or disrespect?
- What is Naturally Acceptable to you — to nurture or to exploit others?
- Is your living the same as your natural acceptance or different?

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

RBT Level: L1 – L4

Unit: II HARMONY IN THE HUMAN BEING **3+6**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health.

PRACTICALS :

- Include sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

PS-4: List down all your desires. Observe whether the desire is related to Self (I) or Body. If it appears to be related to both, see which part of it is related to Self (I) and which part is related to Body.

PS-5:

- Observe that any physical facility you use, follows the given sequence with time: Necessary and tasteful unnecessary and tasteful unnecessary and tasteless intolerable.
- In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If naturally acceptable, you want it continuously and if not acceptable, you do not want it any moment!

PS-6:

- Chalk out programs to ensure that you are responsible to your body- for free nurturing, protection and right utilization of the body.
- Find out the plants and shrubs growing in and around your campus and residence. Find out their use for curing different diseases. If not, what initiative has been taken by you to implant the shrubs?

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

RBT Level: L1 – L4

Unit: III HARMONY IN THE FAMILY AND SOCIETY 3+6

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and coexistence as comprehensive Human Goals, Visualizing a universal harmonious order in society, Undivided Society, Universal Order-from family to world family.

PRACTICALS :

- Include sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

PS 7: Form small groups in the class and in that group initiate dialogue and ask the eight questions related to trust. The eight questions are:

1. Do I want to make myself happy?
2. Do I want to make the other happy?
3. Does the other want to make him happy?
4. Does the other want to make me happy?
    - What is the answer?
    - Intention (Natural Acceptance)
1. Am I able to make myself always happy?
2. Am I able to make the other always happy?
3. Is the other able to make him always happy?
4. Is the other able to make me always happy?
    - What is the answer?
    - Competence

PS 8:

- Observe on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
- Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

PS 9:

- Write a note in the form of story, poem, skit, essay, narration, dialogue to educate a child. Evaluate it in a group.
- Develop three chapters to introduce 'social science- its need, scope and content in the primary education of children

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

RBT Level: L1 – L4

Unit: IV HARMONY IN THE NATURE AND EXISTENCE 3+6

Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Coexistence of mutually interacting units in all- pervasive space, Holistic perception of harmony at all levels of existence.

PRACTICALS :

- Include sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

PS 10: List down units (things) around you. Classify them in four orders. Observe and explain the mutual fulfillment of each unit with other orders.

PS 11:

- Make a chart for the whole existence. List down different courses of studies and relate them to different units or levels in the existence.
- Choose any one subject being taught today. Evaluate it and suggest suitable modifications to make it appropriate and holistic.

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

RBT Level: L1 – L4

Unit: V IMPLICATIONS OF HARMONY ON PROFESSIONAL ETHICS **3+6**

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order.
b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order:

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
b. At the level of society: as mutually enriching institutions and organizations, Sum up.

PRACTICALS :

Include Exercises and Case Studies will be taken up in Sessions E.g. To discuss the conduct as an engineer or scientist etc

PS 12: Choose any two current problems of different kind in the society and suggest how they can be solved on the basis of natural acceptance of human values. Suggest steps you will take in present conditions.

PS 13:

- Suggest ways in which you can use your knowledge of Technology/Engineering/Management for universal human order, from your family to the world family.
- Suggest one format of humanistic constitution at the level of nation from your side.

PS 14: The course is going to be over now. Evaluate your state before and after the course in terms of

- Thought
- Behavior and
- Work
- Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

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

RBT Level: L1 – L4

Total **45**

Suggested Activities : Group Discussion, Presentation, Quiz, Case study, Review of GATE questions.
Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Become more aware of themselves, and their surroundings (family, society, nature);

CO2: Have more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

CO3: Have better critical ability.

CO4: Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

CO5: Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Text Books:

T1: A Foundation Course in Human Values and Professional Ethics by GP Bagaria Rr Gaur R Sangal, 2023

References

R1: Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 3rd revised edition, 2023

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/playlist?list=PLFW6lRTa1g83uYgRiZEy_F4pzedPNWpew

CO-PO & PSO Mapping:

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

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

COMPUTER AIDED DRAWING LABORATORY

Course Code	24CE321	Course Type		PRACTICAL	
Course Offered to	CIVIL				
Total Teaching Periods	30	L:T:P	0:0:4	Credits	2
Handled by	CIVIL	Assessment Methods		IAT	ESE
				60 Marks	40 Marks

Prerequisite : Basic knowledge of engineering drawing and computer fundamentals

Course Objectives: To impart the knowledge of

1. Fundamentals of computer-aided drafting and coordinate systems.
2. Using draw and modify tools for creating engineering drawings.
3. Applying layers, dimensions, text, and blocks in drafting.
4. Developing building plans, sections, and elevations using CAD tools..
5. 3D modeling concepts and visualization of building components.

PRACTICALS:

1. Introduction to computer aided drafting & coordinate system.
2. Exercise on Draw & Modify tool bars.
3. Exercise on Layer, Dimension, Texting & Block etc.
4. Drawing a plan of single storied Building and dimensioning using layers.
5. Drawing a plan of multi storied Building and dimensioning using layers.
6. Developing sections and elevations for given Single storied buildings
7. Developing sections and elevations for given Multi storied buildings.
8. Drawing of building components like walls, lintels, Doors, and Windows.
9. Introduction to 3D view.
10. Exercise on 3D.

Total 30

Suggested Activities: Mini Project/Content beyond Syllabus

Evaluation Methods: Performance in Suggested and day to day activities, model practical and End Semester Examinations.

Course Outcomes:

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

CO1: Explain basic concepts of CAD environment and coordinate systems.

CO2: Use draw and modify tools to create accurate engineering drawings.

CO3: Apply layers, dimensions, text and blocks for professional drafting.

CO4: Prepare plans, sections and elevations for single and multi-storied buildings.

CO5: Develop basic 3D views and visualize building components.

CO-PO & PSO Mapping:

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

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

APPLIED STRENGTH OF MATERIALS

Course Code	24CE401	Course Type		THEORY	
Course Offered to	CIVIL				
Total Teaching Periods	45	L:T:P	2:1:0	Credits	3
Handled by	CIVIL	Assessment Methods		IAT	ESE
				40 Marks	60 Marks

Prerequisite: Basic knowledge of engineering mechanics and strength of materials**.**

Course Objectives: To impart knowledge of

1. Compound stresses and strains, principal stresses, and the application of Mohr's circle..
2. Torsion in circular shafts, power transmission, and the behavior of different types of springs.
3. Shear force and bending moment in beams and analysis of simple trusses..
4. Methods for determining slope and deflection of beams under different loading conditions..
5. The behavior and analysis of columns and struts under axial and eccentric loading.

