KUMARAGURU COLLEGE OF TECHNOLOGY,

An autonomous Institution affiliated to Anna University, Chennai

COIMBATORE – 641 049

B.E. CIVIL ENGINEERING

REGULATION 2024

I to IV Semesters

Department of Civil Engineering

VISION

The Department of Civil Engineering is striving to become a world class Academic Centre for quality education and research in diverse areas of Civil Engineering, with a strong social commitment

MISSION

The Mission of the department is to

- Producing highly competent and technologically capable professionals and motivatedyoung Academicians
- Providing quality education in undergraduate and post graduate levels, with strongemphasis on professional ethics and social commitment.
- Developing a scholastic environment for the state – of –art research, resulting in practical applications. Undertaking professional consultancy services in diverse areas of Civil Engineering

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Our graduates will be able to

PEO 1: To provide strong foundation to graduates to pursue a successful profession or higher studies and take part in providing feasible solution for societal problems resulting in sustainable development of infrastructures.

PEO 2: To enrich competence of graduates to implement emerging techniques for planning, analysis, design and execution of civil engineering projects through lifelong learning

PEO 3: To imbibe ethics and professionalism among the graduates that is to be practiced in their profession

PROGRAM SPECIFIC OUTCOMES (PSOs)

Our Graduates will be able to:

PSO 1: The graduates will be able to Plan, Analyze, Design and Prepare technical reports for Civil Engineering structures as per BIS.

PSO 2: The graduates will be able to apply technical and management skills for the execution

PROGRAM OUTCOMES (POs)

Our Graduates will be able to:

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering

problems.

PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO8: **Individual and team work**: Function effectively as an individual, and as a member or leaderin diverse teams, and in multidisciplinary settings.

PO9: **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.

PO10: **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

PO11: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

KUMARAGURU COLLEGE OF TECHNOLOGY

CIVIL ENGINEERING

REGULATION 2024

B.E. Civil Engineering - Curriculum

Semester I

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HST101	Heritage of Tamils	Theory	HS	1	0	0	0	1
2	24HSP111	Holistic Wellness – 1	Practical	HS	0	0	2	0	1
3	24MAI111	Linear Algebra and Calculus	Embedded	BS	3	0	2	0	4
4	24CYI102	Material Chemistry for Sustainable Infrastructure	Embedded	BS	3	0	2	0	4
5	24ADP001	Basics of AI	Practical	BS	0	0	2	0	1
6	24EET104	Foundations of Electrical and Electronics Engineering	Theory	ES	3	0	0	0	3
7	24INP102	Innovation Practicum - 1	Practical	ES	0	0	2	0	1
8	24MEI101	Engineering Graphics	Embedded	ES	2	0	2	0	3
9	24INO1--	FCLF - General Stack - 1	Practical	OE	0	0	2	0	1
10	24INP101	Design Thinking	Practical	ES	0	0	2	0	1
								Total Credits	**20**
								Total Contact Hours/week	**28**

Semester II

S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HST102	Tamils and technology	Theory	HS	1	0	0	0	1
2	24HST103 / 24HST104	Effective Communication / Professional Communication	Theory	HS	2	0	0	0	2
3	24PHI104	Applied Physics for Civil Engineering	Embedded	BS	3	0	2	0	4
4	24MAI121	Advanced Calculus and Laplace Transform	Embedded	BS	3	0	2	0	4
5	24MET104	Engineering Mechanics	Theory	ES	3	0	0	0	3
6	24CSI101	Logical thinking and Problem Solving	Theory	ES	3	0	2	0	4
7	24INP103	Innovation Practicum - 2	Practical	ES	0	0	2	0	1
8	24CEI101	Building Materials and Construction Practices	Embedded	ES	3	0	2	0	4
9	24HSP112	Holistic Wellness - 2	Practical	HS	0	0	2	0	1
10	24INO1--	FCLF - General Stack - 2	Practical	OE	0	0	2	0	1
								Total Credits	**25**
								Total Contact Hours/week	**32**

Semester III									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1	24HSP005	Mastering Conversations	Theory	HS	0	0	2	0	1
2	24HST202	Universal Human Values 2: Understanding Harmony	Theory	HS	1	0	0	0	1
3	24INP201	Innovation Practicum-3	Theory	ES	0	0	2	0	1
4	24INO___	FCLF General Stack	Theory	OE	1	0	0	0	1
5	24CEJ205	Internship/Mini project	Project	PW	0	0	0	2	1
6	24MAT231	Partial Differential Equations and Transforms Techniques	Theory	BS	3	1	0	0	4
7	24CET201	Fluid Mechanics and Applied Hydraulics	Theory	PC	3	0	0	0	3
8	24CEI202	Solid Mechanics	Embedded	PC	2	1	2	0	4
9	24CEI203	Surveying	Embedded	PC	3	0	2	0	4
10	24CEP204	Building Information Modeling Lab	Practical	ES	0	0	4	0	2
								Total Credits	**22**
								Total Contact Hours/week	**29**

Semester IV									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1	24HSP006	Mastering Group Discussion and Presentation Skills	Theory	HS	0	0	2	0	1
2	24MAI241	Applied Numerical Methods and Probability for Engineers	Embedded	BS	3	0	2	0	4
3	24INP202	Innovation Practicum-4	Theory	ES	0	0	2	0	1
4	24INO___	FCLF Technical Stack	Theory	OE	1	0	0	0	1
5	24INO___	FCLF Emerging Stack	Theory	OE	1	0	0	0	1
6	24MAI241	Indian Knowledge System	Theory	HS	1	0	0	0	1
7	24INM202	Environmental Sci. & Sustainability- I	Theory	HS	1	0	2	0	2
8	24CET206	Fluid Mechanics Lab	Practical	PC	0	0	2	0	1
9	24CEI207	Remote Sensing & Geographic Information Systems	Embedded	PC	2	0	2	0	3
10	24CET208	Strength of Materials	Theory	PC	3	0	0	0	3
11	24CEI209	Concrete Technology	Embedded	PC	3	0	2	0	4
								Total Credits	**22**
								Total Contact Hours/week	**29**

SEMESTER I

24HST101	தமிழர் மரபு / HERITAGE OF TAMILS (Common to all Departments)	L	T	P	J	C
		1	0	0	0	1
HS		SDG	4, 11, 16			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	தமிழ் மமொழி மற்றும் இலக்கியத்தின் அடிப்படை அம்சங்கடை அறிமுகப்படுத்துதல், அதன் மதொன்டமக்கொலம் முதல் நவீனகொலம் வடையிலொன வைர்ச்சிடய விைக்கம் மசய்யுதல். Introduce students to the foundational aspects of Tamil language and literature, tracing its evolution from ancient to modern times.
2	தமிழகத்தின் மசழுடமயொன கலொச்சொை பொைம்பரியத்டத அறிமுகப்படுத்துதல், பொடற ஓவியக் கடலயிலிருந்து நவீன சிற்ப கடலயின்படி அதன் கடல மவைிப்பொடுகடை ளைஆொய்தல். Familiarize students with the rich cultural heritage of Tamil Nadu, exploring its artistic expressions from rock art paintings to contemporary sculptures.
3	தமிழகத்தின் நொட்டுப்புறக் கடலகள் மற்றும் வீைவிடையொட்டுகடை அறிதல்- தினணக்ககோட்போடுகளை ஆரோய்தல்- இந்திய கதசிய இயக்கத்தில் தமிழர்ைகின் பங்கிளன அறிதல். To know the folk arts and heroic ames of Tamilnadu-explore the concept of thinai -to know the role of Tamils in Indian National movement.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	தமிழ் மமொழி மற்றும் இலக்கியத்தின் அடிப்படை அறிடவ மமம்படுத்துதல். மமோழி பண்போட்டில் எவ்வோறு இளைந்துள்ைது என்பளத உைர்தல். Enhance the fundamental knowledge of Tamil language and literature	U
CO2	பழங்கோல போளை ஓவியங்கள், சிற்பம் என களலகள் நவீன கோலம்வளர எவ்வோறு பயிைக்கிைைது என்பளத புரிந்துமகொள்ளுதல். Understand the heritage, rock art paintings to modern art sculpture	U
CO3	நொட்டுப்புறக் களலகள் தற்கொப்புக் கடலகைோகவும், உடல் ஆகரோக்கியத்ளத கமம்படுத்தும் விதமோகவும் அளமவளத ளைஅிந்து களலகள் மீதோன ஆர்வத்ளத அதிகரிக்கச் மசய்தல்- தமிழர்ைகின் அகத்திளை, புைத்திளை ககோட்போட்டிளன புரிந்து மகோள்ளுதல். இந்திய பண்போட்டில் தமிழர்ைகின் பங்கிைப்ளப ளைஅிதல். Acquire essential knowledge in the folk and martial arts-understanding the Agam and puram concept- to know the contribution of Tamils in Indian culture.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1							3	2	2		2			
2							3	3	2		2			
3							3	2	2		2			

Course Content	
மமொழி மற்றும் இலக்கியம் இந்திய மமொழிக் குடும்பங்கள் – திரோவிம மமொழிகள் – தமிழ் ஒரு மசம்மமொழி – தமிழ் மசவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சோர்பற்ற தன்ளம – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறைில் கமலோண்ளமக் கருத்துக்கள் – தமிழ்க் கோப்பியங்கள், தமிழகத்தில் சமண மபௌத்த சமயங்கைின் மதொடக்கம் - பக்தி இலக்கியம், ஆழ்வோர்கள் மற்றும் நோயன்மோர்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வைர்ச்சி – தமிழ் இலக்கிய வைர்ச்சியில் போம்தியோர் மற்றும் போரதிதோசன் ஆகியோரின் பங்கைிப்பு. **LANGUAGE AND LITERATURE** 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.	**3 Hours**
மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வறர – சிற்பக்கறை நடுகல் முதல் நவீன சிற்பங்கள் வளர – ஐம்மபொன் சிளலகள்– பழங்குடியினர் மற்றும் அவர்கள் தயோரிக்கும் ளகவிளனப் மபோருட்கள், மபொம்ளமகள் – கதர் மசய்யும் களல – சுடுமண் சிற்பங்கள் – நோட்டுப்புற மதய்வங்கள் – குமரிமுளனயில் திருவள்ளுவர் சிளல – இளசக் கருவிகள் – மிருதங்கம், பளை, வீளை, யோழ், நோதஸ்வைம் – தமிழர்கைின் சமூக மபொரும்ோதோம் வோழ்வில் ககோவில்கைின் பங்கு. **HERITAGE – ROCK ART PAINTINGS TO MODERN ART SCULPTURES** 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.	**3 Hours**
நாட்டுப்புறக் கறைகள் மற்றும் வீர விறையாட்டுகள் மதருக்கூத்து, கைகோட்ம்ம், வில்லுப்போட்டு, கணியோன் கூத்து, ஒயிலோட்ம்ம, கதோல்போளவக்கூத்து, சிலம்போட்ம்ம, வைரி, புலியோட்ம்ம, தமிழர்கைின் விளையோட்டுகள். **FOLK AND MARTIAL ARTS** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Ciabatta, Valari, Tiger dance - Sports and Games of Tami	**3 Hours**
தமிழர்களின் திறைக்க&ாட்பாடுகள் தமிழகத்தின் தோவைங்களும், விலங்குகளும் – மதொல்கோப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்ககோட்மபொடுகள் – தமிழர்கள் கபோற்றிய அறக்ககோட்போடு – சங்ககோலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககோல நகைங்களும் துளைமுகங்களும் – சங்ககோலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கைல்கைந்த நோடுகைில் தமிழர்கைின் மவற்றி. **THINAI CONCEPTS OF TAMIL** 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.	**3 Hours**
இந்திய கதசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு இந்திய விடுதளலப் கபோரில் தமிழர்கைின் பங்கு – இந்தியோவின் பிறப்பகுதிகைில் தமிழ்ப் பண்போட்டின் தோக்கம் – சுயமரியோளத இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்மவட்டுகள்,	

எகமயழுத்துப்படிகள் - தமிழ்ப் புத்தகங்கின் அச்சு வைலோறு. **CONTRIBUTIONS OF TAMIL TO INDIAN NATIONAL MOMENT AND INDIAN CULTURE** 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.	**3 Hours**

Theory Hours: 15	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 15

Learning Resources

Reference books:

1. தமிழக வைலோறு – மக்களும் பண்போடும் – கக.கக. பிள்ளை (மவியீடு: தமிழ்நோடு போடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முளனவர் இல. சுந்தைம். (விகைன் பிைசுைம்).
3. கீழடி – ளவளக நதிக்களரயில் சங்ககோல நகை நோகரிகம் (மதொல்லியல் துளை மவியீடு)
4. மபொருளந – ஆற்றங்களர நோகரிகம். (மதொல்லியல் துளை மவியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Textbook and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Online Educational Resources:

1. https://www.youtube.com/watch?v=IKPwEmsmuZc&list=PLMMrJE4pHZmc0iJZIE6lBpFoPK_9Y325e
2. https://www.youtube.com/watch?v=j6_ddjn_gLc&list=PLMMrJE4pHZmc0iJZIE6lBpFoPK_9Y325e&index=2
3. https://docs.google.com/presentation/d/1pf0jbyuDTNdvlcKMnOfoPjbqha7JqdOc/edit#slide=id.p1
4. https://www.youtube.com/watch?v=IKPwEmsmuZc&list=PLMMrJE4pHZmc0iJZIE6lBpFoPK_9Y325e&index=1

Assessment (Theory course)
CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE), Assignments, Quiz, Library Record

Course Curated by

Expert from Industry	Expert(s) from Higher Education Institutions	Internal Expert
Mr.Vijayan Ramanathan , Project manager, Toppan Merrill. Technologies,	Dr. Aninditha Sahoo, IIT, Madras Dr.P.R.Sujatha Priyadharshini,	Suriya Prakash Department of Language

Coimbatore	Anna University, Chennai Dr. E. Justin Ruben, CIT, Coimbatore		
Recommended by BoS on	16.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24HSP111	HOLISTIC WELLNESS-1 (Common to all Department)	L	T	P	J	C
		0	0	2	0	1
HS		SDG	2, 3			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	introduce first-year students to the foundational concepts of holistic wellness, emphasizing the integration of physical, mental, emotional, and Internal well-being.
2	create a balanced lifestyle that promotes overall health and happiness through practical activities.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	understand the basic principles of holistic wellness.	U
CO 2	apply strategies for maintaining physical health, including nutrition and exercise	Ap
CO 3	practice mindfulness techniques to enhance mental and emotional well-being.	Ap
CO 4	develop a personal wellness plan incorporating various aspects of holistic health.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1						2		1						
2						2								
3						1					3			
4						2					3			

Course Content

INTRODUCTION TO HOLISTIC WELLNESS: • Overview of holistic wellness: physical, mental, emotional, and internal health. • The importance of balance in overall well-being. • Hands-on activity: Self-assessment of current wellness status.	**4 Hour**
PHYSICAL WELLNESS: • Importance of physical activity and exercise. • Understanding nutrition and its role in health. • Sleep hygiene and its impact on well-being. • Hands-on activity: Designing a personalized fitness and nutrition plan.	**14 Hours**
MENTAL AND EMOTIONAL WELLNESS: • Stress management techniques. • The role of Yoga, mindfulness and meditation in mental health. • Emotional intelligence and its impact on relationships. • Hands-on activity: Practicing Yoga, mindfulness and emotional regulation	**6 Hours**

exercises.	
INTERNAL WELLNESS: • Exploring the concept of Internal wellness. • The role of purpose and meaning in life. • Introduction to meditation and reflective practices. • Hands-on activity: Developing a personal reflection, Yoga and meditation routine.	**4 Hours**
INTEGRATING WELLNESS PRACTICES: • Combining physical, mental, emotional, and Internal wellness practices into daily life. • Developing a balanced wellness plan. • Hands-on activity: Creating a comprehensive personal wellness plan.	**2 Hours**

Theory Hours:	Tutorial Hours:	Practical Hours:	Project Hours:	Total Hours:
0	0	30	0	30

Learning Resources

Textbooks:

1. Jayanna, Krishnamurthy., Science & Practice of Integrative Health & Wellbeing Lifestyle., White Falcon Publishing (2020).
2. Rosenberg, Marshall Bertram., Nonviolent Communication: A Language of Life., Puddle Dancer Press, Encinitas, CA (2015).

References:

1. B.K.S Iyengar., Yoga: The Path to Holistic Health., Dorling Kindersley Limited, City of Publication (2001)
2. Goleman Daniel., Emotional Intelligence., Bloomsbury India, India, (2021).
3. James Allen., As a Man Thinketh., Maple Press, Noida, (2010)
4. Swami Budhanandha., Will power and its development., Advaita Ashrama Mayavati, Pithoragarh, Himalayas from its Publication Department, Calcutta. (2001)
5. Kalderdon Adizes Ichak., What Matters in Life: Lessons I Learned from Opening My Heart ., WS Press, Newtown, PA (2023)

Online Resources (Weblinks)

1. Learning Suryanamskar
2. Yoga for well-being
3. Nutritional Educational contents
4. Introduction to Psychology
5. Guided Meditation
6. Simplified physical exercises instructions
7. Simplified Physical Exercises
8. Life skills and value education
9. James Allen Library

Assessment (Practical course)

Participation, Practical activities and assignments, personal wellness plan and reflection.