Unit: I COMPOUND STRESSES AND STRAINS 9

Two-dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two-dimensional stress-strain system, principal strains and principal axis of strain, Mohr circle of strain.

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

RBT Level: L1- L3

Unit: II TORSION 9

Theory of pure torsion - Assumptions and Derivation of Torsion formula for circular shaft - Torsional moment of resistance - Polar section modulus- power transmission through shafts- Combined bending and torsion -. Springs - Types of springs - deflection of close coiled helical springs under axial pull and axial couple- Carriage or leaf springs.

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

RBT Level: L1- L3

Unit: III BENDING STRESSES AND SHEAR STRESSES 9

Shear force and bending moment diagrams for beams and frames-Analysis of trusses by methods of joints, method of sections and Tension Coefficient method. Theory of simple bending –Bending stress distribution at sections (point of contra flexure) - Beams of uniform strength. Shear stress distribution due to bending.

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

RBT Level: L1- L3

Unit: IV DEFLECTION OF BEAMS **9**

Uniform bending- slope, deflection and radius of curvature- Differential equation for elastic line of a beam - Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr's theorems - Moment area method- application to simply supported and overhanging beams **Propped cantilevers:** Analysis of propped cantilever beams under UDL and point loads.

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

RBT Level: L1- L3

Unit: V COLUMNS AND STRUTS **9**

Introduction - Classification of columns - Axially loaded compression members - Euler's crippling load theory - Derivation of Euler's critical load formulae for various end conditions - Equivalent length - Slenderness ratio - Euler's critical stress - Limitations of Euler's theory - Rankine - Gordon formula - Eccentric loading and Secant formula- Prof. Perry's formula.

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

RBT Level: L1- L3

Total **45**

Suggested activities: Numerical problem-solving, Mohr's circle construction, beam and truss analysis exercises, deflection calculation practice, and column stability case discussion, Case study, Review of GATE questions

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Analyze compound stresses and strains using principal planes and Mohr's circle.

CO2: Apply torsion theory to circular shafts and springs for strength and power transmission.

CO3: Analyze bending and shear stresses in beams and trusses.

CO4: Determine slope and deflection of beams using analytical and energy methods.

CO5: Evaluate the strength and stability of columns using Euler, Rankine, and related theories.

Text Books:

T1: Mechanics of Materials- Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.

T2: Strength of Materials by R.K Rajput, S.Chand & Company Ltd.

T3: Strength of materials by Dr. Sadhu Singh, Khanna Publishers. R.K Bansal, Engineering Mechanics, Lakshmi Publications.

T4: R. Subramanian, Strength of Materials, Oxford University Press

References

R1: R. K. Bansal, A Text book of Strength of materials, Laxmi Publications (P) Ltd., New Delhi.

R2: Strength of Materials, Fourth edition, S.S. Bhavikatti, Vikas Publishing House, Pvt. Ltd.

R3: D. S. Prakasa Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.

R4: Schaum's outline series Strength of Materials, Me Graw hill International Editions.

R5: L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.

R6: S. Basavarajaiah and P. Mahadevappa, Strength of Materials in SI units, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2010.

Web links and Video Lectures (e-Resources):

1 https://www.youtube.com/watch?v=uqnXfWDRXLA
2 https://www.youtube.com/watch?v=ljDIIMvx-eg&list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1NLfs&index=6
3 https://www.youtube.com/watch?v=Fg4LVBPheK4&t=129s
4 https://youtu.be/Xa_qcL0laO0
5 https://youtu.be/ZSQ_5lRj5gI

CO-PO & PSO Mapping:

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

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

STATISTICS, PROBABILITY AND LINEAR ALGEBRA

Course Code	24MA413	Course Type		INTEGRATED	
Course Offered to	EEE,CIVIL & MECH				
Total Teaching Periods	75	L:T:P	2:1:2	Credits	4
Handled by	Mathematics	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite: Basic knowledge of probability, statistics, and matrix algebra.

Course Objectives: To impart knowledge on

1. Sampling distributions and hypothesis testing methods used in statistical analysis.
2. Design of experiments and analysis of variance techniques.
3. Probability theory and one-dimensional random variables with standard distributions.
4. Joint distributions, correlation, regression, and two-dimensional random variables.
5. Vector spaces, linear transformations, and eigenvalues/eigenvectors in linear algebra.

Unit: I TESTING OF HYPOTHESIS **15**

Sampling distributions – Test for Single Mean and difference of two means (Large and small samples) – Tests for Single Variance and Equality of Variances - F -Test - Chi-square test for Goodness of fit- Test of Independent Attributes.

PRACTICALS:

1. Perform Z-test for single mean and difference of means.
2. Perform F-test for equality of variances.
3. Perform Chi-square goodness of fit test and test of independent attributes.

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

RBT Level: L1- L3

Unit: II DESIGN OF EXPERIMENTS **15**

One-way classifications (Completely randomized design) two-way classifications (Randomized block design) and three-way classifications (Latin square design).

PRACTICALS:

1. Compute the treatment means and block means in randomized block design.
2. Analyze data using two-way classification by computing row and column means.
3. Compute the grand mean for data arranged in a Latin square design.

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

RBT Level: L1- L3

Unit: III ONE DIMENSIONAL RANDOM VARIABLES 15

Random Variables — Moments — Moment generating function — Discrete Random Variables: Binomial, Poisson and Geometric Distributions — Continuous Random Variables: Uniform, Exponential and Normal Distributions.

PRACTICALS:

1. Compute the PMF of a Binomial, Geometric and Poisson Distributions.
2. Compute and plot the PDF of a Uniform, Exponential and Normal Distributions.
3. Compute the mean and variance of a Binomial, Geometric and Poisson Distributions.

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

RBT Level: L1- L3

Unit: IV TWO-DIMENSIONAL RANDOM VARIABLES 15

Joint distributions —JPMF and JPDF - Marginal and conditional distributions — Covariance — Correlation coefficient and regression.

PRACTICALS:

1. Find the marginal distribution from joint distributions.
2. Compute conditional probability distributions.
3. Compute the covariance and correlation.