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
		Dr. Ezhilarasi Principal- KCT
Recommended by BoS on	16.08.2024	

Academic Council Approval	No: 27	**Date**	24.08.2024

24MAI111	LINEAR ALGEBRA AND CALCULUS (Common to AE, AU, CE, ME, MR)	L	T	P	J	C
		3	0	2	0	4
BS		SDG	9			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	understand matrix theory for diagonalization, transformations, and their applications in engineering.
2	solve optimization problems using differential calculus.
3	apply partial differentiation for constrained optimization and numerical evaluation.
4	use integral calculus, including double and triple integrals, to solve engineering problems.
5	implement mathematical concepts using MATLAB to solve practical engineering problems.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	apply eigenvalues for matrix diagonalization and transformations and analyse results using computational tools.	Ap
CO2	apply differentiation for solving optimization problems and enhance solutions through computational tools.	Ap
CO3	Analyse and solve unconstrained and constrained optimization problems using the Lagrange multiplier method and determine the maxima and minima of functions with two or more variables relevant to engineering application	An
CO4	apply integral calculus and computational tools to solve engineering problems.	Ap
CO5	apply double integrals and computational tools for solving engineering problems.	Ap
CO6	apply triple integrals techniques and computational tools to solve complex problems.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	2	2		1	1									
2	1	2		1	1									
3	1	1		1	1									
4	1	1		1	1									
5	1	1		1	1									
6	1	1		1	1									

Course Content:

MATRICES

Eigenvalues and Eigenvectors of a real matrix - Properties of eigenvalues and eigenvectors - Orthogonal matrices - Orthogonal transformation of a symmetric matrix to diagonal form - Reduction of quadratic form to canonical form by orthogonal transformation. **Practical Component** • Use MATLAB to compute Matrix Operations - Addition, Multiplication, Transpose, Inverse and Rank of a matrix. • Determining Eigenvalues and Eigenvectors of Matrices.	**9 Hours** **6 Hours**
DIFFERENTIAL CALCULUS Representation of Functions – Limit and Continuity – Differentiation – Rolles Theorem and Mean Value Theorem-Maxima and Minima **Practical Component** • Evaluating Limits and Derivatives • Determining Maxima and Minima of a function of one variable.	**9 Hours** **6 Hours**
PARTIAL DIFFERENTIALS Total derivative – Taylor's series expansion – Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's multiplier method with single constraints – Jacobians. **Practical Component** • Function Approximations with Taylor Series • Determining Maxima and Minima of a function of two variables.	**9 Hours** **6 Hours**
INTEGRAL CALCULUS Definite and Indefinite integrals - Techniques of Integration: Substitution rule, Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction. **Practical Component** • Integration of Rational Functions • Integration of Trigonometric Functions	**9 Hours** **6 Hours**
MULTIPLE INTEGRALS Double integration in Cartesian coordinates – Change of order of integration - Triple integration in Cartesian coordinates – Area as double integral and Volume as triple integral. **Practical Component** • Evaluating double integral with constant and variable limits. • Evaluating triple integral with constant and variable limits.	**9 Hours** **6 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 75

Learning Resources

Textbooks

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2023.

2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw-Hill Publishing Company Limited., New Delhi, 2018.

3. Kreyzig E., "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, 2023.

Reference books

1. Veerarajan T., "Engineering Mathematics (for First Year)", Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2008.

2. Joel R. Hass, Christopher E. Heil, Maurice D. Weir, Przemyslaw Bogacki, George B. Thomas, "Thomas' Calculus", Pearson education 15th Edition, 2024.
3. G.B. Thomas and R.L. Finney, "Calculus and Analytical Geometry", 11th Edition, Pearson Education, 2010.
4. James Stewart, Daniel Clegg, Saleem Watson, "Calculus: Early Transcendentals", Cengage Learning, New Delhi, 9th Edition, 2020.
5. William J. Palm III, "MATLAB for Engineers: Global Edition", McGraw-Hill Education, 5th Edition, 2018.

Online Resources (Web Links)

1. Linear Algebra | Mathematics | MIT Open Courseware https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/
2. Matrix Algebra for Engineers | Coursera https://www.coursera.org/learn/matrix-algebra-engineers
3. Differential Calculus | Khan Academy https://www.khanacademy.org/math/calculus-1
4. Multivariable Calculus | Mathematics | MIT Open Courseware https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/
5. Integral Calculus | Khan Academy https://www.khanacademy.org/math/calculus-2
6. Multivariable Calculus | Khan Academy https://www.khanacademy.org/math/multivariable-calculus
7. Brilliant | Learn Interactively https://www.brilliant.org/

Assessment (Embedded course)

CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. Ramesh V.S., STEPS Knowledge Services Private Limited, Coimbatore. Mr.Jayakumar Venkatesan, Valles Marineras International Private Limited- Chennai. Mr. Imran Khan, GE Transportation Company, Bangalore	Dr.T.Govindan, Government College of Engineering, Srirangam, Trichy. Dr.C.Porkodi, PSG College of Technology, Coimbatore. Dr.P.Paramanathan, Amrita Vishwa Vidyapeetham, Coimbatore.	1. Dr. N.Anitha, 2. Ms. S. Sivasakthi, 3. Dr. S.Selvanayaki, Department of Mathematics

Recommended by BoS on	16.8.2024		
Academic Council Approval	No: 27	**Date**	24.8.2024

24CYI102	MATERIAL CHEMISTRY FOR SUSTAINABLE INFRASTRUCTURE	L	T	P	J	C
		3	0	2	0	4
BS		SDG	9, 11, 12			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	acquire knowledge of sustainable construction materials, advanced engineering materials, and protective coatings to promote eco-friendly infrastructure development.
2	develop skills to analyse the properties and performance of cementitious materials, fiber-reinforced composites, and corrosion prevention techniques in various environmental conditions.
3	gain competency in applying the principles of corrosion mechanisms and protective coatings to enhance the durability and longevity of civil infrastructure.
4	evaluate and recommend advanced engineering materials and sustainable technologies for modern construction projects, including the use of recycled and upcycled materials.
5	enhance analytical and problem-solving abilities through hands-on laboratory experiments, integrating theoretical concepts with practical applications in sustainable construction and material chemistry.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	apply the concepts of sustainable construction materials to select appropriate materials for infrastructure projects.	Ap
CO2	analyse the properties of cementitious materials to evaluate their performance in different environmental conditions.	An
CO3	apply knowledge of corrosion mechanisms in civil infrastructure to suggest preventive measures.	Ap
CO4	analyse the types of Fiber-reinforced composites to assess their suitability for high-performance construction applications.	An
CO5	analyse the properties and applications of protective coatings to identify suitable options foivil engineering projects.	An
CO6	evaluate sustainable solutions using advanced engineering materials and techniques for eco-friendly infrastructure.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	2	2		2		2				2			
2		2		2			3				2			
3			2			2	2							

4				2		2			2					
5				2						2	2			
6	2		2			2	3				2			

Course Content

CONSTRUCTION MATERIALS Introduction to Sustainable Construction Materials -Aggregates: Classification and Properties (Physical and chemical) -Cement and Concrete: Types of cement (Ordinary Portland Cement, Blended cements, Geopolymer cement) – Setting: Role of Chemical composition of cement and Bogue compounds - Hydration mechanisms and kinetics-Supplementary Cementitious Materials (SCMs): Fly ash (Classification, chemical composition, and pozzolanic reactions), Silica Fume-High-Performance Building Materials: Engineered stone (Composition, properties, and applications) **Practical Component:** • Determination of iron in cement using spectrophotometer • Assessing the Impact of Acid Exposure on Concrete Durability	**9 Hours** **6 Hours**
ADVANCED ENGINEERING MATERIALS High-Performance Refractories and Ceramics: Nano-engineered refractories (Composition and properties) - Ultra-high temperature ceramics (UHTCs) (Synthesis and applications). Fiber-Reinforced Composites: Carbon fiber reinforced polymers (CFRP) - Glass fiber reinforced polymers (GFRP) - Basalt fiber reinforced polymers (BFRP) (Properties and applications) - Interfacial chemistry in fiber-matrix bonding Polymer: High-performance polymers (PEEK, PPS, and their properties) - Self-healing polymers (Intrinsic and extrinsic healing mechanisms) - Polymer degradation and stabilization in construction environments. **Practical Component:** • Determination of molecular weight of polymer by viscometry method • Determination of Chemical Resistance of Refractory Materials by immersion method	**9 Hours** **6 Hours**
CORROSION IN CIVIL INFRASTRUCTURE Introduction - Forms of corrosion: Uniform corrosion, Galvanic corrosion, Pitting corrosion, Crevice corrosion, Stress corrosion cracking, Microbially induced corrosion - Corrosion mechanisms: Dry chemical and electrochemical corrosion - Corrosion in Reinforced Concrete: Carbonation (Mechanism and factors affecting rate) - Chloride-induced corrosion (Critical chloride threshold) – Corrosion Inhibitors-Corrosion prevention strategies: Cathodic protection - anodic protection - protective nano coatings - Failure analysis and prevention **Practical Component:** • Determination of corrosion rate on mild steel by Weight loss method • Analysis of pH for determining soil samples.	**9 Hours** **6 Hours**
PROTECTIVE COATINGS AND SURFACE ENGINEERING Introduction to Coating Technology – Classification of Coatings and uses: Protective Coatings (Paints, Sealants and Varnishes) - Decorative Coatings (Aesthetic finishes: Colour theory and pigmentation in decorative coatings) - Functional Coatings (Anti-slip coatings, Fire-resistant coatings) -Coating Materials: Binders, pigments, solvents, and additives - Properties of Common Coating Materials - Epoxy-based coatings (Chemistry and curing mechanisms) - Polyurethane coatings (Types and performance characteristics) **Practical Component:** • Colour Theory and Its Application for Aesthetic Design • Evaluation of Colour Fastness for coating resistance	**9 Hours** **6 Hours**

SUSTAINABLE TECHNOLOGIES AND EMERGING TRENDS Green chemistry principles applied to material development. - Recycled and upcycled materials in construction - Sustainable Building Materials: Natural fibers in construction (Sisal, jute, and coir) - Green cement alternatives (Calcium sulfoaluminate cement, Alkali-activated materials)-Smart Coatings: Self-healing coatings (Mechanisms and materials) - Stimuli-responsive coatings (thermochromic, electrochromic) - Self-cleaning coatings: (Hydrophobic and photocatalytic coatings)- 3D – Printing Building Material : Introduction to 3D Printing in Construction - Advantages and limitations - 3D Printing Materials - Environmental impact - Examples of sustainable infrastructure projects - Future trends and research areas in material chemistry for sustainability.	**9 Hours**
Practical Component: • Estimation of hardness in grey water sample • Estimation of Dissolved oxygen in grey water sample	**6 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 75

Learning Resources

References:

6. Rangwala, S. C. (2009), Engineering materials. Charotar Publishing House.
7. Rajput, R. K. (2006). Engineering materials. S. Chand & Company Ltd.
8. Butinski, K. G. (). Engineering material. Prentice-Hall of India.ehta, P. K., & Monteiro, P. J. M. (2017). Concrete: Microstructure, properties, and materials. McGraw-Hill Education.
9. Mukhopadhyay, A. K., & Pandey, K. N. (2010). Composite materials: Science and engineering. Narosa Publishing House.
10. Jain, P. C., & Jain, M. (2015). Engineering chemistry. Dhanpat Rai Publishing Company (P) Ltd.
11. Syed Shabudeen, P. S. (2015). Engineering chemistry II. Inder Publications.
12. Rao, S. S. (2010). Engineering materials: Properties and applications of metals and alloys. Narosa Publishing House.
13. Callister, W. D., & Rethwisch, D. G. (2020). Materials science and engineering: An introduction (10th ed.). Wiley.
14. Fontana, M. G. (2005). Corrosion engineering. Tata McGraw-Hill Education.
15. Srinivasan, S., & Baskar, V. (2011). Protective coatings for steel structures. Tata McGraw-Hill Education.
16. Vyas, N., & Chauhan, M. S. (2020). Sustainable construction: Green building design and delivery. Narosa Publishing House.
17. Kibert, C. J. (2016). Sustainable construction: Green building design and delivery (4th ed.). Wiley.

Online Resources (Weblinks)

1. https://www.youtube.com/watch?v=ULt4aEst4mM&list=PLyqSpQzTE6M_RfjEQMK7_L-UvxAMhplUT&index=2
2. https://www.youtube.com/watch?v=5ur7kMCXnnk
3. https://www.youtube.com/watch?v=CJSgJssj4mc
4. https://www.youtube.com/watch?v=6ObSmW8fYL0
5. https://www.youtube.com/watch?v=08j-uyrCg6Q

Assessment (Embedded course)

CAT, Activity and Learning Task(s) (Concept Map, Think-Pair-Share, Jigsaw), MCQ, End Semester Examination (ESE).Lab Workbook, Model Exam, Viva-Voce.

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Dr. Muthuraja Perumal General Manager - Research & Development Rohith Industries, APIIC Industrial Park, Andhra Pradesh	Dr. Venkatakrishnan Professor, School of Chemical Sciences Indian Institute of Technology (Mandi) Himachal Pradesh India	Dr R Mayildurai, Dr. R Mahalakshmi, Department of Chemistry
Recommended by BoS on	16.08.2024	
Academic Council Approval	No: 27	**Date** 24.08.2024

24ADP001	BASICS OF ARTIFICIAL INTELLIGENCE (Common to all Departments except CS, IT, AD)	L	T	P	J	C
		0	0	2	0	1
ES		SDG	8, 9, 16			
Pre-requisite courses	-	Data Book / Code book (If any)	-			

Course Objectives:

The purpose of taking this course is to:

1	introduce students to the fundamentals of Artificial Intelligence (AI) and Generative AI, and its key concepts
2	enable students to explore and experiment with common generative AI models and tools for generating text, images, audio, video, and code
3	equip students with the techniques and best practices for crafting effective prompts for AI models

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	understand the fundamentals of AI and generative AI, including its potential impact, issues, limitations, and ethical concerns and its practical use cases in real-world scenarios.	U
CO 2	explore common generative AI models and tools for text, code, image, audio, and video generation.	E
CO 3	apply common prompt engineering techniques and approaches for writing effective prompts.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	2						2							
2	2		2											
3					2					2				

Course Content

Introduction to Artificial Intelligence (AI) **Practical Component** Introduction to Artificial Intelligence (AI) - Generative AI Overview and Use Cases - Impact and Examples of AI - Application Domains for AI - Generative AI Applications. AI Concepts, Terminology - Cognitive Computing (Perception, Learning, Reasoning) - Terminology and Related Concepts of AI- Machine Learning Techniques and Training - Deep Learning - Neural Networks - Natural Language Processing, Speech, Computer Vision - Self Driving Cars. AI: Issues, Concerns and Ethical Considerations - AI Ethics, Regulations, Governance, and ESG. The evolution and future of AI - The AI Ladder - The Journey for Adopting AI Successfully - Hotbeds of AI Innovation.	**8 Hours**
Generative AI: Introduction and Applications	

Practical Component Introduction and Capabilities of Generative AI - Applications of Generative AI - Tools for Text Generation - Tools for Image Generation - Tools for Audio and Video Generation - Tools for Code Generation	**6 Hours**
Generative AI: Prompt Engineering Basics **Practical Component** Introduction to Prompt and Prompt Engineering - Best Practices for Prompt Creation - Common Prompt Engineering Tools - Hands on Lab: Getting to Know Our AI Prompting - Experimenting with Prompts - Naive Prompting and Persona Pattern. Prompt Engineering Techniques and Approaches - Text-to-Text Prompt Techniques - Interview Pattern Approach - Chain-of-Thought Approach - Tree-of-Thought Approach - Future of Human-Crafted Prompts - Text-to-Image Prompt Techniques - Hands-on Lab: Effective Text Prompts for Image Generation.	**7 Hours**
Project and Wrap Up **Practical Component** Graded Quiz Final Project: Generating Text, Images, and Code.	**9 Hours**

Theory Hours: 0	**Tutorial Hours: 0**	**Practical Hours: 30**	**Project Hours: 0**	**Total Hours: 30**

Learning Resources

Textbooks:

1. George F. Luger "Artificial Intelligence: Structures and Strategies for Complex Problem Solving" (6th Edition), Pearson, 2021.
2. Anna Jordan, Robert S. Menzies, Kristine P. Schwab, "AI-Powered Creativity: Generative AI and the Future of Content Creation" Routledge, 2023.