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

RBT Level: L1- L3

Unit: V LINEAR ALGEBRA 15

Vector Spaces- Subspaces- Linear Transformation – Null space, Range space - dimension theorem - Matrix and representation of Linear Transformation – Eigen values Eigen vectors of linear transformation.

PRACTICALS:

1. Find the image, null space and range space of a vector under a linear transformation.
2. Compute the eigenvectors corresponding to the eigenvalues of a matrix and also find its characteristic polynomial.
3. Find the matrix representation of a linear transformation and verify the Rank-Nullity Theorem for a given matrix.

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

RBT Level: L1- L3

Total 75

Course Outcomes:

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

CO1: Apply sampling distributions and perform hypothesis testing for means, variances, and attributes

CO2: Analyze experimental data using CRD, RBD, and Latin Square Design.

CO3: Apply one-dimensional random variable concepts and standard probability distributions to compute statistical measures.

CO4: Evaluate joint probability distributions and analyze relationships using covariance, correlation, and regression techniques.

CO5: Apply linear algebra concepts including vector spaces, linear transformations, eigenvalues, eigenvectors, and verify the Rank–Nullity theorem using computational tools.

Text Books:

T1: Grewal, B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, New Delhi, 2020.

T2: Gilbert Strang, "Introduction to Linear Algebra", 6th Edition, Wellesley–Cambridge Press, 2023

T3: Montgomery, D.C., "Design and Analysis of Experiments", 9th Edition, Wiley, 2017.

T4: Lehmann, E.L. and Romano, J.P., "Testing Statistical Hypotheses", 3rd Edition, Springer, 2005.

References

R1: Bernard Kolman and David R. Hill, "Introductory Linear Algebra", Pearson Education, New Delhi, 2010.

R2: Gerald, C.F. and Wheatley, P.O., "Applied Numerical Analysis", 7th Edition, Pearson Education, 2004.

R3: Kumaresan, S., "Linear Algebra – A Geometric Approach", PHI Learning, New Delhi, 2010.

R4: Lipschutz, S., *Schaum's Outline of Linear Algebra*, McGraw-Hill, New York, 1989.

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/111105090
2. https://nptel.ac.in/courses/111102112
3. https://nptel.ac.in/courses/111102160
4. https://nptel.ac.in/courses/111101115
5. https://nptel.ac.in/courses/111106415

CO-PO & PSO Mapping:

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

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

ENVIRONMENTAL STUDIES AND SUSTAINABLE DEVELOPMENT

Course Code	24CH416	Course Type		INTEGRATED	
Course Offered to	CIVIL				
Total Teaching Periods	45	L:T:P	2:0:2	Credits	3
Handled by	CHEMISTRY	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite : Basic knowledge of environmental and sustainability concepts.

Course Objectives: To enhance knowledge of

1. The principles, historical perspectives, and importance of sustainability in engineering and technology..
2. Environmental sustainability issues such as climate change, biodiversity loss, pollution, and resource conservation..
3. Social and economic sustainability including equity, community development, corporate social responsibility, and sustainable economic growth..
4. Engineering approaches and technologies used for sustainable development and climate change mitigation..
5. Sustainability practices, green technologies, environmental management systems, and sustainable development initiatives.

Unit: I INTRODUCTION **9**

Principles and Historical perspectives, Importance and need for sustainability in engineering and technology, impact and implications. United Nations Sustainability Development Goals (SDG) UN summit- Rio & outcome, Sustainability and development indicators

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

Unit: II ENVIRONMENTAL SUSTAINABILITY **9**

Climate change, Biodiversity loss, Pollution and Waste Management, Renewable vs Non-renewable resources, water and energy conservation Sustainable agriculture and forestry. National and International policies, Environmental regulations and compliance, Ecological Footprint Analysis.

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

Unit: III SOCIAL & ECONOMIC SUSTAINABILITY **9**

Equity and justice, Community development, Smart cities and sustainable infrastructure, Cultural heritage and sustainability, Ethical considerations in sustainable development. Triple bottom line approach, Sustainable economic growth, Corporate social responsibility (CSR), Green marketing and sustainable product design: Circular economy and waste minimization, green accounting and sustainability reporting.

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

Unit: IV ENGINEERING FOR SUSTAINABLE DEVELOPMENT **9**

Engineering for mitigating the impact of climate change and advancement in sustainable development, Perspectives in India and Small Island Developing States (SIDS), Implications of the automation in the manufacturing of building and construction materials and modern construction practices for the sustainable development Manufacturing of Green cement and sustainable building materials, decarbonization and Carbon Capture Utilization for the cement industry, buildability and constructability analysis of green and energy efficient buildings and infrastructure, sustainable practices in the water and waste water treatment processes. Application of Design thinking for civil engineering projects to enhance sustainability.

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

Unit: V SUSTAINABILITY PRACTICES **9**

Suggested Practices not limited to

• Energy efficiency – how to save energy (energy efficient equipment, energy saving behavior).

• Chemical use and storage – the choice of chemicals being procured, the safe disposal of leftover chemicals, the impact of chemicals on the environment and long– term health impacts on humans.

• Green building, green building materials, green building certification and rating: green rating for integrated habitat assessment (GRIHA), leadership in energy and environmental design (LEED)

• Tools for Sustainability – Environmental Management System (EMS), ISO14000, life cycle assessment (LCA)

• Ecological footprint assessment using the Global Footprint Network spreadsheet calculator • National/Sub national Status of Sustainable Development Goals.

• Develop a campus sustainability plan and prototype, integrating sustainable IT practices and energy–efficient solutions.

• Develop AI– driven solutions for efficient water management, demonstrating the role of IT in smart environmental monitoring.

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

Total **45**

Suggested Activities: Puzzle Activity, Case study, Review of GATE questions

Evaluation Methods: Performance in Suggested day to day activities, and End Semester Examinations

Course Outcomes:

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

CO1: Analyze the historical evolution of sustainability and the practical implications of the UN Sustainable Development Goals (SDGs) in engineering.

CO2: Quantity ecological footprints and design mitigation strategies for climate change, biodiversity loss, and resource depletion.

CO3: Apply the Triple Bottom line and circular economy principles to balance corporate social responsibility with economic growth

CO4: Implement sustainable construction practices, including the use of green cement, carbon capture, and energy-efficient building designs.

CO5: Utilize professional tools like LCA (Life Cycle Assessment), GRIHA/LEED ratings, and AI-driven monitoring for efficient resource management.

Text Books:

T1: Allen D & Shonnard D R Sustainability Engineering, Concept, design and case studies, Prentice Hall

T2: Munier N, Introduction to sustainability by Springer

T3: Blackburn W R, The Sustainability hand book, The complete management guide to achieving social, economic and environmental responsibility, Routledge.

T4: Clini C., Musu I & Gullino M L Sustainable development and environment management Springer

T5: Bennett m., James P., & Klinker's Sustainable measures: Evaluation and reporting of environmental and social performance, Routledge

References

R1: Stark R., Seliger G., & amp; Bonvoisin Sustainable manufacturing, challenge, solution and Implementation perspective. Springer Klinker's Sustainable

R2: Seliger G Sustainable manufacturing for global value creation (2012) Springer Berlin Heidelberg

R3: Davim J P. Sustainable manufacturing by (2013) John Wiley & sons

R4: Niklas Sundberg Sustainable IT Playbook for technology Leaders, Design and Implements sustainable IT practices and unlock sustainable business opportunities by (2022), Kindle Edition

R5: Tam V W Y., Le Sustainable Construction Technologies, life cycle Assessment K N (2019 Elsevier science

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/109105171
2. https://www.ipcc.ch/reports/
3. https://smartcities.gov.in/
4. https://www.iea.org/topics/energy-efficiency
5. https://nptel.ac.in/courses/105106137

CO-PO & PSO Mapping:

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

2	2	3	2	2	1	2	3	1	-	-	-	2	2	2
3	1	2	1	-	-	3	2	3	2	2	1	1	1	3
4	2	2	3	2	2	2	3	1	-	1	2	3	3	2
5	2	2	2	3	3	1	3	2	2	2	2	2	3	2
AVG	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
1 – “Low”, 2 – “Medium”, 3 – “High”, – “No correlations”														

APPLIED HYDRAULIC ENGINEERING

Course Code	24CE413	Course Type		INTEGRATED	
Course Offered to	CIVIL				
Total Teaching Periods	75	L:T:P	2:1:2	Credits	4
Handled by	Civil Engineering	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite: Basic knowledge of fluid mechanics.

Course Objectives: To impart knowledge of

1. The principles of open channel flow and computation of uniform flow in channels.
2. Gradually varied flow and methods for determining water surface profiles in channels.
3. Rapidly varied flow phenomena such as hydraulic jumps and surges in open channels.
4. The working principles, classification, and performance of hydraulic turbines.
5. The operation, characteristics, and performance of different types of pumps.

Unit: I UNIFORM FLOW **9**

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Sub-critical, Super-critical and Critical flow - Velocity distribution in open channel - Steady uniform flow: Chezy's equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: II VARIED FLOWS **9**

Dynamic equations of gradually varied - Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standard step method – Change in Grades.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: III RAPIDLY VARIED FLOWS **9**

Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation – Positive and Negative surges.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: IV TURBINES **9**

Turbines - Classification - Impulse turbine – Pelton wheel - Reaction turbines - Francis turbine - Kaplan turbine - Draft tube - Cavitation - Performance of turbine - Specific speed - Runaway speed – Minimum Speed to start the pump.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: V PUMPS **9**

Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitation's in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Indicator diagrams and its variations - Air vessels.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Suggested Activities : Numerical problem-solving, flow profile sketching, hydraulic jump illustration, turbine–pump performance discussion, and PPT-based concept explanation, Case study, Review of GATE questions

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

PRACTICALS:

A. FLOW MEASUREMENT
1. Calibration of Rotameter
2. Flow through Orifice meter/mouthpiece, Venturimeter and Notches

B. LOSSES IN PIPES
3. Determination of friction factor in pipes.
4. Determination of minor losses

C. PUMPS
5. Characteristics of Centrifugal pumps
6. Characteristics of Gear pump
7. Characteristics of Submersible pump
8. Characteristics of Reciprocating pump

D. TURBINES
9. Characteristics of Pelton wheel turbine
10. Characteristics of Francis turbine

E. DETERMINATION OF METACENTRIC HEIGHT
11. Determination of metacentric height of floating bodies

Total **45**

Course Outcomes:

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

CO1: Explain uniform flow concepts, equations, and energy principles in open channels.

CO2: Describe gradually varied flow profiles and determine water surface profiles using numerical methods.

CO3: Explain rapidly varied flow phenomena such as hydraulic jumps and surges using momentum principles.

CO4: Describe the working, performance, and characteristics of hydraulic turbines.

CO5: Explain the working principles, performance, and applications of centrifugal and reciprocating pumps.

Text Books:

T1: Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi,2010.

T2: Chandramouli P N, Applied Hydraulic Engineering, Yes Dee Publisher, 2017

References

R1: Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.

R2: Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 19th edition, 2013.

R3: Mays L. W., Water Resources Engineering, John Wiley and Sons (WSE), New York, 2019

R4: Subramanya K., Flow in open channels, Tata McGraw Hill, New Delhi, 2019.

Web links and Video Lectures (e-Resources):

1. **https://nptel.ac.in/courses/105105175**
2. **https://nptel.ac.in/courses/112107209**
3. **https://ocw.mit.edu/courses/mechanical-engineering/2-25-advanced-fluid-mechanics-fall-2013**
4. **https://www.youtube.com/watch?v=af-WqjDHoZQ**
5. **https://www.youtube.com/watch?v=2kl1dFGcZlM**

CO-PO & PSO Mapping:

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

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

CONCRETE TECHNOLOGY

Course Code	24CE411	Course Type		INTEGRATED	
Course Offered to	CIVIL				
Total Teaching Periods	75	L:T:P	2:0:2	Credits	3
Handled by	Civil Engineering	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite : Basic knowledge of building materials and construction fundamentals.

Course Objectives: To impart knowledge of

1. Constituent materials of concrete such as cement, aggregates, and water and their properties.
2. Chemical and mineral admixtures and their effects on the properties of concrete.
3. Principles of concrete mix proportioning and BIS methods of mix design.
4. Fresh and hardened properties of concrete and the tests used to evaluate them..
5. Different types of special concretes and their applications in construction.

Unit: I CONSTITUENT MATERIALS 9

Cement-Different Types-Chemical composition and Properties -Tests on cement-IS Specifications-Aggregates- Classification-Mechanical properties and tests as per BIS Grading Requirements-Water-Quality of water for use in concrete.