References:

1. https://platform.openai.com/docs/overview
2. https://towardsdatascience.com/
3. https://gemini.google.com/

Online Resource (Weblinks)

1. Introduction to Artificial Intelligence (AI) | Coursera
2. Generative AI: Introduction and Applications | Coursera
3. Generative AI: Prompt Engineering Basics | Coursera

Assessment (Practical course)
MCQ, Mini project and viva-voce

Course Curated by

Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**
-	-	Dr. S. Sangeetha, Associate Professor Department of AI&DS

Recommended by BoS on	16.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24EET104	FOUNDATIONS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common to CE & TT)	L	T	P	J	C
		3	0	0	0	3
ES		SDG	7, 9, 12			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	impart knowledge on power system structure, apparatus and its operation
2	familiarize the students about the operation of Electrical and Electronic circuits
3	provide significance of energy conservation and safety in Electrical Installations

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	analyse the components of electrical power system and interconnections.	An
CO2	apply Ohm's Law and Kirchhoff's Laws to solve basic problems in electrical circuits.	Ap
CO3	compare the structure and principle of operation of Electrical motors and choose the motor for suitable applications.	Ap
CO4	analyse the operation of electronic devices, circuits and instrumentation systems.	An
CO5	apply Electrical safety and energy conservation measures.	An

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11		
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	2	2											
2	2	2											
3	2	2	1										
4	1	1	1										
5				1	1	1							

Course Content

ELECTRIC POWER SYSTEM — **9 Hours**

Structure of Power system: Single line diagram, Generation of power: Layouts of Hydro power station, Thermal power station, Solar power plant, Wind energy conversion system. Types of substations -Types of wires and cables, Domestic wiring.

ELECTRIC CIRCUITS Basic circuit elements and sources, Ohms law, Kirchhoff's laws, Series and Parallel connection of circuit elements (simple problems), Single phase AC series circuit: Voltage, Current, Power, Energy, Power factor in R-L series circuit.	**9 Hours**
ELECTRICAL MACHINES (Qualitative treatment Only) Single phase Transformers - Separately Excited DC motor - PM DC motor - Single phase Capacitor start and run induction motor - Three phase squirrel cage induction motor - PM Stepper motor - BLDC motor drive.	**9 Hours**
ELECTRONIC CIRCUITS PN junction diode - Full wave rectifier – Bipolar Junction transistors – Single phase bridge inverter (VSI) - Block diagrams of Online UPS, Digital Energy meter - Types of transducers- Introduction to smart sensors and automation systems.	**9 Hours**
ELECTRICAL SAFETY AND ENERGY CONSERVATION Earthing, Protective devices: Switch fuse unit - Miniature circuit breaker - Earth leakage circuit breaker-Lightning arrester - Safety precautions - PPE and First Aid - Energy conservation measures in domestic and industrial facilities.	**9 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 45

Learning Resources

Textbooks

1. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj - Basic Electrical and Electronics Engineering, 3rd Edition, McGraw Hill Education, 2021
2. S.L. Uppal, G.C. Garg - Electrical Wiring, Estimating and Costing, 6th Edition, Khanna Publishers, 2022

Reference books

1. P.S. Bimbhra - Electrical Machinery, 8th Edition, Khanna Publishers, 2023
2. V.K. Mehta, Rohit Mehta - Principles of Electrical Engineering, 2nd Edition, S. Chand Publishing, 2022
3. B.L. Theraja, A.K. Theraja - A Textbook of Electrical Technology - Vol. 2: AC & DC Machines, 25th Edition, S. Chand Publishing, 2023
4. Adel S. Sedra, Kenneth C. Smith - Microelectronic Circuits, 8th Edition, Oxford University Press, 2023
5. Robert L. Boylestad, Louis Nashelsky - Electronic Devices and Circuit Theory, 12th Edition, Pearson, 2023

Online Resources (Web Links)

1. https://www.coursera.org/learn/electronics
2. https://archive.nptel.ac.in/courses/108/105/108105053/

Assessment (Theory course)
CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. S. Jaya kumar Swagat Industries Ltd, CBE Mr. Lakshmiprasad Bosch Global Software Technologies, CBE	Dr.N.Senthilnathan Professor/EEE Kongu Engineering College Dr. S. Balamurugan Professor - EEE Amrita Vishwa Vidyapeetham	Dr. P. Thirumoorthi Professor Department of EEE
Recommended by BoS on	14.08.2024	

Academic Council Approval	27	**Date**	24.08.2024

24INP102	INNOVATION PRACTICUM – 1 (Common to all Departments)	L	T	P	J	C
		0	0	2	0	1
ES		SDG	9, 11, 12			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	analyse the effectiveness of systems thinking and problem-solving methodologies in applying data-driven insights for innovative solution design.
2	evaluate the impact of transdisciplinary collaboration on creating functional hardware prototypes through fabrication techniques.
3	understand the future trends and implications of technology in developing innovative products.

Course Outcomes:

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	recall the fundamental principles of custom hardware design.	R
CO2	understand the appropriate tools and their applications for solving hardware-related problems.	U
CO3	apply systems engineering concepts to real-world hardware design challenges.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	2		1											
2	2				1									
3		2	2	1										

Course Content

Engineering Fundamentals and Innovation Why engineering? The concept of street fight engineering - Real-world design process and problem-solving methodology - Data-driven insights and concept generation - Case studies of successful engineering innovations.	**3 Hours**
Transdisciplinary Systems and Manu'Futuring Transdisciplinary systems to accelerate innovation - Manu'Futuring: Technology in hardware manufacturing and manufacturing of hardware technologies - Future scopes with product case studies.	**6 Hours**
Building Custom Hardware How to build a basic custom hardware - Electronics fundamentals and components - Software for hardware control - Fabrication techniques.	**6 Hours**
System Thinking and Engineering Introduction to system thinking - Real world as a system - Concept of system engineering and its application – iLenSys.	**7 Hours**

Creativity Time and Tech Teardown Creativity exercise: Apply system thinking to a real-world problem - Tech teardown: Analyse a product or system to understand its engineering principles - Presentation: Present your creative project and tech teardown with an engaging title	**8 Hours**

Theory Hours:	0	Tutorial Hours:	0	Practical Hours:	30	Project Hours:	0	Total Hours:	30

Learning Resources

Textbooks:

1. Sanjoy Mahajan - Street Fighting Mathematics
2. Donald Knuth - The Art of Computer Programming
3. Think like a programmer: An introduction to creative problem solving
4. Thinking in Systems: A Primer

References:

1. Learning to code: How to think like a programmer
2. How to find innovative ideas: Ramesh Raskar's note
3. Case study: How Tesla changed the auto industry
4. Ultimate Guide: How to develop a new electronic hardware product

Online Resources (Weblinks)

1. https://www.ifixit.com/Teardown?srsltid=AfmBOorwzDG9RhJoL3L5tlZ_Dr4sVcey-vPC-pkKTj2E0mWJWtFYlikY
2. https://www.symmetryelectronics.com/technology-teardowns/

Assessment (Practical course)
Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert from Industry	Expert from Higher Education Institutions	Internal Expert
Dr. Mahesh Veezhinathan Director - Innovation Practicum Associate VP - Forge. Innovation	-	Dr. Samuel Ratna Kumar P S Assistant Professor – III Department Mechanical Engineering

Recommended by BoS on	17.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24MEI101	ENGINEERING GRAPHICS (Common to AE, AU, CE, FT, ME, MR, TT)	L	T	P	J	C
		2	0	2	0	3
ES		SDG		4, 9, 11		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	understand the importance of graphics in the design process, including visualization, communication, and documentation.
2	develop proficiency in constructing various curves, orthographic projections, and using drafting tools.
3	gain the ability to project and section simple solids and develop lateral surfaces and isometric projections.
4	learn to use AutoCAD for sketching, editing objects, and creating detailed engineering drawings.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply the construction of curves such as ellipses, parabolas, and hyperbolas to accurately visualize and communicate design ideas using drafting tools.	Ap
CO 2	analyze the projections of points, lines, and planes to determine true lengths and inclinations for effective representation of objects in design.	An
CO 3	evaluate the projections and sections of solids like prisms, pyramids, cylinders, and cones to create accurate sectional views and true shapes in engineering drawings.	An
CO 4	create developments of surfaces for simple solids and construct isometric projections to enhance the design process with three-dimensional visualizations.	An
CO 5	design free-hand sketches of orthographic views using AutoCAD.	Ap
CO 6	apply AutoCAD commands to demonstrate object selection and editing techniques, enabling precise modifications in engineering drawings.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	2	2			2									
2		2		2						2				
3		2	2				2							
4	2		2		2									
5	2				2					2				
6	2				2					2				

Course Content

PLANE CURVES, PROJECTION OF POINTS, LINES AND PLANES — **6 Hours**

- Importance of graphics in design process, visualization, communication, documentation and drafting tools, Construction of curves - ellipse, parabola, and hyperbola by eccentricity method only. Orthographic projection of points.

• Construction of cycloid — Construction of spirals - Construction of involutes of square and circle. • Drawing of tangents and normal to the above curves. • Projections of straight lines located in first quadrant - determination of true length and true inclinations. • Projections of plane surfaces - polygonal lamina and circular lamina, located in the first quadrant and inclined to one reference plane.	**6 Hours**
PROJECTION AND SECTION OF SOLIDS • Projection of simple solids - prism, pyramid, cylinder and cone. Drawing views when the axis of the solid is inclined to one reference plane. • Sectioning of simple solids - prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane.	**6 Hours** **6 Hours**
DEVELOPMENT OF SURFACES, ISOMETRIC PROJECTIONS • Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones. • Isometric projection, Isometric scale, Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones.	**6 Hours** **6 Hours**
FREE-HAND SKETCHING AND INTRODUCTION TO AUTOCAD • Free hand sketching techniques, sketching of orthographic views from given pictorial views of objects, including free-hand dimensioning. Free hand sketching of isometric views from orthographic views. • Introduction to Drafting Software (AutoCAD) & its Basic Commands. Introduction to coordinate systems, object selection methods, selection of units and precession. Annotation and dimensions, Object properties.	**6 Hours** **6 Hours**
DRAWING ORGANIZATION AND HOUSE PROJECT AutoCAD - Sketching – line, circle, arc, polygon, rectangle and ellipse. Working with object snaps, layers and object properties. Editing the objects – copy, move, trim, extend, working with arrays, mirror, scale, hatch, fillet and chamfer. Isometric views of simple solid blocks.	**6 Hours** **6 Hours**

Theory Hours: 30	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 60

Learning Resources

Textbooks:

18. Basant Agrawal and CM Agrawal, Engineering Drawing, McGraw-Hill, New Delhi, First Edition, 2008.
19. Venugopal K. and Prabhu Raja V., Engineering Graphics, New Age International (P) Limited, New Delhi, 2008.

References:

1. Nataraajan K.V., Engineering Drawing and Graphics, Dhanalakshmi Publisher, Chennai, 2005.
2. Warren J. Luzadder and Jon. M. Duff, Fundamentals of Engineering Drawing, Prentice Hall of India Pvt. Ltd., New Delhi, Eleventh Edition, 2005.
3. Gopalakirishna K.R., Engineering Drawing (Vol. I & II), Subhas Publications, 2001.
4. James Leach, AutoCAD 2017 Instructor, SDC Publications, 2016.

Online Resources (Open sources):

1. https://www.khanacademy.org/math/differential-calculus
2. https://nptel.ac.in/courses/106105171
3. https://swayam.gov.in/nd1_noc19_cs42/preview

Assessment (Embedded course)

CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by			
Expert from Industry	**Expert from Higher Education Institutions**	**Internal Expert**	
Mr. G. Vergin Vino Design Engineer TANCAM, Chennai	Dr. V. Prabhuraja Professor Department of Mechanical Engineering PSG College of Technology, Coimbatore	Dr. K. M Senthil Kumar Associate Professor Department of Mechanical Engineering	
Recommended by BoS on	17.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24HSJ102	FLUENCY THROUGH PRACTICE (Common to all Departments)	L	T	P	J	C
		0	0	0	4	2
HS		SDG	4, 8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	develop professional communication skills, including technical writing, public speaking, and collaborative discourse.
2	foster creativity and critical thinking by producing real-world academic and professional outputs such as book chapters, journal articles, and intellectual property.
3	instil awareness of global and ethical communication practices, contributing to sustainability and social impact.
4	enhance students' language fluency through project-based learning relevant to engineering

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	analyse and apply effective communication techniques in professional contexts.	An
CO2	collaborate in teams to design and execute language-based projects with real-world applications.	Ap
CO3	develop critical thinking and problem-solving skills through research, analysis, and presentation of technical content.	An
CO4	produce publishable-quality written and spoken outputs, such as book chapters, journal articles, and copyrighted content.	C

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1		2	2	1			3	2	2	1	2			
2		3	2	1			3	2	2	1	2			
3		2	2	2			3	2	2	1	2			
4		3	1	1			3	2	2	1	1			

Course Content

- Introduction to Activity Based Learning
- Research and Initial Project Planning
- Technical Writing and Documentation
- Creative Writing
- Drafting and Editing Techniques
- Teamwork and Peer Collaboration
- Public Speaking and Presentation Skills
- Challenges to Opportunities
- Cross-Cultural Communication and Global Ethics Intellectual Property and

60 Hours

Copyrighting Publication – English for research Writing Digital Communication & Social Responsibility	

Theory Hours: 0	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 60	Total Hours: 60

Learning Resources

Reference books

1. Mahesh Kumar, Dr.Soma. Soft Skills: Enhancing Personal and Professional Success, McGraw Hill,2023.
2. Maxwell, John C. Developing the leader within you, Harper Collins, 2018.
3. Ansarian, Loughman, and Teoh, Mei Lin. Problem-based Language Learning and Teaching: An Innovative Approach to Learn a New Language. Singapore, Springer Nature Singapore, 2018.
4. Savin Baden, M., Major, C. H. (2004). Foundations of Problem Based Learning. United Kingdom: McGraw-Hill Companies, Incorporated.

Online Resources (Weblinks)

1. https://www.sciencedirect.com/science/article/pii/S2590291123002735
2. https://www.cal.org/adultesl/pdfs/problem-based-learning-and-adult-english-language-learners.pdf
3. https://www.apu.ac.jp/rcaps/uploads/fckeditor/publications/polyglossia/Polyglossia_V16_Ng.pdf

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr.Vijayan Ramanathan , Project Manager, Toppan Merrill. Technologies, Coimbatore	Dr. Aninditha Sahoo, IIT, Madras Dr.P.R.Sujatha Priyadharshini, Anna University Chennai Dr. E. Justin Ruben, CIT, Coimbatore	Dr. Arokia Lawrence Vijay Dr. SG Mohanraj Department of English

Recommended by BoS on	16.08.2024		
Academic Council Approval	No:27	**Date**	24.08.2024

24INP101	DESIGN THINKING (Common to all Department)	L	T	P	J	C
		0	0	2	0	1
ES		SDG	9			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	introduces first-year engineering students to Design Thinking, focusing on practical, user-centered problem-solving techniques
2	empathize with users, generate ideas, and create models to test and refine their solutions
3	understand iteration, empathy, and critical reflection to cultivate a creative mindset

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply problem-solving techniques and the Design Thinking process to engineering problems using simple models	Ap
CO 2	understand user needs through various empathy techniques and develop/refine models iteratively based on user insights.	U
CO 3	reflect critically on their learning journeys and the emotional demands of problem-solving. Collaborate effectively in teams to develop innovative solutions	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	1		2			2		2			1			
2	1							2			1			
3	1		2			2		1			1			

Course Content

Introduction to Problem Solving and Ground Rules Introduction to problem-solving strategies without mentioning Design Thinking-Emphasize problem-solving attitudes, mindsets, and behaviours necessary for iterative problem solving (e.g., openness to failure, patience, empathy)-Set ground rules for the course, including incentives for creative risk-taking and penalties for non-participation or lack of reflection-Overview of the Design Thinking process and its importance.	**6 Hours**
Empathy and Problem Definition Techniques for understanding user needs, including observation, interviews, **surveys** and **focus groups-**Importance of secondary research as a complement for the above-mentioned methods-Introduction to empathy cycles: involve students in two empathy cycles before and after problem definition-Finetuning problem definition based on user insights.	**6 Hours**
Ideation and Concept Modelling Brainstorming ideas and selecting feasible solution-Creating concept modelling to	

visualize ideas-Include an empathy cycle after students propose solutions, allowing them to revisit and reshape their solutions based on further insights from users.	**6 Hours**
Prototyping and Testing with Models Building basic prototypes using simple materials (e.g., cardboard, clay)- Introduction to different prototyping methods (e.g., **low-fidelity** vs **high-fidelity models**) for different contexts: product design, space design, policy, and digital/e-commerce solutions-Conduct an empathy cycle after the prototype is developed to gather user feedback and refine the prototype.	**6 Hours**
Iteration and Final Modelling Project Students refine their prototypes based on feedback from the empathy cycle-Finalize prototypes for presentation based on consistent feedback loops.	**6 Hours**
Presentation, Reflection, and Learning Summaries Students present their final projects and reflect on their learning journeys, including how their understanding of problem-solving and empathy evolved during the course-**Learning Summary Activity:** Each student presents their individual journey and learning outcomes from the empathy cycles and iterations-Peer review and group discussions.	**6 Hours**

Theory Hours:	**0**	**Tutorial Hours:**	**0**	**Practical Hours:**	**30**	**Project Hours:**	**0**	**Total Hours:**	**30**