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

RBT Level: L1-L2

Unit: II CHEMICAL AND MINERAL ADMIXTURES 9

Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties.

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

RBT Level: L1-L2

Unit: III PROPORTIONING OF CONCRETE MIX 9

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples- Mix Design for Specific Situations.

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

RBT Level: L1-L2

Unit: IV FRESH AND HARDENED PROPERTIES OF CONCRETE 9

Workability-Tests for workability of Concrete-Slump Test and Compacting Factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete- Stress-Strain curve for Concrete-Determination of Modulus of elasticity.

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

RBT Level: L1-L2

Unit: V SPECIAL CONCRETES **9**

Light weight concretes - High strength concrete - Fiber reinforced concrete – Ferro cement - Ready mix concrete - SIFCON - Shotcrete - Polymer concrete - High performance concrete- self compacting concrete - Geopolymer Concrete-Foam Concrete-Hot and Cold Weather Concrete.

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

RBT Level: L1-L2

Suggested activities: Material testing demonstrations for cement and aggregates., Numerical problems on mix design as per BIS guidelines, Case studies on use of admixtures and special concretes, Lab-based analysis of fresh and hardened concrete properties, Quizzes, assignments & CIA tests on concepts and applications, , Review of GATE questions.

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

PRACTICALS:

1. Determination of Slump of Concrete.
2. Compaction factor Test.
3. Flowability test on Concrete.
4. Vee-Bee Consistometer Test.
5. Determination of Compressive Strength of Concrete.
6. Flexural Strength of Concrete.
7. Split Tensile Strength of Concrete.
8. Determination of Modulus of elasticity test on Concrete.
9. Ultrasonic pulse velocity Test.
10. Rebound Hammer Test.

Total **75**

Course Outcomes:

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

CO1: Identify and explain the properties and tests of cement, aggregates and water.

CO2: Describe the role of chemical and mineral admixtures in modifying concrete properties.

CO3: Apply BIS guidelines to proportion concrete mixes for given requirements.

CO4: Analyze fresh and hardened properties of concrete using standard test methods.

CO5: Explain the characteristics and applications of special concretes.

Text Books:

T1: Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.

T2: Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003.

References

R1: Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995.

R2: Gambhir.M.L. Concrete Technology, Fifth Edition, McGraw Hill Education,2017.

R3: Job Thames, Concrete Technology, encage learning India Private Ltd, New Delhi,2015.

R4: IS 10262-2019 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=6ju8mig4VoU&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin&index=1
2. https://www.youtube.com/watch?v=2H8WOrQtews&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin&index=4
3. https://www.youtube.com/watch?v=2SaZlCn4uxI&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin& index=7-
4. https://www.youtube.com/watch?v=T4pjWFzd3rA-
5. https://www.youtube.com/watch?v=PPlQPTlKdrQ&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin&index=14

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	2	1	0	1	0	0	0	1	1	0	3	2	3
2	3	2	1	0	1	0	1	0	1	1	0	3	2	3
3	3	3	2	1	1	0	1	0	1	1	1	3	2	3
4	3	3	2	1	1	0	0	0	1	1	0	3	2	3
5	2	2	2	1	1	0	1	0	1	1	1	3	2	3
AVG	3	2	2	1	1	–	1	–	1	1	1	3	2	3

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

SOIL MECHANICS

Course Code	24CE412	Course Type		INTEGRATED	
Course Offered to	CIVIL				
Total Teaching Periods	75	L:T:P	2:1:2	Credits	4
Handled by	CIVIL	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite: Basic knowledge of engineering mechanics and building materials.

Course Objectives: To impart knowledge of

1. Soil formation, classification systems, and index properties used in soil identification.
2. Effective stress principles, permeability, seepage, and flow of water through soils.
3. Stress distribution in soils and settlement analysis of foundations.
4. Shear strength characteristics of soils and laboratory methods used to determine them.
5. Slope stability concepts and methods used for analyzing and protecting soil slopes.

Unit: I SOIL CLASSIFICATION AND COMPACTION 9

History – formation and types of soil – composition - Index properties – clay mineralogy structural arrangement of grains – description – Classification – BIS – US – phase relationship – Compaction – theory – laboratory and field technology – field Compaction method – factors influencing compaction.

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

RBT Level: L1- L2

Unit: II EFFECTIVE STRESS AND PERMEABILITY 9

Soil - water – Static pressure in water - Effective stress concepts in soils – Capillary phenomena – Permeability – Darcy's law – Determination of Permeability – Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer – Factors influencing permeability of soils – Seepage - Two-dimensional flow – Laplace's equation – Introduction to flow nets – Simple problems Sheet pile and wier.

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

RBT Level: L1- L2

Unit: III STRESS DISTRIBUTION AND SETTLEMENT 9

Stress distribution in homogeneous and isotropic medium – Boussines of theory – (Point load, Line load and udl) Use of Newmarks influence chart –Components of settlement – Immediate and consolidation settlement – Factors influencing settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement. – √t and log t methods. e-log p relationship consolidation settlement N-C clays – O.C clays – Computation.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Unit: IV SHEAR STRENGTH 9

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Factors influences shear strength of soil.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1, L2

Unit: V SLOPE STABILITY **9**

Infinite slopes and finite slopes — Friction circle method – Use of stability number –Guidelines for location of critical slope surface in cohesive and c - soil – Slope protection measures.

Teaching-Learning Process **Pedagogy:** BB & PPT

RBT Level: L1- L2

Suggested Activities :

Soil testing demonstrations for classification and compaction, Numerical problem solving on permeability, settlement and shear strength, Case studies on seepage, slope failures and ground improvement, Chart-based analysis using flow nets and influence diagrams, Quizzes, assignments & CIA tests on soil behavior and applications, Review of GATE questions.

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

PRACTICALS

1. **Determination of Index Properties**
   a. Specific gravity of soil solids
   b. Grain size distribution – Sieve analysis
   c. Grain size distribution - Hydrometer analysis
   d. Liquid limit and Plastic limit tests
2. **Determination of insitu density and compaction characteristics**
   a. Field density Test (Sand replacement method)
   b. Determination of moisture – density relationship using standard proctor compaction test
3. **Determination of Engineering Properties**
   a. One dimensional consolidation test (Determination of co-efficient of consolidation only)
   b. Direct shear test in cohesion less soil
   c. Unconfined compression test in cohesive soil
   d. Tri-axial compression test in cohesion less soil (Demonstration only)
   e. California Bearing Ratio Test

Total **75**

Course Outcomes:

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

CO1: Classify soils and determine index properties and compaction characteristics.

CO2: Explain effective stress concepts, permeability and seepage behavior in soils.

CO3: Compute stress distribution and settlement in soil deposits.

CO4: Evaluate shear strength of soils using laboratory and field test data.

CO5: Analyze slope stability problems and suggest suitable protection measures.

Text Books:

T1: Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2014

T2: Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7th Edition, 2017(Reprint).

T3: Gopal Ranjan, A S R Rao, "Basic and Applied Soil Mechanics" New Age International Publication, 3rd Edition, 2016.

T4: Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition, 2017.

References

R1: McCarthy, D.F., "Essentials of Soil Mechanics and Foundations: Basic Geotechnics". Prentice-Hall, 2006.

R2: Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt. Ltd. New Delhi, 2010.

R3: Braja M Das, "Principles of Geotechnical Engineering", Cengage Learning India Private Limited, 8th Edition, 2014.

R4: Palanikumar.M., "Soil Mechanics", Prentice Hall of India Pvt. Ltd, Learning Private Limited Delhi, 2013.

R5: Craig.R.F., "Soil Mechanics", E & FN Spon, London and New York, 2012.

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/105/103/105103214/
2. https://www.youtube.com/watch?v=3cBVWhr3jRo
3. https://tkiet.digimat.in/nptel/courses/video/105105168/L21.html
4. https://archive.nptel.ac.in/courses/105/105/105105168/
5. https://archive.nptel.ac.in/courses/105/105/105105168/

CO-PO & PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	2	1	0	1	0	0	0	1	1	0	1	1	-
2	3	2	1	1	1	0	0	0	1	1	0	1	1	-
3	3	3	2	1	1	0	0	0	1	1	0	1	1	-
4	3	3	2	1	1	0	0	0	1	1	0	1	1	-
5	3	3	2	2	1	0	1	0	1	1	1	2	1	-
AVG	3	2	1	1	1	–	1	–	1	1	1	1.2	1	-

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

IDEA TO PRODUCT

Course Code	24PC411	Course Type		INTEGRATED	
Course Offered to	Common to ECE, EEE, MECH & CIVIL				
Total Teaching Periods	45	L:T:P	1:0:2	Credits	2
Handled by	MECH	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite: Basic knowledge of engineering graphics and design concepts.

Course Objectives: To provide knowledge of

1. Global trends, product development concepts, methodologies, and product life cycle used in modern product development.
2. Rapid prototyping techniques, tools, and methods used for mechanical and electronic prototype development.
3. Industrial design principles including sketching, CAD modeling, product visualization, and reverse engineering strategies.
4. UI/UX design principles, human factors, information architecture, and design practices for digital products.
5. Application development concepts including SDLC, web and mobile technologies, databases, APIs, cloud services, and deployment of applications.

Module: I BASICS OF PRODUCT DEVELOPMENT 6

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends Environmental Trends - Political/Policy Trends - Introduction to Product Development Methodologies and Management - Overview of Products and Services - Types of Product Development - Overview o Product Development methodologies - Product Life Cycle – Product Development Planning and Management.

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

RBT Level: L1- L4

Module: II RAPID PROTOTYPING 6

Need for prototyping - Domains in prototyping - Difference between actual manufacturing and prototyping - Rapid prototyping methods - Tools used in different domains.

Mechanical Prototyping: 3D Printing and classification - Laser Cutting and engraving - RD Works – Additive manufacturing.

Electronic Prototyping: Basics of electronic circuit design - - Working with simulation tool - simple PCB design with EDA.

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

RBT Level: L1- L4

Module: III INDUSTRIAL DESIGN 6

Introduction to Industrial Design - Points, lines, and planes - Sketching and concept generation - Sketch to CAD - Introduction to CAD tools - Types of 3D modeling - Basic 3D Modeling Tools - Part creation – Assembly - Product design and rendering basics – Dimensioning & Tolerance – Basics of reverse Engineering and its strategies

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

RBT Level: L1- L4

Module: IV UI / UX 6

Fundamental concepts in UI & UX - Tools - Fundamentals of design principles - Psychology and Human Factors for User Interface Design - Layout and composition for Web, Mobile and Devices - Typography - Information architecture - Color theory - Design process flow, wireframes, best practices in the industry -User engagement ethics - Design alternatives

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

RBT Level: L1- L4

Module: V APP DEVELOPMENT 6

SDLC - Introduction to App Development - Types of Apps - web Development -understanding Stack - Frontend - backend - Working with Databases - Introduction to API - Introduction to Cloud services - Cloud environment Setup- Reading and writing data to cloud - Embedding ML models to Apps - Deploying application

Important Note :

It is considered as a lab, observation is to be submitted every week starting from block diagram, Design, Circuit Diagram, Simulation Results, Implementation results and Analysis. Finally, a Report is to be submitted for the System Design, End Semester Exam is a Demo.

The main objective of this laboratory is to understand and apply the principles and concepts in Product Design for Innovative Product with hands on training. Each student group (not more than three) have to develop digital and physical prototype models of a new product / existing product with enhanced feature.

The fabricated models (For Mech & Civil students) may be in the form of RP models, clay models, sheet metal models or cardboard models etc. The design and development of the product will be reviewed in two stages for awarding internal marks. The end semester examination mark will be based on the project report (Introduction; Literature survey; Methodology; Simulation; Experimentation; Analysis and Discussion; and Conclusion) and their demonstration followed by oral examination of their new product by internal examiner.

S.No	ECE, EEE, ACT & VLSI Design	Mech & Civil
1	VLSI Subsystem Design	Automotive / Aerospace
2	Embedded System Design	Medical components.
3	IoT based System Design	Industrial components
4	AI based System Design	Machining / Forming
5	Energy Innovative Design	Casting tool, fixtures, & supplementary components.
6	Power / Industrial Electronics	Consumer products

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

RBT Level: L1-L4

Total **75**

Suggested Activities: Case Study, Quiz, Group Task**,** Review of GATE questions

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Explain global trends, product development concepts, methodologies, and the product life cycle involved in product development.