Learning Resources

Textbooks:

1. Handbook of Design Thinking, Christian Muller – Roterberg, Kindly Direct Publishing
2. The Art of Innovation, Tom Kalley
3. **E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company**

Online Resources (Weblinks)

1. Survey and focus group design guides
2. Guidance on Designing, Administering and Analyzing Focus Groups and Interviews
3. Empathy mapping tools
4. How to Make a Concept Model
5. Brainstorming Techniques: 15 Creative Activities
6. 10 Brainstorming Techniques for Developing New Ideas
7. Brainstorming templates
8. 5 Common Low-Fidelity Prototypes and Their Best Practices
9. UX Prototypes: Low Fidelity vs. High Fidelity
10. Low-fidelity vs. High-fidelity Design Prototypes (and when to use which)

Case study 1: Iterative Design and Prototype Testing of the NN/g Homepage

Case study 2: Using iterative design to optimise the user flow of a product

11. Reflective practice toolkit

Assessment
Formative: Assignments, Mini project

Course Curated by

Expert(s) from Industry	**Expert(s) from Higher Education Institutions**	**Internal Expert(s)**
		Dr. Padhmanand Sudhagar R Department of Bio-Tech Dr. Arul H Department of Physics
Recommended by BoS on	16.08.2024	

Academic Council Approval	No: 27	**Date**	24.08.2024

Semester II

24HST102	தமிழரும் ததாழில்நுட்பமும்/ TAMILS AND TECHNOLOGY	L	T	P	J	C
		1	0	0	0	1
HS		SDG	4, 8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	தமிழர்கின் மநசவு மற்றும் போளனத் மதோழில்நுட்பத்ளத அிமுகப்படுத்துதல், சங்க கோல கட்டிட மதோழில்நுட்பத்ளத விைக்குதல், ககோயில்கள் மற்றும் சிற்பக்களலகளை ஆரோய்தல். introducing weaving and pottery technology of Tamils -Explaining the building technology of the Sangam Period-Explore temples and sculptures.
2	கப்பல், இரும்பு, நோைாயங்கள், மை உருவோக்கும் மதோழிற்சோளலகள், ஆகியவற்ளை விைக்கம் மசய்தல், தமிழகத்தின் மதோல்லியல் சோன்றுகின் பழளமளய உைர்த்துதல். explain Ship, Iron, Coins, Beads Making Factories. Realizing the Antiquity of Archaeological Evidence of Tamil Nadu
3	கவோண்ளம மற்றும் அிவியல் தமிளழப் பற்ைி அிதல், இளையத்தில் தமிழின் கதளவளய உைர்த்துதல்,தமிழ் மமன்மபோருள்களை அிமுகம் மசய்தல். knowledge of Agricultural and Scientific Tamil, Realizing the need for Tamil on the Internet, Introducing Tamil software.

Course Outcomes:

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	தமிழர்கின் மநசவு மற்றும் போளனத் மதோழில்நுட்பத்தின் முக்கியத்துவத்திளன அிந்து மகோள்ளுதல். சங்ககோல தமிழர் வைர்த்த அழகுக் களலகளைத் மதரிந்து மகோள்ளுதல். know the importance of weaving and pottery technology of Tamils-To know the Aesthetics arts developed by Sangam Tamils	U
CO 2	கப்பல் கட்டும் களல, இரும்புத் மதோழிற்சோளல, நோைாயங்கள் அச்சடித்தல்,மை உருவோக்கும் மதோழிற்சோளலகள், சிலப்பதிகோரத்தில் உள்ை மிைிகின் வளகளய அிதல். knowledge of ship building, ironworks, coinage, minting, and beads making factories,Knowing the types of beads in Silapathikaram.	U
CO 3	கவோண்ளம மற்றும் நீர்ப்போசன மதோழில்நுட்பத்ளத அிந்து மகோள்ைல். அிவியல் தமிழ் மற்றும் கினித் தமிளழப் புரிந்து மகோள்ளுதல். know agriculture and irrigation technology. Understanding Scientific Tamil and Computer Tamil.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3

1	2		2				3	2	2		2			
2	2		2				3	2	2		2			
3	2		2				3	2	2		2			

Course Content

தநசவு மற்றும் பாறைத் ததாழில்நுட்பம்: சங்க கோலத்தில் மநசவுத் மதோழில் - போளனத் மதோழில்நுட்பம் - கருப்பு சிவப்பு போண்டங்கள் - போண்டங்கைில் கீைல் குை◌ியீடுகள். Weaving Industry during Sangam Age - Ceramic technology - Black and Red Ware Potteries (BRW)-Graffiti on Potteries.	**3 Hours**
வடிவறமப்பு மற்றும் &ட்டிடத் ததாழில்நுட்பம்: சங்க கோலத்தில் வடிவளமப்பு மற்றும் கட்டுமோனங்கள் ரூ சங்க கோலத்தில் வீட்டுப் மபோருட்கைில் வடிவளமப்பு - சங்க கோலத்தில் கட்டுமோன மபோருட்களும் நடுகல்லும் -சிலப்பதிகோரத்தில் கமளட அளமப்பு பற்◌ை◌ிய விவரங்கள் - மோமல்லபுரச் சிற்பங்களும், ககோவில்களும் - கசோழர் கோலத்துப் மபருங்ககோயில்கள் மற்றும் பிை◌ வழிபோட்டுத் தலங்கள் - நோயக்கர் கோலக் ககோயில்கள் - மோதிரி கட்டளமப்புகள் பற்◌ை◌ி அைிதல், மதுளர மீனோட்சி அம்மன் ஆலயம் மற்றும் திருமளல நோயக்கர் மஹோல் - மசட்டிநோட்டு வீடுகள் - பிரிட்டிஷ் கோலத்தில் மசன்ளனயில் இந்கதோ-சோகரோமசனிக் கட்டிடக் களல. 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.	**3 Hours**
உற்பத்தித் ததாழில் நுட்பம்: கப்பல் கட்டும் களல - உகலோகவியல் - இரும்புத் மதோழிற்சோளல - இரும்ளப உருக்குதல், எஃகு - வரலோற்றுச் சோன்றுகோக மசம்பு மற்றும் தங்க நோை◌யங்கள்- நோை◌யங்கள் அச்சடித்தல் - மைி உருவோக்கும் மதோழிற்சோளலகள் - கல்மைிகள், கண்ை◌ோடி மைிகள் - சுடுமண் மைிகள் - சங்கு மைிகள் - எலும்புத்துண்டுகள் - மதோல்லியல் சோன்றுகள் - சிலப்பதிகோரத்தில் மைிகைின் வளகைகள். 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 evidence - Gem stone types described in Silappathikaram.	**3 Hours**
கவைாண்றம மற்றும் நீர்ப்பாசைத் ததாழில் நுட்பம்: அளை, ஏரி, குை◌ங்கள், மதகு - கசோழர்கோலக் குமுழித் தூம்பின் முக்கியத்துவம்- கோல்நளட பரோமரிப்பு - கோல்நளடகளுக்கோக வடிவளமக்கப்பட்ட கிை◌றுகள்- கவைோண்ளம மற்றும் கவைோண்ளமச் சோர்ந்த மசயல்போடுகள் - கடல்சோர் அைிவு - மீன்வைம் - முத்து மற்றும் முத்துக்குை◌ித்தல் - மபருங்கடல் குை◌ித்த பண்ளடய அைிவு - அைிவுசோர் சமூகம். 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.	**3 Hours**
அைிவியல் தமிழ் மற்றும் &ை◌ித்தமிழ்: அைிவியல் தமிழின் வைர்ச்சி - கைித்தமிழ் வைர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு மசய்தல் - தமிழ் மமன்மபோருட்கள் உருவோக்கம் - தமிழ் இளையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இளையத்தில் தமிழ் அகரோதிகள்- மசோற்குளவத் திட்டம். 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.	**3 Hours**

Theory Hours: 15	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 15

Reference books

1. தமிழக வரலாறு மக்களும் பண்பாடும் கக.கக. பிள்ளள (வவளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முளனவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - ளவளக நதிக்களரயில் சங்ககால நகர நாகரிகம் (வதால்லியல் துளற வவளியீடு).
4. வபாருளந - ஆற்றங்களர நாகரிகம். (வதால்லியல் துளற வவளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL- (in print)
6. Social Life of the Tamils the Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tarnils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Textbook and Educational Services Corporation> Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation> Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) - Reference Book.

Online Resources

4. https://www.youtube.com/watch?v=Gp1ratX2sOE&list=PLtyn2o7hocf40PtPibRqJTf_dQL3eOtLl
5. https://www.youtube.com/watch?v=jteRvnNiD6w

Assessment (Theory course)

CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
-	-	-

Recommended by BoS on	16.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24HST103	EFFECTIVE COMMUNICATION	L	T	P	J	C
		2	0	0	0	2
HS		SDG	4, 8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to

1	enhance students' abilities to communicate ideas effectively, both orally and in writing, by developing skills in organizing thoughts clearly and logically and expressing them through well-structured paragraphs and concise summaries.
2	enable students to critically evaluate and synthesize information from multiple sources and utilize suitable writing techniques and formats to produce professional-quality content tailored to various contexts.
3	foster active listening, critical reading, and reflective thinking, empowering students to create engaging, relevant, and informative content by applying effective communication strategies across diverse platforms.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	demonstrate proficiency in delivering ideas effectively, both in speaking and writing, with a deeper understanding of the content and the ability to convey complex ideas through well-structured paragraphs and summaries.	Ap
CO2	create and present original content by evaluating information from multiple sources and employing appropriate formats and writing strategies across various professional contexts.	C
CO3	produce engaging and informative content through active listening, reading, reflection, and effective communication skills.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1							2	2	3		3			
2							2	2	3		3			
3							2	2	3		3			

Course Content

Text Analysis Composition of Coherent Paragraphs (Expository, Descriptive, Narrative, Evaluative) - Loud Reading (Reading Extracts will be given were students	**6 Hours**

identify the main idea of paragraphs or sections and debrief)	
Visual & Written Analysis Process writing (Drafting effective introduction, process and conclusion using appropriate transition words and phrases) - Describing Visuals (Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram) - Note Making & Summarizing	**6 Hours**
Professional Correspondence Crafting Professional Emails - Writing Instruction for Manuals - Reading technical documents (Reading extracts will be given to construct sentences from the new words found in the document)	**6 Hours**
Research and Documentation Library Reading (Identify at least three sources and extract information, Summarize the main ideas and key findings from each source, compile them findings into a brief report that includes the main points, sources, and relevance to the topic)- Report Writing (Title Page, Abstract, Introduction, Methodology, Results, Discussion, Conclusion and recommendation)	**6 Hours**
Talk Analysis and Podcast Skills Listening to and analyzing TED talks – Preparing Podcast-PRISM (Professional Rhetoric Improvement and Speech Mastery) to share facts, opinions and experiences - Writing Reviews on products.	**6 Hours**

Theory Hours:	**30**	**Tutorial Hours:**	**0**	**Practical Hours:**	**0**	**Project Hours:**	**0**	**Total Hours:**	**30**

Learning Resources

References:

1. Swamy, V. R. Narayana. Strengthen Your Writing. Orient Longman, 2003.
2. Sasikumar, V., and P. V. Dhamija. Spoken English: A Self-Learning Guide to Conversation Practice. Tata McGraw Hill, New Delhi (1993).
3. Maison, Margaret M. Examine Your English. Orient Longman, 1999.
4. Rizwi, Ashraf. Effective Technical Communication. Tata McGraw Hill, 2005.
5. Pickett, Nell Ann, and Ann A. Laster. Technical English: Writing, Reading, and Speaking.
6. Harpercollins College Div, 1993.

Online Resources (Weblinks)

1. https://owl.purdue.edu/owl/general_writing/academic_writing/paragraphs_and_paragraphing/index.html
2. https://learnenglish.britishcouncil.org/skills/writing/upper-intermediate b2/describing-trends
3. https://hbr.org/2016/07/how-to-write-email-with-military-precision
4. https://owl.purdue.edu/owl/subject_specific_writing/professional_technical_writing/reports and_memos/index.html

Assessment (Theory course)

CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated by			
Expert from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr.Vijayan Ramanathan , Project manager, Toppan Merrill. Technologies, Coimbatore	Dr. Aninditha Sahoo, IIT, Madras Dr.P.R.Sujatha Priyadharshini, Anna University, Chennai Dr. E. Justin Ruben, CIT, Coimbatore	Dr. Arokia Lawrence Vijay Dr. Sreejana Dr. Tissaa Department of English	
Recommended by BoS on	16.08.2024		
Academic Council Approval	No:27	**Date**	24.08.2024

24HST104	PROFESSIONAL COMMUNICATION (Common to all Departments)	L	T	P	J	C
		2	0	0	0	2
HS		SDG	4, 8			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to

1	develop students' abilities to craft clear, concise, and well-structured technical content and professional communications
2	enhance students' communication skills in team settings
3	equip students with cross-cultural communication skills and effective listening techniques

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	demonstrate proficiency in crafting clear, concise, and well-structured technical content and professional communications, including emails that meet industry standards.	Ap
CO2	communicate effectively in team settings, showcasing collaboration, conflict resolution, and leadership skills, while employing creative writing techniques to convey complex ideas.	An
CO3	apply principles of cross-cultural communication and effective listening techniques to engage successfully in diverse, globalized professional environments.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1						2	1	3	1		3			
2						2	3	3	2		3			
3						1	1	3	1		3			

Course Content

Mastering Professional Communication Industry-specific terminology (Business / Technical Register) - Crafting professional emails - Essential elements of an effective email (subject line, salutation, body, closing) - reading and responding to email communication – Networking Emails - Analyzing and interpreting technical texts (Loud Reading).	**6 Hours**
Navigating Digital Media Introduction to Digital media and online communication tools (instant messaging, video conferencing, social media, blogs, forums) - Listening and analyzing advanced audio materials - Creative & Blog Writing (General & Technical).	**6 Hours**

Technical Writing Techniques Writing Reflective Essays / Experience Sharing, Process writing, Transcoding graphics (interpreting technical texts), Writing Reviews (Research Articles & Books).	**6 Hours**
Building a Professional Digital Presence Creating Digital Profile - Overview of different digital platforms (LinkedIn, GitHub, personal websites) - Setting Up a LinkedIn Profile – Crafting a Video Resume – Digital Etiquette and Professionalism - Cross-cultural communication and diversity awareness.	**6 Hours**
Social Responsibility in Practice Environmental and social responsibilities - Case studies and real-world applications - Project Work - Writing Project reports.	**6 Hours**

Theory Hours: 30	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 30

Learning Resources

Reference books

1. Baker, W., & Ishikawa, T. Transcultural Communication Through Global Englishes: An Advanced Textbook for Students. Routledge, 2021.
2. Bodnar, O., Fedak, S., Hinsirovska, I., Denysiuk, N., Perenchuk, O., Plavutska, I., ... & Shchur, N. English for Study and Work: A Coursebook In-class Activities. 2017.
3. Doff, A., Thaine, C., Puchta, H., Stranks, J., & Lewis-Jones, P. Cambridge English Empower Advanced Student's Book. Cambridge University Press, 2016.
4. Hewings, M., Thaine, C., & McCarthy, M. Cambridge Academic English C1 Advanced Student's Book: An Integrated Skills Course for EAP. Cambridge University Press, 2012.
5. Beer, D. F., & McMurrey, D. A. A Guide to Writing as an Engineer. John Wiley & Sons, 2019.

Online Resources (Web Links)

1. https://hbr.org/2016/07/how-to-write-email-with-military-precision
2. https://ocw.mit.edu/courses/comparative-media-studies-writing/21w-732-scientific-and-technical-communication-spring-2015/
3. https://www.coursera.org/learn/digital-media
4. https://owl.purdue.edu/owl/subject_specific_writing/professional_technical_writing/reports_and_memos/index.html

Assessment (Theory course)
CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr.Vijayan Ramanathan , Project manager, Toppan Merrill. Technologies, Coimbatore	Dr. Aninditha Sahoo, IIT, Madras Dr.P.R.Sujatha Priyadharshini, Anna University, Chennai Dr. E. Justin Ruben, CIT, Coimbatore	Dr. Arokia Lawrence Vijay Dr. Hema Department of English

Recommended by BoS on	16.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24PHI104	APPLIED PHYSICS FOR CIVIL ENGINEERING	L	T	P	J	C
		3	0	2	0	4
BS		SDG	7, 9			

Pre-requisite courses	High School Education	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	explaining quantum tunnelling, material strength, and advanced engineering techniques.
2	exploring practical applications of laser technology in imaging, holography, and laser gyroscopes for various engineering and technological fields.
3	gaining foundational knowledge of green energy technologies and their significance in sustainable development.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply the principles of quantum mechanics to explain phenomena such as wave-particle duality and quantum tunnelling in civil engineering contexts.	Ap
CO 2	analyse the interactions between light and matter to determine the applications of lasers in civil engineering, such as in imaging and measurement.	An
CO 3	evaluate different renewable energy technologies like solar and wind energy to recommend sustainable energy solutions for civil engineering projects.	E
CO 4	analyse the thermal properties of materials and their impact on building performance to optimize the thermal design of civil structures.	An
CO 5	apply Hooke's Law and understand various elastic moduli and their relationships, including Poisson's Ratio.	An
CO 6	analyse by comparing the mechanical properties of materials, such as elasticity and bending, to assess their suitability for use in civil engineering applications.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3													
2	3	2												
3	3	2									2			
4	3	2									2			
5	3	2									2			
6	3													

Course Content

QUANTUM PHYSICS	9 Hours

Necessity of quantum mechanical picture- Planck's concept (hypothesis) - Wave-particle duality - de-Broglie waves - Physical significance of wave function - Schrodinger equation- Time independent and time dependent equation - Particle in a box- Eigen values and Eigen function- Superposition Principle- Quantum mechanical tunnelling through a barrier. **Practical Component** 1. Determination of Planck's constant – Electroluminescence method. Determination of magnetic susceptibility of a solid material – B-H curve apparatus	**6 Hours**
LASERS Interaction of light and matter - Quantization of electromagnetic radiation – Absorption, Spontaneous emission and Stimulated emission - Einstein's theory of stimulated emission- Population inversion - Sources of excitation - Active medium - Laser beam output- Nd-YAG laser - CO2 laser - Applications – Laser Imaging and Holography- Laser gyroscopes. **Practical Component** 1. Semiconductor laser: a. Determination of wavelength of laser b. Determination acceptance angle and numerical aperture of an optical fibre. c. Determination of particle size 2. Spectrometer – Determination of wavelength of mercury source using grating	**9 Hours** **6 Hours**
GREEN ENERGY Introduction to Green energy – Solar energy: Energy conversion by photovoltaic principle – Solar cells – Efficiency measurements – Types (First, Second and Third Generation) of Solar Cells - Wind energy: Basic components and principle of wind energy conversion systems – Ocean energy: Wave energy – Wave energy conversion devices. Futuristic Energy: Hydrogen – Methane Hydrates – Carbon capture and storage (CCS). **Practical Component** 1. Determination of efficiency of solar cell Determination of band gap of a semiconductor	**9 Hours** **6 Hours**
THERMAL PHYSICS Principles of heat transfer, steady state of heat flow - 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 **Practical Component** 1.Lee's disc – Determination of thermal conductivity of a bad conductor	**9 Hours** **6 Hours**
PROPERTIES OF MATTER Hooke's Law - Elastic moduli - Relation between elastic constants - Poisson's Ratio – Stress - Strain Diagram and its uses – factors affecting elastic modulus – Bending of beams – Expression for bending moment and depression - Cantilever - Depression of a cantilever - experimental determination of Young's modulus by Non uniform bending – I shape girders. **Practical Component** 1. Non-uniform bending – Determination of Young's modulus 2. Compound pendulum – Determination of acceleration due to gravity 3. Melde's string – Determination of frequency of a tuning fork	**9 Hours** **6 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 75

Learning Resources

Textbooks:

3. M N Avadhanulu, P.G. Kshirsagar, and TVS Arun Murthy. A Textbook of Engineering Physics, 11th Edition. S. Chand Publications (2018).
4. R.K. Gaur and S.L. Gupta. Engineering Physics, 10th Edition. Dhanpat Rai Publications (P) Ltd., New Delhi (2016).
5. Arthur Beiser, Shobhit Mahajan, and S. Rai Choudhury. Concepts of Modern Physics, 7th Edition. McGraw Hill Education, New Delhi (2017).
6. V. Rajendran. Applied Physics. Tata McGraw Hill Publishing, New Delhi (2017).

References:

1. Brij Lal and Subrahmanyam. Properties of Matter. S. Chand & Co Ltd., New Delhi (2014).
2. Satya Prakash. Quantum Mechanics. Pragati Prakashan Publishers (2015).
3. K. Thiagarajan and Ajoy Ghatak. Lasers: Fundamentals and Applications. Springer Science & Business Media (2010).
4. Marcel Dekker. Ultrasonics: Fundamentals, Technology, Applications, Second Edition. New York (1988).
5. William Silfvast Hill. Laser Fundamentals. Cambridge University Press (2018).
6. S.O. Pillai. Solid State Physics, Ninth Edition. New Age International Press (2020). Godfrey Boyle. Renewable Energy: Power Sustainable Future, Second Edition. Oxford University Press, UK (2019).
7. Chetan Singh Solanki. Solar Photovoltaics – Fundamentals, Technologies and Applications. PHI Learning Private Limited (2019).

Online Resources (Weblinks)

1. https://www.khanacademy.org/science/physics/forces-newtons-laws/hookes-law-and-elasticity
2. https://ocw.mit.edu/courses/1-050-solid-mechanics-fall-2004/
3. https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016/
4. https://ocw.mit.edu/courses/ec-s07-photovoltaic-solar-energy-systems-fall-2004/

Assessment (Embedded course)
CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE) Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
		Dr. R.G. Sethuraman Dr. R. Prakasam Department of Physics

Recommended by BoS on	16.08.2024		
Academic Council Approval	No:27	**Date**	24.08.2024

24MAI121	ADVANCED CALCULUS AND LAPLACE TRANSFORMS (Common to AE, AU, ME, MR)	L	T	P	J	C
		3	0	2	0	4
BS		SDG	7, 9			

Pre-requisite courses	24MAI111/ Linear Algebra and Calculus	Data Book / Codes books (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	utilize gradient, divergence, and curl, along with Green's, Stokes', and Gauss' theorems to solve complex vector calculus problems.
2	focus on first order and higher-order linear ordinary differential equations, including Bernoulli's and Leibniz's equations, relevant to engineering contexts.
3	use Laplace transforms to solve linear ordinary differential equations of second order and understand the behavior of simple and periodic functions.
4	explore Cauchy-Riemann equations for analytic functions and construct these functions using the Milne-Thomson method
5	employ the residue theorem to determine complex integrals and resolve real definite integrals effectively.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply gradient, divergence, and curl to solve vector calculus problems using Green's, Stokes', and Gauss' theorems.	Ap
CO 2	analyse first-order linear ordinary differential equations like Leibnitz's and Bernoulli's equations and higher-order linear homogeneous ordinary differential equations in engineering applications.	An
CO 3	apply the properties of Laplace transforms to solve simple and periodic functions	Ap
CO 4	apply Laplace transforms to solve linear ordinary differential equations of second order.	Ap
CO 5	analyse analytic functions using Cauchy-Riemann equations and construct analytic functions using Milne-Thomson method.	An
CO 6	determine complex integrals and apply the residue theorem to solve real definite integrals.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	2			2									
2	2	3	1		1									
3	2	2			2									
4	2	2		1	2									
5	3	2		2	2									

6	3	2			2									

Course Content

VECTOR CALCULUS Gradient, divergence, and curl, Line integrals, Green's theorem –Stoke's theorem – Gauss divergence theorem (without proofs)	**9 Hours**
Practical Component • Evaluating gradient, divergence and curl. • Evaluating line integrals and work done. • Verifying Green's theorem in the plane.	**9 Hours**
ORDINARY DIFFERENTIAL EQUATIONS Leibnitz's equation – Bernoulli's equation – Linear equations of higher order with constant coefficients – Euler's and Legendre's linear equations – Method of variation of parameters.	**9 Hours**
Practical Component • Solving of second and higher order ordinary differential equations.	**3 Hours**
LAPLACE TRANSFORMS Definition - Properties: Superposition, Shift in t or Time Delay, Shift in s, Time Derivatives, Time Integral – Initial Value Theorem – Final Value Theorem - Transform of periodic functions - Inverse transforms – Convolution theorem – Solution of linear ordinary differential equations of second order with constant coefficients.	**9 Hours**
Practical Component • Evaluating Laplace transforms and inverse Laplace transforms of functions. • Applying the technique of Laplace transform to solve differential equations.	**6 Hours**
ANALYTIC FUNCTIONS Functions of a complex variable – Analytic functions – Necessary and sufficient conditions in Cartesian coordinates, Cauchy – Riemann equations (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method	**9 Hours**
Practical Component • Verifying the analyticity of a function. • Construction of analytic functions by Milne Thomson method.	**6 Hours**
COMPLEX INTEGRATION Cauchy's integral theorem – Cauchy's integral formula –Taylor's and Laurent's series –Singularities and zeros –Residues –Residue theorem –Application of residue theorem for evaluation of real definite integrals.	**9 Hours**
Practical Component • Verification of Cauchy's integral formula and integral theorem. • Evaluation of real definite integrals using Complex integration.	**6 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 75

Learning Resources

Textbooks

7. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2020.
8. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2018.
9. Kreyzig E., "Advanced Engineering Mathematics" International students' version, 10th Edition, John Wiley and sons, 2023.

Reference books

1. Veerarajan T., "Engineering Mathematics (for First Year)", Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2008.
2. Weir, MD, Hass J, Giordano FR, "Thomas' Calculus", Pearson education 15th Edition, 2022.
3. G.B. Thomas and R.L. Finney, "Calculus and Analytical Geometry", 11th Edition, Pearson Education, 2006.
4. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 9th Edition, New

Delhi, 2020.

Online Resources (Weblinks)

6. **Multivariable Calculus by MIT OpenCourseWare (Free)**
   https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/
7. **Khan Academy: Multivariable Calculus (Free)**
   https://www.khanacademy.org/math/multivariable-calculus
8. **Coursera: Introduction to MATLAB Programming by Vanderbilt University**
   https://www.coursera.org/learn/matlab

Assessment

CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. Ramesh V.S., STEPS Knowledge Services Private Limited, Coimbatore. Mr. Jayakumar Venkatesan, Valles Marineris International Private Limited- Chennai. Mr. Imran Khan, GE Transportation Company, Bangalore.	Dr. T. Govindan, Government College of Engineering, Srirangam, Trichy. Dr. C. Porkodi, PSG College of Technology, Coimbatore. Dr. P. Paramanathan, Amrita Vishwa Vidyapeetham, Coimbatore.	Dr. S.MeenaPriyadarshini Dr.K.Maheswari Ms. A.Shamugavadivu Department of Mathematics

Recommended by BoS on	16.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24MET104	ENGINEERING MECHANICS (Common to AE, AU, CE, ME, MR)	L	T	P	J	C
		3	0	0	0	3
ES		SDG	9			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	apply principles of equilibrium to analyse rigid body systems in 2D space
2	calculate geometry-dependent properties such as centroid and moments of inertia
3	analyse the effects of friction in mechanical systems
4	understand the kinematics and kinetics of rigid bodies in plane motion

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	analyze the principles of transmissibility and moments to determine equilibrium conditions in rigid bodies.	Ap
CO 2	evaluate the geometry-dependent properties like center of gravity and moment of inertia to assess their impact on mechanical systems	Ap
CO 3	examine the laws of friction to distinguish between different types of friction in practical scenarios.	An
CO 4	analyze and solve problems related to the kinematics of rigid bodies in plane motion	An
CO 5	apply Newton's laws and principles of kinetics to solve problems involving the motion of rigid bodies.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3					2								
2	3					2								
3	3					2								
4	3					2								
5	3					2								

Course Content

STATICS OF RIGID BODIES Resolution of a Force into Components, Free body diagram. Equivalent systems of forces acting on a rigid body in 2D space: Principle of transmissibility – Moment of force about a point – Varignon's theorem – Moment of a couple – Equivalent couple – Moment of force about an axis – Coplanar non-concurrent forces acting on rigid bodies – Resultant and equilibrium – Resolution of a given force into force couple system – Equilibrium of a rigid bodies 2D space – Reactions and supports. Analysis of	**9 Hours**

structures.	
GEOMETRY DEPENDENT PROPERTIES Centre of gravity, Centre of mass and Centroid – Moment of Inertia of simple and complex areas – Transfer formula – Radius of gyration – Polar moment of inertia – Product of inertia - Mass moment of Inertia of simple solids, thin plates, composite bodies.	**9 Hours**
FRICTION Laws of friction – coefficient of friction – Dry friction – wedge friction – ladder friction – rolling resistance. Applications of friction by analytical approach in belt drives (open belt drive), clutches (plate and cone clutches), brakes (single shoe brake)	**9 Hours**
KINEMATICS OF RIGID BODIES - PLANE MOTION Kinematics of rigid bodies: Plane motion, translation and rotation General plane motion: Absolute velocity, relative velocity, instantaneous centre of rotation, absolute acceleration, relative acceleration.	**9 Hours**
KINETICS OF RIGID BODIES - PLANE MOTION Equations of motion of a rigid body - angular momentum, D'Alembert's principle; Principle of work and energy for a rigid body, work of forces acting on a rigid body, kinetic energy of a rigid body in plane motion, conservation of energy; Impulse-momentum principle for the plane motion of a rigid body; Overview of Lagrange's equations of motion.	**9 Hours**

Theory Hours: 45	**Tutorial Hours: 0**	**Practical Hours: 0**	**Project Hours: 0**	**Total Hours: 45**

Learning Resources

Textbooks

10. Ferdinand P. Beer, Jr. Johnston, E. Russell, Mechanics for Engineers: Statics and Dynamics, McGraw-Hill Inc.,US (1987).
11. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 15th edition, Prentice Hall, 2022

Reference books

20. Beer, Ferdinand P., E. Russell Johnston, David Mazurek, Phillip Cornwell, and Brian Self. *Vector Mechanics for Engineers: Statics and Dynamics*. 2024 ed. New Delhi: Tata McGraw-Hill, 2024. ISBN 9781260710892.
21. .James L. Meriam, L. G. Kraige, J. N. Bolton: Engineering Mechanics Statics , 9th edition, Wiley student edition, 2020.
22. James L. Meriam, L. G. Kraige, J. N. Bolton: Engineering Mechanics: Dynamics, 9th edition, Wiley student edition, 2020.
23. P. Boresi & J. Schmidt, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
24. Irving H. Shames, G. Krishna Mohana Rao, Engineering Mechanics - Statics and Dynamics, Fourth Edition – PHI / Pearson Education Asia Pvt. Ltd., 2006.
25. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics-Statics and Dynamics", Vikas Publishing House Pvt. Ltd., New Delhi, 2006

Assessment (Theory course)
CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert from Industry	Expert from Higher Education Institution	Internal Expert
Mr. Babin. T, Design Engineer Lead	Dr S Parimala Murugaveni Associate Professor, Department of Mechanical Engineering,	Dr. N. Sangeetha, Associate Professor, Department of Mechanical

|Mechanical Product Design Engineer-III at SLB, Singapore.	Government College of Technology, Coimbatore.	Engineering	
Recommended by BoS on	17.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24CSI101	LOGICAL THINKING AND PROBLEM SOLVING (Common to all Programmes)	L	T	P	J	C
		3	0	2	0	4
ES		SDG	8, 9			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	gain a comprehensive understanding of computing systems, including their classification, processing units, memory structures, storage hierarchies, and the essential functions and types of operating systems
2	develop strong logical and analytical thinking skills, enabling the systematic analysis and solution of computational problems using reasoning techniques, algorithms, and flowcharts.
3	acquire a solid foundation in C programming, mastering the use of data types, operators, control structures, and input/output operations to create efficient and effective programs.
4	apply advanced programming techniques, including the use of arrays, structures, pointers, and functions, to solve complex real-world problems with a focus on modular and efficient coding practices.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	understand the basic concepts of hardware, software, Operating systems, and the logic behind the functioning of the Computing systems.	U
CO2	apply logical thinking and reasoning to solve computing problems using tools like algorithms and flowcharts.	Ap
CO3	understand the structured programming paradigms, memory organization and how the language can be used as a tool to solve problems.	U
CO4	develop simple programs using data types, operators, control structures, pointers, and functions as appropriate in real world applications.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	
1	2													
2	3	2	1									3		
3		1										2		
4	3	2	1									3		

Course Content

FUNDAMENTALS OF COMPUTERS AND COMPUTING	6 Hours
Generations of computers, and classification of computers (supercomputers, mainframes, minicomputers, microcomputers). Processing Units (CPU, GPU, TPU),	

memory (RAM, ROM), storage devices and hierarchy, input / output and peripheral devices. System software, application software. Operating Systems - Functions (process management, memory management, file system management, device management, security), types of operating systems (desktop, mobile, networking, distributed, real-time, embedded). **Number Systems**: Introduction to different number systems (binary, octal, decimal, hexadecimal), conversions between number systems, and binary arithmetic (addition, subtraction, multiplication, division). **Practical Component** Exploring hardware and software components	 **4 Hours**
LOGICAL THINKING, REASONING AND TOOLS Problem Analysis – Logical Thinking vs Critical Thinking vs Design Thinking - Inference – Inductive Reasoning – Deductive Reasoning – **Logical Thinking Tools: Algorithms**: Definition and importance, characteristics of algorithms (finite, clear and unambiguous, well-defined inputs and outputs, feasible). Algorithm representation Techniques: Pseudocode, stepwise refinement, and top-down design. **Flowcharts**: Symbols used in flowcharts, creating flowcharts, and examples of flowchart-based problem-solving. **Practical Component** Algorithm writing and Flowcharts,	**8 Hours** **4 Hours**
PROGRAMMING PARADIGMS AND INTRODUCTION TO C PROGRAMMING **Programming Paradigms**: Structured programming - functional programming - object-oriented programming. **Introduction to C Programming**: History of C - features of C - structure of a C program – input / output statements. **Data Types**: Primitive data types (int, char, float, double) - derived data types, typecast. **Operators**: Arithmetic operators - relational operators - logical operators - bitwise operators - assignment operators - operator precedence. **Conditional Statements**: If - if-else - nested if - switch-case. **Looping Statements**: For loop - while loop - do-while loop. Pre-processor Directives and Command line arguments, Storage Classes. **Practical Component** Programs on Operator precedence, Decision Making, Iterations	**11 Hours** **10 Hours**
ARRAYS AND STRUCTURES **Collections**: Arrays – 2D Arrays – String Manipulation. **Structures and Unions**: Definition - declaration - accessing members - differences between structures and unions - applications. **Practical Component** Programs on Arrays, Structures, Union,	**10 Hours** **6 Hours**
POINTERS AND FUNCTIONS **Pointers**: Definition - declaration - pointer arithmetic - pointers and arrays. **Functions**: Definition - declaration - types of functions (user-defined, library functions) - parameter passing (by value, by reference) pointers and functions, recursion. **Practical Component** Pointers and Functions. Additional programs on Files to be discussed.	**10 Hours** **6 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 75

Learning Resources
Textbooks:

1. Kanetkar, Yashavant. Let Us C. BPB Publications, New Delhi (2023).
2. Rajaraman, V. Fundamentals of Computers. PHI Learning, New Delhi (2020).
3. Dromey, R.G. How to Solve it by Computer. Prentice Hall International, New York (2008).