CO2: Apply rapid prototyping techniques and tools to develop mechanical and electronic prototypes.

CO3: Develop basic industrial product designs using sketching, CAD modeling, assembly, and rendering techniques.

CO4: Design user interfaces by applying UI/UX principles, design elements, and human–computer interaction concepts

CO5: Develop and deploy basic applications by applying software development concepts, databases, APIs, and cloud services for product implementation

Text Books:

T1: Product Design and Development, McGraw-Hill Education, 6th Edition

T2: Engineering Design: A Project-Based Introduction, John Wiley & Sons, 4th Edition.

References

R1: The Design of Everyday Things, Basic Books, Revised and Expanded Edition.

R2: Rapid Prototyping: Principles and Applications, World Scientific Publishing.

R3: Sketching: Drawing Techniques for Product Designers, BIS Publishers.

Web links and Video Lectures (e-Resources):

1.https://www.adobe.com/products/xd/learn/get-star ted.html
2. https://developer.android.com/guide
3. https://help.autodesk.com/view/fusion360/ENU/courses/
4. https://help.prusa3d.com/en/categor y/prusaslicer_204

CO-PO & PSO Mapping:

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

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

BUILDING DRAWING AND DETAILING LABORATORY

Course Code	24CE421	Course Type		PRACTICAL	
Course Offered to	CIVIL				
Total Teaching Periods	30	L:T:P	0:0:2	Credits	1
Handled by	Civil Engineering	Assessment Methods		IAT	ESE
				60 Marks	40 Marks

Prerequisite : Basic knowledge of engineering drawing and building construction concepts.

Course Objectives: To provide knowledge of

1. The principles of building planning, orientation, and building components used in construction.
2. Different types of building structures such as load bearing structures, framed structures, and sloping roof buildings..
3. Reinforcement detailing of RCC structural elements including slabs, beams, columns, and different types of footings..
4. Steel structural components and connections such as beam-to-column and beam-to-beam connections.
5. Preparation of building drawings including plan, elevation, section, and service layouts using CAD software.

Unit: I UNIT I OVERVIEW & INSTRUCTIONS 30

1. Principles of planning and orientation.
2. Buildings with load bearing walls and RCC roof (Plan, section, elevation).
3. Buildings with sloping roof.
4. Buildings with Framed structures.
5. Building information modeling.
6. Reinforcement details of RCC structural elements (slab, beam and column).
7. Reinforcement details of footings (Isolated, stepped, combined footing).
8. Steel structures (Steel Connections detailing, beam to column connection, beam to beam connection – bolt & Weld, Roof truss & purlin).
9. Drawing of plan, elevation and sectional elevation including electrical, plumbing and sanitary services using CAD software.
10. Plan of school building

Total 30

Suggested Activities: Mini Project/Content beyond syllabus

Evaluation Methods: Performance in Suggested and day to day activities ,Model practical and End Semester Examinations.

Course Outcomes:

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

CO1: Apply principles of planning and orientation in preparing building plans.

CO2: Prepare drawings for load-bearing, RCC roof, sloping roof, and framed structures.

CO3: Draw reinforcement detailing for RCC slabs, beams, columns, and various footings.

CO4: Prepare detailed drawings of steel structures including connections, trusses, and purlins.

CO5: Develop complete building drawings using CAD/BIM, including services and special buildings such as schools.

CO-PO & PSO Mapping:

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

DISASTER MANAGEMENT

Course Code	24AE401	Course Type		THEORY	
Course Offered to	Common to All				
Total Teaching Periods	30	L:T:P	2:0:0	Credits	0
Handled by	MECH	Assessment Methods		IAT	ESE
				40 Marks	60 Marks

Prerequisite : Basic awareness of environmental and disaster-related issues.

Course Objectives: To provide knowledge of

1. The fundamental concepts of disasters, hazards, vulnerability, resilience, and risk.
2. Different types of disasters and their social, economic, environmental, and health impacts.
3. Disaster risk reduction strategies and the roles of institutions at local, state, and national levels.
4. The relationship between disasters, development activities, and climate change.
5. Disaster management practices using case studies, hazard assessment, and GIS-based technologies.

Unit: I INTRODUCTION TO DISASTERS 6

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

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

Unit: II APPROACHES TO DISASTER RISK REDUCTION (DRR) 6

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies

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

Unit: III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 6

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

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

Unit: IV DISASTER RISK MANAGEMENT IN INDIA 6

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

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

Unit: V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 6

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

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

Total 30

Suggested Activities : Case Study, Quiz, Assignment topics, Class Presentation

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Explain the concepts of ethical management, managerial ethics, professional ethics, and social responsibility.

CO2: Analyze ethical decision-making processes and apply ethical principles in crisis management situations.

CO3: Evaluate stakeholder relationships and sustainability issues in ethical management. *(L2, L3)*

CO4: Analyze individual variables such as ethical awareness, judgment, courage, and emotions in managerial decision-making.

CO5: Apply ethical management techniques and skills to resolve dilemmas and promote an ethical organizational culture.

Text Books:

T1: Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011.

T2: Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

T3: Singhal J.P. "Disaster Management", Laxmi Publications, 2019. ISBN-10: 9380386427 ISBN-13: 978-9380386423

T4: Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]

References

R1: Govt. of India: Disaster Management Act, Government of India, New Delhi, 2025

R2: Government of India, National Disaster Management Policy,2009.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=TB97oX7ANGo
2. https://www.youtube.com/watch?v=xA6_X74SYEk

CO-PO & PSO Mapping:

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

INDUSTRIAL SAFETY

Course Code	24AU402	Course Type		THEORY	
Course Offered to	Common to All				
Total Teaching Periods	30	L:T:P	2:0:0	Credits	-
Handled by	MECH	Assessment Methods		IAT	ESE
				40 Marks	60 Marks

Prerequisite : Basic knowledge of engineering workshop practices and mechanical equipment.

Course Objectives: To provide knowledge of

1. Industrial safety practices, accident causes, hazard control measures, fire prevention methods, and safety regulations in industrial environments.
2. Maintenance engineering concepts, functions of maintenance departments, types of maintenance, and maintenance cost considerations.
3. Wear and corrosion mechanisms and their prevention using suitable lubrication and protection techniques.
4. Systematic fault tracing methods and diagnostic procedures used in mechanical and electrical equipment.
5. Periodic inspection and preventive maintenance procedures for machine tools, pumps, compressors, motors, and DG sets.