Reference

1. Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Introduction to Algorithms. MIT Press, Cambridge (2022).
2. Balagurusamy, E. Programming in ANSI C. McGraw Hill Education, New York (2021).
3. Kernighan, Brian W., and Dennis M. Ritchie. The C Programming Language. Prentice Hall, New York (2017).
4. Patterson, David A., and John L. Hennessy. Computer Organization and Design: The Hardware/Software Interface. Morgan Kaufmann, San Francisco (2017).

Online Resources (Weblinks)

1. https://nptel.ac.in/courses/106105214
2. https://www.coursera.org/learn/computer-fundamentals
3. https://www.khanacademy.org/computing/computer-science/algorithms
4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/
5. https://www.geeksforgeeks.org/c-programming-language/

Assessment (Embedded course)
CAT, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE) Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**
-	-	Dr. S. Kavitha, Department of Information Technology

Recommended by BoS on	16.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24INP103	INNOVATION PRACTICUM – II (Common to All branches)	L	T	P	J	C
		0	0	2	0	1
ES		SDG	9, 11, 12			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	equip students with essential tools and techniques for leveraging open-source technologies to develop proof-of-concepts and prototypes
2	provide hands-on experience and participants will gain a comprehensive understanding of the entire product development process
3	final prototyping, empowering them to transform their ideas into tangible outcomes

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	analyse the effectiveness of various electronic tools and techniques in product development processes	An
CO 2	develop and implement functional software prototypes using open-source tools	Ap
CO 3	design and fabricate 3D models using digital fabrication techniques	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	2	2	2	2									
2	2	2	2		2									
3	2	2	3	2	2									

Course Content

INTRODUCTION TO OPEN-SOURCE TOOLS AND TECHNIQUES Explore the concept of open-source, its underlying principles and its contrast with proprietary software, Discuss the advantages of using open-source tools, such as lower costs, increased innovation, educational value, and community support, walk through to the commonly used open-source tools for electronics design (KiCad, FreeCAD), software development (Python, Eclipse), and fabrication (Cura, LinuxCNC).	**3 Hours**
ELECTRONICS FUNDAMENTALS AND TOOLS Introduction to basic electronic components (resistors, capacitors, transistors, etc.), Understanding of electronic circuits and their functions, Hands-on practice with CircuitJS and Falstad, Simulating and analysing electronic circuits, Introduction to Arduino and Raspberry Pi, exploring their capabilities and applications, Designing PCBs using KiCad and EasyEDA, Understanding PCB fabrication processes	**6 Hours**
SOFTWARE PROTOTYPING AND TOOLS Benefits of rapid prototyping in product development, Iterative design and testing,	**6 Hours**

Wireframing tools (Balsamiq, Figma), UI design tools (Sketch, Figma), Programming languages (Python, JavaScript), Testing frameworks (Selenium), No-code platforms (Bubble, Adalo, Wix, AppGyver), Building functional prototypes without extensive coding	
FABRICATION AND PROTOTYPING Overview of fabrication techniques (3D printing, laser cutting, CNC machining), Prototyping methods for physical products, using tools like Blender, TinkerCAD, or Fusion 360, Creating 3D models for physical prototypes, Hands-on experience with laser cutting and engraving, Understanding their applications and limitations	**7 Hours**
SIMULATION & DEMONSTRATION Integrated project demonstration, explaining the design process, technical choices, and outcomes, simulation showcase to demonstrate their understanding of various technical tools and prototyping techniques	**8 Hours**

Theory Hours:	0	Tutorial Hours:	0	Practical Hours:	30	Project Hours:	0	Total Hours:	30

Learning Resources

Textbooks:

12. Damir Godec, Joamin Gonzalez-Gutierrez, Axel Nordin, Eujin Pei, Julia Ureña Alcázar, A guide to additive manufacturing, Springer – 2022. https://doi.org/10.1007/978-3-031-05863-9
13. Introducing SolidWorks, Dassault Systems.

References:

26. Insight into Electronics
27. Microcontroller Programming with Arduino and Python
28. Fundamentals of 3D modelling

Online Resources (Weblinks)

9. Google Play store apps:
    a. https://play.google.com/store/apps/details?id=com.electronicslab
    b. https://play.google.com/store/apps/details?id=it.android.demi.elettronica
2. https://engservices-ece.sites.olt.ubc.ca/files/2020/01/SolidWorks-3D-Printing-Tutorial-R2.pdf

Assessment (Practical course)
Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert from Industry	Expert(s) from Higher Education Institution	Internal Expert
Dr. Mahesh Veezhinathan Director - Innovation Practicum Associate VP - Forge. Innovation	-	Dr. Samuel Ratna Kumar P S Assistant Professor – III Department Mechanical Engineering

Recommended by BoS on	17.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

24CEI101	BUILDING MATERIALS AND CONSTRUCTION PRACTICES	L	T	P	J	C
		3	0	2	0	4
ES		SDG		9,11		

Pre-requisite courses	Material Chemistry for Sustainable Infrastructure	Data Book / Codebook (If any)	-

Course Objectives:	
After successful completion of this course, the students should be able to	
1	Ability to select appropriate building materials for different construction scenarios.
2	Proficiency in applying advanced construction technologies in real-world projects.
3	Understanding of sustainable practices and their integration into construction projects.
4	To Explore Innovative Construction Techniques and technologies
5	Capability to analyse and implement innovative construction techniques and emerging technologies to enhance structural performance and sustainability.

Course Outcome:	After successful completion of this course, the students shall be able to	Bloom's Taxonomy Level(BTL)
CO 1	Identify and select appropriate building materials based on structural, environmental, and economic considerations for various construction scenarios.	R
CO 2	Demonstrate proficiency in utilizing advanced construction technologies to optimize efficiency, durability, and sustainability in real-world projects.	U
CO 3	Apply sustainable construction practices by integrating eco-friendly materials, energy-efficient techniques, and waste reduction strategies into construction projects.	AP
CO 4	Investigate and implement innovative construction techniques and emerging technologies to enhance construction efficiency, durability, and sustainability.	AP
CO 5	Analyze and apply innovative construction techniques and emerging technologies to improve structural performance, efficiency, and sustainability in construction projects.	AP

Course Outcomes (CO)	Program Outcomes (PO)(Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11	12	
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Environment& Sustainability	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2

1	3	2	2	2	2		2						3	
2	3	2	2	2	2								3	
3	3	2		2	2		2	2					3	
4	3	3	2	2	2		2						2	3
5	3	3	2	2	2		2	2					2	3

Course Content	
INTRODUCTION TO BUILDING MATERIALS Classification of Stones–Properties of Stones in structural requirements. Composition of Good Brick Earth, Manufacturing of bricks. Cement and Manufacturing process, Types of cement -Tests for Cement. Sustainable Materials: Introduction to Green Building Materials and their importance, Energy-Efficient Building Materials- Limestone Calcined Clay Cement (LC3) **Practical** • Determine the Fineness of Cement • Determine the Consistency Test on Cement • Determine the Initial Setting Time of Cement	**9 Hours** **6 Hours**
INNOVATIVE CONSTRUCTION MATERIALS Concrete Ingredients, Manufacturing, Types of Special Concrete. 3D Printing of Concrete, Nanotechnology in Concrete, Utilization of recycled aggregates, fly ash, and slag in construction. Applications of bio-based materials in sustainable construction. Classification of timber, plywood, fiberboard, masonite and its manufacturing- Timber used for interior design. Finishes, painting & varnishes – MEP in Construction. **Practical** • Determine the Specific Gravity of Fine Aggregate • Determine the Specific Gravity of Coarse Aggregate • Determine the Crushing Strength on Aggregates	**9 Hours** **6 Hours**
SUSTAINABLE CONSTRUCTION USING MODERN TOOLS Vasthu Science for Civil Engineers, Types of Constructions - Load Bearing, Framed& Composite Structure, Construction of Substructure - Job Layout, Foundation -Plinth. - DPC – Superstructure - Brick masonry- Stone Masonry- Flooring-Roofing- Scaffolding - Advanced Formwork Systems - Digital Tools for Monitoring and Management. **Practical** • Determine the Compressive Strength on Cement Mortar Concrete • Determine the Workability of Concrete Using Slump Test • Determine the Workability of Concrete Using Compaction Factor Test	**9 Hours** **6 Hours**
DIGITAL CONSTRUCTION TECHNOLOGIES Prefabrication - Building Information Modeling (BIM) - Automation and Robotics in Construction- Use of drones, automated machinery, and robotics in construction processes. Augmented Reality (AR) and Virtual Reality (VR):	**9 Hours** **6 Hours**

Practical • Determine the Workability of Concrete Using Flow Table Test • Determine the Compressive Strength of Concrete • Determine the Impact Strength on Aggregates	
EMERGING TRENDS IN CONSTRUCTION Smart Cities and Smart Buildings- Integration of IoT and AI in building design and construction - Digital tools for site management, safety, and quality control. Case Studies- Zero-Energy and Passive Houses **Practical** • Determine the Tensile Strength of Concrete • Determine the Flexural Strength of Concrete	**9 Hours** **6 Hours**

Theory Hours:	**30**	**Tutorial Hours:**	**0**	**Practical Hours:**	**30**	**Project Hours:**	**0**	**Total Hours:**	**60**

Learning Resources

Textbooks:

1. B.C.Punmia, "Building Construction", Laxmi Publications, New Delhi. 2016.
2. G.S.Birdie, T.D.Ahuja, "Building Construction and construction materials", Dhanpatrai publishing company, New Delhi, 2012

References:

1. SK Duggal, "Building Materials," New Age Publications 4th Edition, April, 2014
2. Varghese. P.C. "Building Construction", prentice hall of India Pvt. Ltd. New Delhi,2015.
3. Shah M.G. Kalec M. & Palki SY Building Drawing, Tata McGraw Hill, New Delhi,2000.
4. .M.S.Shetty. "Concrete Technology", S Chand and Company Limited, New Delhi, 2017.

Online Educational Resources:

https://archive.nptel.ac.in/courses/105/102/105102088/
https://archive.nptel.ac.in/courses/105/102/105102088/
https://archive.nptel.ac.in/courses/105/102/105102088/

Assessment (Embedded course)

CAT, Activity and Learning Task(s) MCQ, End Semester Examination (ESE).Lab Workbook, Model Exam, Viva-Voce.

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**		**Internal Expert(s)**
Er.Vijayakumar Founder Mannoviyum Institute of Training /SKV Constructions Coimbatore	Dr.M.P.Muthuraj HOD Coimbatore Institute of Technology Coimbatore		Dr.A.Vennila Assistant Professor -II Kumaraguru College of Technology Coimbatore
Recommended by BoS on	14/08/2024		
Academic Council Approval	No.	**Date**	24/08/2024

24HSP112	HOLISTIC WELLNESS-II (Common to all Department)	L	T	P	J	C
		0	0	2	0	1
HS		SDG	3, 4			

Pre-requisite courses	Holistic Wellness-I	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	build on the foundation laid in Holistic Wellness -I and deepening into the practices and principles of holistic wellness.
2	explore advanced techniques in mental, emotional, and spiritual well-being, with an emphasis on creating sustainable wellness habits.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply advanced techniques in mindfulness, meditation, and stress management.	Ap
CO 2	understand the role of community and social connections in wellness.	U
CO 3	develop resilience and adaptability in maintaining wellness.	E
CO 4	refine and sustain a personalized holistic wellness plan.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1						2		2						
2						2								
3						2					3			
4						2					3			

Course Content

ADVANCED MINDFULLNESS AND MEDITATION: • Deepening mindfulness practices for enhanced mental clarity. • Exploring different forms of meditation (e.g., guided, transcendental, movement-based). • Hands-on activity: Daily meditation practice and journaling reflections.	**6 Hours**
EMOTIONAL RESILIENCE AND MENTAL HEALTH: • Building emotional resilience through positive psychology practices. • Cognitive-behavioural strategies for managing stress and anxiety. • Hands-on activity: Developing and practicing a resilience toolkit.	**6 Hours**
SOCIAL AND ENVIRONMENTAL WELLNESS: • The impact of social connections and community on wellness. • Creating a supportive environment for personal growth. • Hands-on activity: Building a community wellness project or group activity.	**6 Hours**
INTERNAL GROWTH AND PURPOSE:	**6 Hours**

• Exploring the deeper aspects of internal wellness and self-actualization. • Reflective practices for discovering life purpose and meaning. • Hands-on activity: Creating a vision board or personal mission statement.	
SUSTAINING WELLNESS PRACTICES: • Strategies for maintaining wellness habits over the long term. • Adapting wellness plans to life changes and challenges. • Hands-on activity: Revising and finalizing a long-term personal wellness plan.	**6 Hours**

Theory Hours: 0	Tutorial Hours: 0	Practical Hours: 30	Project Hours:	Total Hours: 30

Learning Resources

Textbooks:

14. Hanh, Thich Nhat. The Miracle of Mindfulness: An Introduction to the Practice of Meditation. Beacon Press, Boston (1975).
15. Tolle, Eckhart. The Power of Now: A Guide to Spiritual Enlightenment. New World Library, Novato (1997).
16. Patel, Kamlesh. Heartfulness Way: Heart-Based Meditations for Spiritual Transformation, Kamlesh Patel, 2018.

References:

29. Goleman Daniel., Emotional Intelligence., Bloomsbury India, India, (2021).
30. James Allen., As a Man Thinketh., Maple Press, Noida, (2010)
31. Swami Budhanandha., Will power and its development., Advaita Ashrama Mayavati, Pithoragarh, Himalayas from its Publication Department, Calcutta. (2001)
32. Rosenberg, Marshall Bertram., Nonviolent Communication: A Language of Life., Puddle Dancer Press, Encinitas, CA (2015).
33. Jayanna, Krishnamurthy., Science & Practice of Integrative Health & Wellbeing Lifestyle., White Falcon Publishing (2020).
34. Lipton, Bruce., The Biology of Belief 10th Anniversary Edition: Unleashing the Power of Consciousness, Matter & Miracles, Hay House, Carlsbad (2015).
35. Kalderdon Adizes Ichak., What Matters in Life: Lessons I Learned from Opening My Heart
36. ., WS Press, Newtown, PA(2023).
37. Murphy, Joseph., The Power of Your Subconscious Mind [Original Edition (Complete)], Prentice-Hall, Englewood Cliffs (1963).
38. Kamlesh D. Patel., Designing Destiny: The Heartfulness Way, Heartfulness Institute, Chennai (2021)

Online Resources (Weblinks)

- Introduction to Psychology
- Guided Meditation
- Life skills and value education
- James Allen Library

Assessment (Practical course)
Participation, Practical activities and assignments, personal wellness plan and reflection.

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
		Dr. Ezhilarasi Principal- KCT

Recommended by BoS on			
Academic Council Approval	No: 27	**Date**	24.08.2024

24HSJ102	FLUENCY THROUGH PRACTICE (Common to all Programmes)	L	T	P	J	C
		0	0	0	4	2
HS		SDG	4, 9, 12			

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	develop professional communication skills, including technical writing, public speaking, and collaborative discourse.
2	foster creativity and critical thinking by producing real-world academic and professional outputs such as book chapters, journal articles, and intellectual property.
3	instil awareness of global and ethical communication practices, contributing to sustainability and social impact.
4	enhance students' language fluency through project-based learning relevant to engineering

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	analyse and apply effective communication techniques in professional contexts.	An
CO2	collaborate in teams to design and execute language-based projects with real-world applications.	Ap
CO3	develop critical thinking and problem-solving skills through research, analysis, and presentation of technical content.	An
CO4	produce publishable-quality written and spoken outputs, such as book chapters, journal articles, and copyrighted content.	C

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1		2	2	1			3	2	2	1	2			
2		3	2	1			3	2	2	1	2			
3		2	2	2			3	2	2	1	2			
4		3	1	1			3	2	2	1	1			

Course Content

- Introduction to Activity Based Learning
- Research and Initial Project Planning
- Technical Writing and Documentation
- Creative Writing
- Drafting and Editing Techniques
- Teamwork and Peer Collaboration
- Public Speaking and Presentation Skills
- Challenges to Opportunities

60 Hours

• Cross-Cultural Communication and Global Ethics Intellectual Property and Copyrighting Publication – English for research Writing Digital Communication & Social Responsibility	

Theory Hours: 0	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 60	Total Hours: 60

Learning Resources

Reference books

5. Mahesh Kumar, Dr.Soma. Soft Skills: Enhancing Personal and Professional Success, McGraw Hill,2023.
6. Maxwell, John C. Developing the leader within you, Harper Collins, 2018.
7. Ansarian, Loughman, and Teoh, Mei Lin. Problem-based Language Learning and Teaching: An Innovative Approach to Learn a New Language. Singapore, Springer Nature Singapore, 2018.
8. Savin Baden, M., Major, C. H. (2004). Foundations of Problem Based Learning. United Kingdom: McGraw-Hill Companies, Incorporated.

Online Resources (Weblinks)

4. https://www.sciencedirect.com/science/article/pii/S2590291123002735
5. https://www.cal.org/adultesl/pdfs/problem-based-learning-and-adult-english-language-learners.pdf
6. https://www.apu.ac.jp/rcaps/uploads/fckeditor/publications/polyglossia/Polyglossia_V16_Ng.pdf

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr.Vijayan Ramanathan , Project Manager, Toppan Merrill. Technologies, Coimbatore	Dr. Aninditha Sahoo, IIT, Madras Dr.P.R.Sujatha Priyadharshini, Anna University Chennai Dr. E. Justin Ruben, CIT, Coimbatore	Dr. Arokia Lawrence Vijay Dr. SG Mohanraj Department of English

Recommended by BoS on	16.08.2024		
Academic Council Approval	No:27	**Date**	24.08.2024

SEMESTER -III

24CET201	Fluid Mechanics and Applied Hydraulics	L	T	P	J	C
		3	0	0	0	3
Professional Core		SDG	6,7,9,11			

Pre-requisite courses	Nil	Data Book / Code book (If any)	NA

Course Objectives:	
The purpose of taking this course is to:	
1	Introduce the fundamental properties of fluids and the principles of fluid statics, kinematics and dynamics, enabling them to analyze and solve practical engineering problems.
2	Equip students with the skills to solve practical problems related to pipe flow systems
3	To provide an in-depth understanding of open channel flow and uniform and non uniform flow behavior.
4	To study the selection, design, and performance analysis of turbines and pumps used in water and energy systems.
5	Develop students' ability to apply dimensional analysis for scaling fluid systems and to use CFD tools for simulating and analyzing fluid flow behaviour

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Understand and apply the fundamental properties of fluids and fluid statics and kinematics to solve real-world engineering problems.	U
CO 2	Analyze and interpret fluid flow behaviour using principles of fluid dynamics, including the continuity equation and Bernoulli's theorem and solve practical pipe flow problems	An
CO 3	Understand the principles of open channel flow and analyze the characteristics of uniform and non uniform flow behaviour	An
CO 4	Evaluate performance characteristics of hydraulic machines	Ap
CO 5	Apply dimensional analysis and use CFD tools for simulating and analyzing flow in civil engineering applications.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11		
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative eamwork	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	3	2	1	1	2	2	1	2	3	1	2	3	2
2	3	3	2	2	3	2	1	3	3	1	2	2	3
3	3	3	2	3	2	3	2	1	3	2	3	3	2
4	3	3	3	2	3	2	1	2	3	3	2	3	3
5	3	2	3	3	3	3	2	2	3	2	3	3	3

Course Content

MODULE 1: FLUID STATICS AND FLUID KINEMATICS — **9 Hours**

- Basic concept of Fluid and its properties – density, specific weight, viscosity, surface

tension, capillarity, compressibility • Pressure measurement – manometers, pressure transducers •	
MODULE 2: FLUID DYNAMICS AND PIPE FLOW • Flow visualization – streamlines, pathlines; continuity equation and classification of Flow • Euler's and Bernoulli's equations and applications (Venturimeter and Orificemeter) • Major (Darcy-Weisbach) and minor losses, empirical relations • Pipes in Series and Parallel	**9 Hours**
MODULE 3: FUNDAMENTALS OF OPEN CHANNEL FLOW • Open channel flow and Classification of flow • Chezy's and Manning's equations – Most Economical Rectangular, Trapezoidal and circular Channels • Specific Energy – Critical Depth, Critical velocity, Alternate depths, Specific Energy Curve, and normal depth • Gradually varied flow and classification of water surface profiles. • Rapidly Varied flow – Hydraulic Jump– types, energy loss, applications in spillways.	**9 Hours**
MODULE 4: HYDRAULIC MACHINES • Turbines - Types and Working Principle. • Computation of work done and determination of efficiency. • Centrifugal pump – working principle, types and performance curves • Reciprocating pump – working principle, types and performance curves	**9 Hours**
MODULE 5: INTRODUCTION TO CFD • Introduction to CFD (Computational Fluid Dynamics): Concepts, boundary conditions, post-processing and applications in Civil Engineering: • Advanced simulation of cavitation, flow separation, and turbulence using ANSYS Fluent, OpenFOAM	**9 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 45

Learning Resources

Textbooks:

1. Cimbala, J. M. and Y. A. Cengel, Essentials of Fluid Mechanics, McGraw-Hill, New York (2006).
2. Bansal, R.K., "Fluid Mechanics and Hydraulic Machines", 5th edition, Laxmi Publications Pvt. Ltd, New Delhi, 2008 (2).
3. Subramanya, K, *Flow in Open Channels*, McGraw Hill, 2017.
4. Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 2004.

References:

1. Jain A. K. "Fluid Mechanics", Khanna Publishers, 2010
2. Y. A. Cengel, J. M. Cimbala,"Fluid Mechanics, Fundamentals and Applications," 2nd Ed., McGraw-Hill, 2009.
3. Kundu, Pijush K., and Ira M. Cohen. *Fluid Mechanics*. 6th ed. Academic Press, 2015.
4. "Computational Methods for Fluid Dynamics," J. H. Ferziger, M. Peric, 3rd edition, Springer, 2002
5. Ven Te Chow, *Open Channel Hydraulics*, McGraw Hill, 2009.
6. L.W. Mays, *Water Resources Engineering*, Wiley, 2020
7. Jagadish Lal, Hydraulic *Machines*, Metropolitan Book Co., 2022.

Online Educational Resources:

1. https://archive.nptel.ac.in/courses/105/103/105103095/
2. https://archive.nptel.ac.in/courses/105/101/105101082/
3. http://ocw.mit.edu/courses/2-25-advanced-fluid-mechanics-fall-2013/pages/fluid-statics/
4. http://www.digimat.in/nptel/courses/video/105103096/L01.html
5. http://www.digimat.in/nptel/courses/video/112103249/L36.html
6. https://ocw.mit.edu/ans7870/2/2.25/assignments/sec5/5-27/index.html

sessment (Theory course)

T, Open Book Test, Learning Tasks (Concept Maps, Diagnostic Questions), End Semester Examination (ESE).

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
.		1. Ms.S.Rajalakshmi / AP / Civil 2. Mr.KRP.Satheesh Kumar / AP / Civil 3. Ms.Chitra / AP/ Civil 4. Dr.Prasanna Venkatesh R / AP / Civil	
Recommended by BoS on	XX/YY/2024		
Academic Council Approval	No.	**Date**	XX/YY/2024

24CEI202	SOLID MECHANICS	L	T	P	J	C
		2	1	2	0	4
Professional Core		SDG	SDG No's. -9			

Pre-requisite courses	Engineering Mechanics	Code book	Nil

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the fundamental principles of stress, strain, and strain energy in materials.
2	Analyze the beams to determine shear forces, bending moments.
3	Analyze internal forces, stresses, and deflections in beams under various loading conditions
4	Apply methods to analyze plane and space trusses for structural evaluation.
5	Evaluate torsional behavior and design shafts under combined loading and analyse helical springs.
6	Develop practical skills through testing and simulations to validate theoretical concepts.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Analyze and evaluate axial stress-strain behavior in materials under various loading conditions, including thermal and impact loads	Ap
CO 2	Construct shear force and bending moment diagrams for statically determinate beams and interpret the internal force distribution.	An
CO 3	Apply flexural and shear stress theories to determine the stress distribution in beam cross-sections and compute beam deflections using analytical methods.	Ap
CO 4	Analyze plane and space trusses using the method of joints, method of sections, and the tension coefficient method for both theoretical and practical applications.	An
CO 5	Evaluate torsional behavior of solid and hollow shafts, assess combined loading conditions, and analyze the mechanical response of closed and open-coiled helical springs.	Ap
CO 6	Perform material and structural tests using standard laboratory equipment and virtual simulations to interpret results and validate theoretical analysis.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	3	2	2	3	2	2	1	1	2	2	3	2	2
2	3	3	2	2	3	2	1	1	1	2	2	3	2	1
3	3	3	3	2	3	3	2	1	1	2	2	3	2	2
4	3	3	2	2	3	2	2	2	1	2	2	3	2	2
5	3	3	2	2	3	3	2	1	1	2	2	3	2	2
6	3	2	2	2	3	3	2	2	2	3	3	3	3	2

Course Content

MODULE 1: SIMPLE STRESSES AND STRAIN: Fundamentals of Stress and Strain- Stress-Strain relationships- Hooke's Law and Elastic Constants - Strain Energy- Factor of Safety -Thermal stress analysis-Analysis of composite bars- 2D stress system- Mohr's Circle **Practical Component:** • Tension Test on Mild Steel Specimen/Cast iron specimens • Compression Test on Concrete / Wood / Cast Iron Specimen • Study of Mohr's Circle using strain rosette (Virtual Study)	**12 Hours**
MODULE 2: SHEAR AND BENDING IN BEAMS Introduction to beam mechanics- Sign conventions and interpretation- Analysis of statically determinate beams - Construction of shear force and bending moment diagrams (SFD & BMD) for different loading conditions. **Practical Component:** • Indentation hardness test on metals	**12 Hours**
MODULE 3: FLEXURAL, SHEAR STRESSES AND DEFLECTION IN BEAMS Theory of simple bending- Stress Analysis in Beams- Shear and Bending Stress distribution at a cross section with different loading conditions- Deflection of determinate beams - Double integration method-Macaulay's methods- Area moment method- Conjugate beam method for the computations of slopes and deflections. **Practical Component:** • Bending Test on Simply Supported Beam/Cantilever Beam • Bending Stresses (Virtual Study)	**12 Hours**
MODULE 4: PLANE AND SPACE TRUSSES Fundamentals of Trusses- Analysis of Plane Trusses- Method of joints – Method of sections; Space truss – Tension Co-efficient Method **Practical Component:** • Model Making: Plane Truss (Pin jointed simply supported/Cantilever Truss)	**12 Hours**
MODULE 5: SHAFTS AND SPRINGS Elastic theory of torsion – Torsion in solid and hollow shafts- Combined loading on shafts- Strain energy in torsion- Modulus of rupture in torsion- Power transmission in shafts- Closed and open coiled helical springs **Practical Component:** • Torsion test on round mild steel/cast-iron rods • Tests on Helical Springs	**12 Hours**

Theory Hours:	**45**	**Tutorial Hours:**	**0**	**Practical Hours:**	**15**	**Project Hours:**	**0**	**Total Hours:**	60

Learning Resources
Textbooks:
1.Popov, E.P., Engineering Mechanics of Solids, Prentice-Hall of India, New Delhi, 2009. 2.Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, Mechanics of Materials, Laxmi Publications (P) Ltd., New Delhi, 2017. 3.Bansal, R.K., Strength of Materials, 6th Edition, Laxmi Publications (P) Ltd., New Delhi, 2018. 4.. Timoshenko, S., Gere, J.M., Mechanics of Materials, A&C Black, 2nd Edition, 2013. 5.Rajput, R.K., Strength of Materials: Mechanics of Solids, 4th Edition, S. Chand & Company Ltd., New Delhi, 2015. 6.Ramamrutham, S., Narayan, R., Strength of Materials, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2017. 7.Rattan, S.S., Strength of Materials, 3rd Edition, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2022. 8.Beer, F.P., Johnston, E.R., DeWolf, J.T., Mazurek, D.F., Mechanics of Materials, 8th Edition, McGraw Hill Education, New York, 2018. 9.Gere, J.M., Goodno, B.J., Mechanics of Materials, 8th Edition, Cengage Learning, Boston, 2012. 10.Shames, I.H., Pitarresi, J.M., Introduction to Solid Mechanics, 3rd Edition, Prentice Hall, New Jersey, 2000.
Online Educational Resources:
1.https://onlinecourses.nptel.ac.in/noc23_me40/preview (*Mechanics of Solids by Prof. C.S. Shankar*

Ram, IIT Madras)
2. https://archive.nptel.ac.in/courses/112/105/112105234/ (*Mechanics of Materials by Prof. S. K. Bhattacharyya, IIT Kharagpur*)
3.https://ocw.mit.edu/courses/1-050-solid-mechanics-fall-2004/ (*Solid Mechanics by Prof. Louis Bucciarelli, MIT OpenCourseWare*)
4.https://www.youtube.com/playlist?list=PLrjkTql3jnm8ZtMKXZmAJxYzGZLEb4ESZ (*Strength of Materials – Neso Academy YouTube Playlist*)
5. https://www.youtube.com/playlist?list=PL3D11462114B62A4E (*Mechanics of Materials by MIT – YouTube MIT OCW Lectures*)
6.https://www.coursera.org/learn/mechanics-1 (*Mechanics of Deformable Structures – École Polytechnique on Coursera*)
7. https://www.edx.org/course/mechanics-of-materials-i-fundamentals-of-stress-strain-and-axial-loading (*Mechanics of Materials I – Georgia Tech on edX*)
8.https://web.mit.edu/course/3/3.11/www/modules/mom.pdf (*Mechanics of Materials – Free MIT Textbook PDF by David Roylance*)
9.https://www.khanacademy.org/science/physics/forces-newtons-laws (*Basic Mechanics – Khan Academy Physics Section*)
10.https://www.coursera.org/learn/solid-mechanics (*Fundamentals of Solid Mechanics – Delft University of Technology on Coursera*)

sessment (Embedded course)
T 1, CAT 2, Activity and Learning Task(s), MCQ, End Semester Examination (ESE)
o Workbook, Experimental Cycle tests, viva-voce

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
[Mr. K. Sankar, Designation]		[Mr. A. Vishnu / AP/ CE/KCT] &Dr.V. Selvan, Head and Associate professor/CE/KCT	
Recommended by BoS on	XX/YY/2025		
Academic Council Approval	No.	**Date**	20/04/2025

24CEI203	Surveying	L	T	P	J	C
		3	0	2	0	4
Professional Core		SDG	9,11			

Pre-requisite courses	Nil	Data Book / Code book (If any)	NA

Course Objectives:	
The purpose of taking this course is to:	
1	Acquire fundamental knowledge of traditional and modern surveying techniques.
2	Develop technical skills for field data collection, analysis, and interpretation.
3	Implement surveying methods using advanced instruments like Total Station, GPS, and Drones.
4	Integrate photogrammetry, remote sensing, and GIS in surveying practices.
5	Build competency for handling real-time engineering survey projects for infrastructure development.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Understand the principles, measurements, and instruments of basic surveying.	U
CO 2	Perform levelling, traversing, and curve setting for site planning and execution.	Ap
CO 3	Analyze surveying data and conduct hydrographic surveys using modern techniques.	An
CO 4	Apply advanced field survey systems such as EDM, Total Station, and drones for precision surveying.	Ap
CO 5	Integrate GPS, Photogrammetry, and Remote Sensing data for geospatial applications.	C
CO 6	Execute engineering survey projects with best practices for sustainable and smart infrastructure.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	2	1	1	1	1	1	1	1	1	2	3	2	1
2	3	3	3	2	3	1	1	2	2	1	2	3	2	1
3	3	3	3	3	2	1	1	2	2	1	2	3	2	1
4	3	2	2	3	3	1	1	2	2	2	2	3	2	1
5	3	2	2	2	3	1	1	2	2	2	2	3	3	1
6	3	2	3	3	3	2	2	2	3	3	2	3	3	1

Course Content

MODULE 1: FUNDAMENTALS OF SURVEYING — **9 Hours**

- Principles of Surveying – Linear measurements – Ranging and Chaining – Error

corrections – Chain and Compass Surveying. • Levelling: Fly levelling, Check levelling – Contours – Area and Volume Calculations. **Practical Component:** • Setting out foundation by chaining and ranging. • Levelling to determine reduced levels.	**6 Hours**
MODULE 2: THEODOLITE AND TACHEOMETRY SURVEYING • Theodolite Surveying: Measurement of angles (horizontal and vertical), Traversing. • Tacheometry: Stadia method, Tangential method – Height and Distance measurement. • Control Surveys and Triangulation. **Practical Component:** • Measurement of horizontal angles using repetition and reiteration. • Determination of gradient using tacheometric surveying.	**9 Hours** **6 Hours**
MODULE 3: CURVES AND HYDROGRAPHIC SURVEYING • Simple curves, Compound curves, Reverse curves, Transition and Vertical curves – Setting out methods. • Hydrographic Surveying: Tides – Mean Sea Level – Sounding methods – Three-point problem. **Practical Component:** • Setting out of simple curve (right or left handed). • Conducting hydrographic survey simulation exercises.	**9 Hours** **6 Hours**
MODULE 4: MODERN FIELD SURVEY SYSTEMS • Principles of Electronic Distance Measurement (EDM). • Total Station: Components, Accessories, Field procedures, Error corrections, Care and Maintenance. • Introduction to Drone Surveying: Types of drones, Applications in Surveying. **Practical Component:** • Area determination using Total Station. • Height and distance measurement using Single plane and Double plane methods.	**9 Hours** **6 Hours**
MODULE 5: GPS, PHOTOGRAMMETRY AND GIS APPLICATIONS • GPS Surveying: Segments, Satellite Configuration, Signal structure, Orbit determination. • Types of GPS Receivers: Handheld and Geodetic. • Introduction to Photogrammetry and Remote Sensing. • Introduction to GIS Applications in Surveying. **Practical Component:** • Marking column points using Total Station and GPS. • Geospatial data collection using basic mobile GIS applications.	**9 Hours** **6 Hours**

Theory	Tutorial	Practical	Project	Total
Hours: 45	**Hours: 0**	**Hours: 30**	**Hours: 0**	**Hours: 75**

Learning Resources

Textbooks:

5. Punmia, B.C., Jain, A.K., Jain, A.K., *Surveying Vol I and II*, Laxmi Publications, New Delhi (2016).
6. Duggal, S.K., *Surveying Vol I and II*, McGraw Hill Education, New Delhi (2013).