Unit: I INDUSTRIAL SAFETY 6

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety color codes. Fire prevention and firefighting, equipment and methods.

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

Unit: II MAINTENANCE ENGINEERING 6

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

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

Unit: III WEAR AND CORROSION AND THEIR PREVENTION 6

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

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

Unit: IV FAULT TRACING **6**

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

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

Unit: V PERIODIC AND PREVENTIVE MAINTENANCE **6**

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, Advantages of preventive maintenance. Repair cycle concept and importance.

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

Total **30**

Suggested Activities: Case Study, Quiz, Assignment topics, Class Presentation, Review of GATE questions.

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Explain industrial safety concepts, accident causes, hazards, fire prevention methods, and relevant provisions of the Factories Act, 1948.

CO2: Describe maintenance engineering principles, types of maintenance, tools used, and cost-replacement analysis.

CO3: Analyze wear and corrosion mechanisms and recommend suitable prevention and lubrication methods.

CO4: Apply fault tracing techniques using decision tree methods for mechanical, hydraulic, pneumatic, thermal, and electrical systems.

CO5: Develop periodic and preventive maintenance plans for industrial equipment and evaluate their effectiveness.

Text Books:

T1: L. M. Deshmukh, Industrial Safety Management, Tata McGraw-Hill Education, 1st Edition, 2005.

T2: Charles D. Reese, Occupational Health and Safety Management: A Practical Approach, CRC Press, 3rd Edition, 2015.

References

R1: Edward Ghali, V. S. Sastri, M. Elboujdaini, Corrosion Prevention and Protection: Practical Solutions, John Wiley & Sons, 2007.

R2: Garg, HP, Maintenance Engineering, S. Chand Publishing, 2012.

R3: J Maiti, Pradip Kumar Ray, Industrial Safety Management: 21st Century Perspectives of Asia, Springer, 2017

R4: R. Keith Mobley, Maintenance Fundamentals, Elsevier, 2011.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=v-eltsixu4I
2. https://www.youtube.com/watch?v=jFDWlKayrTc&list=PLbRMhDVUMngdXebaRB59KdKwstzuAovua
3. https://www.youtube.com/watch?v=ZEShNJX3kcg&list=PLbRMhDVUMngdXebaRB59KdKwstzuAovua&index=12

CO-PO & PSO Mapping:

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

GENDER SENSITIZATION

Course Code	24AU403	Course Type		THEORY	
Course Offered to	Common ton All				
Total Teaching Periods	30	L:T:P	2:0:0	Credits	2
Handled by	MECH	Assessment Methods		IAT	ESE
				50 Marks	50 Marks

Prerequisite : Basic awareness of societal values, ethics, and human relationships.

Course Objectives: To provide knowledge of

1. Fundamental concepts of gender studies, gender identity, gender roles, and the social construction of gender in society.
2. Gender relations in society, including patriarchy, intersectionality, and gender representation in education, media, and professional environments.
3. Gender issues and challenges in workplaces and industries, particularly in science, technology, and engineering sectors.
4. Legal provisions, constitutional rights, and policy frameworks that promote gender equality and protect individuals from discrimination and harassment.
5. Inclusive practices, ethical responsibilities, and leadership approaches that support gender diversity and equality in engineering and professional spaces.

Module: I INTRODUCTION TO GENDER STUDIES

- Sex and Gender: Conceptual differences
- Gender identity and gender expression
- Social construction of gender
- Gender roles and stereotypes
- Gender and culture
- Overview of global equality principles promoted by the United Nations

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

RBT Level: L1- L4

Module: II GENDER AND SOCIETY **6**

- Patriarchy and power structures
- Intersectionality (caste, class, disability, race)
- Gender representation in media
- Gender and education
- Women in STEM fields
- Gender bias in academic institutions
- Case studies from engineering education environments.

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

RBT Level: L1- L4

Module: III GENDER IN WORKPLACE & INDUSTRY **6**

- Gender diversity in corporate environments
- Equal opportunity and pay equity
- Gender bias in recruitment and promotion
- Workplace harassment and prevention
- Role of the International Labour Organization in promoting workplace equality
- Inclusive team building in engineering organizations

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

RBT Level: L1- L4

MODULE: IV LEGAL & POLICY FRAMEWORK **6**

- Constitutional provisions for equality
- Prevention of Sexual Harassment (POSH) guidelines
- Rights of LGBTQ+ individuals
- Institutional grievance redressal mechanisms
- Regulatory framework guidance from the University Grants Commission (where applicable)
- Students should understand institutional compliance standards aligned with bodies such as the University Grants Commission (if applicable in Indian context).

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

RBT Level: L1- L4

Module: V BUILDING INCLUSIVE ENGINEERING SPACES **6**

- Gender-sensitive communication
- Ethical responsibility of engineers
- Creating inclusive campus culture
- Leadership and ally ship
- Diversity and innovation,
- Case studies from global technology organizations
- Discussion on how inclusive teams improve innovation in tech companies like Google and Microsoft.

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

RBT Level: L1,L2,L3

Total **30**

Suggested activities : Case studies, Group discussions, Role play exercises; Industry case analysis,

assignments.

Evaluation Methods: Performance in Suggested activities, IAT and End Semester Examinations.

Course Outcomes:

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

CO1: Explain the concepts of sex, gender, gender identity, gender roles, and the social construction of gender.

CO2: Analyze gender issues in society, including patriarchy, intersectionality, and gender representation in education and media.

CO3: Examine gender challenges and biases in workplaces, particularly in engineering and technology sectors.

CO4: Explain legal provisions, institutional policies, and regulatory frameworks that support gender equality and protection.

CO5: Apply inclusive practices and ethical principles to promote gender-sensitive communication and inclusive professional environments.

Text Books:

T1: Gender in Engineering: Interdisciplinary Approaches, Routledge Publications

T2: Gender Issues in Science and Technology, Allied Publishers.

T3: Gender: Ideas, Interactions, Institutions, W.W. Norton & Company

References

R1: Nivedita Menon – Seeing Like a Feminist

R2: Judith Butler – Gender Trouble

R3: UN Women – Gender Equality Reports

R4: Government policy documents on workplace equality

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses
2. https://onlinecourses.nptel.ac.in/
3. https://www.un.org/sustainabledevelopment/gender-equality/

CO-PO & PSO Mapping:

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

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