References:

8. Basak, N.N., *Surveying and Levelling*, Tata McGraw-Hill Education (2014).
9. Madhu, N., Sathish Kumar, R., Satheesh Gopi, *Advanced Surveying: Total Station, GIS and Remote Sensing*, Pearson India (2017).
10. Arora, Manoj K., Badjatia, *Geomatics Engineering*, Nem Chand & Bros (2011).
11. Reddy, Anji M., *Remote Sensing and Geographical Information Systems*, B.S. Publications (2012).

Online Educational Resources:

7. https://www.udemy.com/course/surveying/
8. https://www.teacheron.com/online-surveying-tutors

9. https://archive.nptel.ac.in/courses/105/104/105104101/

sessment (Embedded course)
T, Open Book Test, Learning Tasks (Concept Maps, Diagnostic Questions), End Semester Examination (ESE). Workbook, Experimental Cycle tests, viva-voce.

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
Mr. V. Saravanan, Assistant Director, PA to Collector, District Survey Office, Coimbatore.	Dr Srinivasa Raju Kolanuvada, Professor, Department of Civil Engineering, Anna University (CEG), Chennai.	5. Mr. J. Viswanath/Civil 6. Ms. S. Anita/Civil 7. Mr. A. Aswin Bharath/Civil	
Recommended by BoS on	XX/YY/2024		
Academic Council Approval	No.	**Date**	XX/YY/2024

24CEP204 Engineering Science	BUILDING INFORMATION MODELING LAB	L	T	P	J	C
		0	0	2	0	2
		SDG	4,9 ,11			

Pre-requisite courses	NIL	Data Book / Code book (If any)	NIL

Course Objectives:

The purpose of taking this course is to:

1	To impart foundational knowledge of 2D drafting principles and conventions used in civil engineering drawings.
2	To develop hands-on skills in creating accurate 2D plans, sections, and elevations using AutoCAD for different building types.
3	To introduce students to Building Information Modelling (BIM) concepts and their applications in architectural, structural, and MEP modelling.
4	To enable students to create, edit, and manage 3D parametric models using BIM software like Revit, focusing on real-world construction scenarios.
5	To build competency in generating presentation-ready outputs, including detailed drawings, 3D views, and walkthroughs from BIM models for design communication.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Apply AutoCAD tools to create 2D architectural and civil engineering drawings for various building types.	Ap
CO 2	Develop parametric 3D BIM models including architectural, structural, and MEP elements using Revit.	Ap
CO 3	Create annotated documentation, sheets, and visualization outputs from BIM models for project communication.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11		
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	3	2	3	1	3	1	1	2	2	2	2	3	2
2	3	2	3	1	3	1	1	2	2	2	2	3	3
3	2	1	3	1	3	2	1	3	3	3	2	3	2

Course Content

2D MODELLING — **30 Hours**

Practical Component:

1. Introduction to CAD: Interface, Layers, Units, Drafting Settings, and Tools
2. 2D Plan, Section, and Elevation of a Simple Residential Building
3. Creation of standard blocks: Doors, Windows, Staircases, Furniture Layouts
4. 2D Working Drawings for an Office Building: Floor plan with furniture and HVAC layout — **30 Hours**
5. 2D Drafting of a Commercial Building (e.g., shopping complex) with multiple rooms

and service zones 6. Layout Preparation and Plotting: Creating drawing sheets with title blocks, dimensions, hatching, legends	
3D BIM Modelling **Practical Component:** 7. Introduction to BIM, Revit Interface, Levels, Grids, and Project Setup 8. Basic 3D Modelling: Walls, Doors, Windows for a Residential House 9. Modelling of Floors, Roofs, and Staircases (parametric control) 10. Curtain Walls, Wall Openings, Railings, and Architectural Detailing 11. 3D Modelling of an Office Building: Multi-story design with lobby and workspaces 12. Family Creation: Custom doors, windows, furniture, equipment 13. Structural Elements: Beams, Columns, Slabs, Footings (in model form only) 14. MEP Elements: Plumbing layout, basic ducting and lighting for commercial spaces 15. Annotations, Callouts, Legends, and View Templates 16. Complete 3D BIM model of a Commercial Building, including rendering and sheet creation	**30 Hours** **30 Hours**

Theory Hours:	**0**	**Tutorial Hours:**	**0**	**Practical Hours:**	**60**	**Project Hours:**	**0**	**Total Hours:**	60

Learning Resources

Textbooks:

7. Krygiel, Eddy., Mastering Autodesk Revit 2021, Wiley, Indianapolis (2021).
8. Omura, George., AutoCAD 2021 for Beginners, BPB Publications, New Delhi (2021).

References:

12. Eastman, Chuck., BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers, Wiley, New Jersey (2018).
13. Smith, Dana K., "BIM in Civil Engineering Practice," BIM Handbook, Wiley, New Jersey (2018): pp. 245–267.
14. Kymmell, Willem., "Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations," SDC Publications, Kansas City, MO, USA. (2016). DOI: 10.1002/9781119287537
15. Hergunsel, Mehmet F., "Benefits of Building Information Modeling for Construction Managers," Technical Report No. CM-2011-103, Worcester Polytechnic Institute, Worcester, MA, USA. (2011).
16. Azhar, Salman., "Building Information Modeling (BIM): Trends, Benefits, Risks, and Challenges," Architectural Engineering and Design Management, Vol. 6 No. 3 (2011): pp. 240–252, DOI: 10.3763/aedm.2010.0117, Link
17. Arayici, Yusuf., "Towards Implementation of BIM in the UK Construction Industry," Proceedings of CIB W78 Conference, Paper #37: pp. 51–62, Sophia Antipolis, France, October 26–29, 2009., DOI: 10.1109/ICCRE.2009.37,

Online Educational Resources:

10. https://nptel.ac.in/courses/106105171
11. https://swayam.gov.in/nd1_noc19_cs42/preview
12. https://www.coursera.org/learn/fundamentals-of-bim
13. https://www.linkedin.com/learning/learning-autodesk-revit
14. https://www.udemy.com/course/mastering-building-information-modeling-bim-in-revit

sessment (Practical course)

b Workbook, Experimental Cycle tests, viva-voce, etc…

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. P. Ravikumar MD, Infinity PMC solutions Pvt Ltd		1. Dr.P.A.Prabakaran AP/Civil 2. Mr. A. Aswin Barath AP/Civil, 3. Ms.U.Sindhu Vaardini AP/Civil

Recommended by BoS on	XX/YY/2024		
Academic Council Approval	No.	**Date**	XX/YY/2024

SEMESTER IV

24CEP206 Professional Core	FLUID MECHANICS LABORATORY	L	T	P	J	C
		0	0	2	0	1
		SDG	6,7,9,11			

Pre-requisite courses	NIL	Data Book / Code book (If any)	NIL

Course Objectives:	
The purpose of taking this course is to:	
1	To experimentally verify the fundamental principles of fluid mechanics.
2	To familiarize students with various flow measurement devices and techniques.
3	To analyze the performance characteristics of hydraulic machines such as pumps and turbines.
4	To enable basic exposure to flow simulation tools used in engineering practice.

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Apply fundamental principles to analyze fluid flow systems	Ap
CO 2	Calibrate and use various flow measurement devices.	Ap
CO 3	Evaluate the performance of different types of pumps and turbines	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11		
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	3	2	3	1	3	1	1	2	2	2	2	3	2
2	3	2	3	1	3	1	1	2	2	2	2	3	3
3	2	1	3	1	3	2	1	3	3	3	2	3	2

Course Content

Practical Component: **30 Hours**

Flow Measurement

17. Determine the coefficient of discharge and compare theoretical vs actual flow using a venturimeter.
18. Determine the coefficient of discharge and compare theoretical vs actual flow using a Orificemeter.
19. Determination of velocity using Pitot Tube.
20. Measure flow rate over v-notch and determine its coefficient of discharge

sses in Pipes

21. Measure the frictional losses in pipes and determine the Darcy-Weisbach friction factor.
22. Evaluate head losses and loss coefficients in various pipe components

minar and Turbulent Flow

23. Determine Reynolds number and Visualize the flow behaviour.

draulic Machines

24. Analyze the performance characteristics of a Pelton wheel turbine.
25. Study the performance characteristics of reaction turbine (Kaplan or Francis).

26. Determine the efficiency and plot the characteristic curves of centrifugal pump. 27. Determine the efficiency and plot the characteristic curves of reciprocating pump. **mputational Fluid Dynamics** 28. CFD simulation of laminar pipe flow using OpenFOAM or ANSYS Fluent.	

Theory Hours:	**0**	**Tutorial Hours:**	**0**	**Practical Hours:**	**30**	**Project Hours:**	**0**	**Total Hours:**	**30**

Learning Resources
Textbooks:
9. Modi, P.N., and Seth, S.M., *Hydraulics and Fluid Mechanics*, Standard Book House, New Delhi, 2017. 10. Fox, R.W., McDonald, A.T., and Pritchard, P.J., *Introduction to Fluid Mechanics*, Wiley, 2020.
References:
18. White, F.M., *Fluid Mechanics*, McGraw-Hill Education, 2015. 19. Hydraulic Laboratory Manual, Centre for Water Resources, Anna University, 2015. 20. Anil W. Date, "Introduction to Computational Fluid Dynamics", Cambridge University Press
Online Educational Resources:
15. https://fmc-nitk.vlabs.ac.in/List%20of%20experiments.html 16. https://doc.cfd.direct/openfoam/user-guide/ 17. https://elearn.nptel.ac.in/shop/masterclasss-workshops/masterclass-series-closed/introduction-to-cfd-using-openfoam/

sessment (Practical course)
b Workbook, Experimental Cycle tests, viva-voce, etc…

Course Curated by		
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**
		8. Ms.S.Rajalakshmi / AP / Civil 9. Mr.KRP.Satheesh Kumar / AP / Civil 10. Ms.Chitra / AP/ Civil 11. Dr.Prasanna Venkatesh R / AP / Civil
APRecommended by BoS on	XX/YY/2024	
Academic Council Approval	No.	**Date** XX/YY/2024

24CEI207	Remote Sensing and Geographic Information Systems	L	T	P	J	C
		3	0	2	0	4
Professional Core		SDG	9,11			

Pre-requisite courses	Engineering Survey	Data Book / Code book (If any)	NA

Course Objectives:	
The purpose of taking this course is to:	
1	Understand the fundamental principles of remote sensing and the electromagnetic spectrum as it relates to Earth observation.
2	Familiarize with various satellite platforms, sensors, and image acquisition techniques used in environmental and civil engineering studies.
3	Develop skills in interpreting and analyzing satellite imagery using visual and digital image processing methods.
4	Gain proficiency in using GIS software to manage, analyze, and visualize spatial and attribute data
5	Apply knowledge of remote sensing and GIS to real-world civil engineering problems such as land use planning, infrastructure development, and environmental monitoring

Course Outcomes		
After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	Understand and explain the fundamental principles of remote sensing, including electromagnetic spectrum interactions and the characteristics of various natural surfaces.	U
CO 2	Classify and analyze the types of sensors and satellite platforms and evaluate their suitability for specific Earth observation applications.	An
CO 3	Apply digital image processing techniques for image enhancement, classification, and interpretation using both supervised and unsupervised methods.	Ap
CO 4	Demonstrate the ability to use Geographic Information Systems (GIS) software tools to digitize, manage, and analyze spatial and non-spatial data.	Ap
CO 5	Perform integrated data analysis using GIS models, apply raster and vector data processing, and use GIS for solving civil engineering problems.	C
CO 6	Apply practical skills in map digitization, database integration, spatial data visualization, and layout preparation using industry-standard GIS and remote sensing software.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	2	1	1	1	1	1	1	1	1	2	3	2	1
2	3	3	3	2	3	1	1	2	2	1	2	3	2	1

3	3	3	3	3	2	1	1	2	2	1	2	3	2	1
4	3	2	2	3	3	1	1	2	2	2	2	3	2	1
5	3	2	2	2	3	1	1	2	2	2	2	3	3	1
6	3	2	2	2	3	1	1	2	2	1	2	3	3	1

Course Content

• **MODULE 1: INTRODUCTION TO REMOTE SENSING** • Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzmann and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows. • Spectral signature concepts –typical spectral reflective characteristics of water, vegetation and soil **Practical Component:** • Projection, Re-projection and Coordinate Transformation of Maps.	**9 Hours** **6 Hours**
MODULE 2: PLATFORMS AND SENSORS • Types of platforms – orbit types, Sun- synchronous and Geosynchronous • Passive and Active sensors – resolution concept. • Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors. **Practical Component:** • Data Input – Onscreen Digitisation – Creation of Point, Line and Polygon layers. • Linking External Database and Tabular Data Analysis using SQL commands	**9 Hours** **6 Hours**
MODULE 3: IMAGE INTERPRETATION AND ANALYSIS • Types of Data Products – types of image interpretation- basic elements of image interpretation- visual interpretation keys • Digital image processing – Pre-processing – image enhancement techniques – multispectral image classification – supervised and unsupervised. **Practical Component:** • Attribute data input and Measurement of Distance, Area • Supervised and Unsupervised Image Classification	**9 Hours** **6 Hours**
MODULE 4: GEOGRAPHIC INFORMATION SYSTEM • GEOGRAPHIC INFORMATION SYSTEM 6 Hours Introduction – Maps- Definitions – Map projections – types of map projections – map analysis • GIS definition – basic components of GIS – standard GIS software. • Data type – Spatial and non-spatial (attribute) data – measurement scales- Data base Management Systems (DBMS). **Practical Component:** • Generating Graphs, Charts and Diagrams from Tabular data	**9 Hours** **6 Hours**
MODULE 5: DATA ANALYSIS • data type – Spatial and non-spatial (attribute) data – measurement scales- Data base Management Systems (DBMS). • Application of GIS in highway- alignment studies, Environmental and water resources – land Information system. **Practical Component:** • Data Conversion – Vector to Raster and Raster to Vector. • Map Joining, Edge Matching and Layout Design.	**9 Hours** **6 Hours**

Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 75

Learning Resources

Textbooks:

11. Thomas. M.Lillesand and Ralph. W. Kiefer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 7th Edition 2015.).
12. Basudeb Bhatta "Remote sensing and GIS" Oxford Publication, 2nd Edition 2011.

References:

21. Ian Heywood “An Introduction to GIS”, Pearson Education, Asia, 4th Edition 2012
22. Lo.C.P and A.K.W.Yeung, “Concepts and Techniques of Geographic Information Systems”, Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition 2010
23. Burrough P.A. and Rachel A. McDonell, “Principles of Geographical Information Systems”, Oxford Publication, 3rd Edition 2016.

Online Educational Resources:

18. https://elearn.nptel.ac.in/shop/nptel/remote-sensing-and-gis/?v=c86ee0d9d7ed
19. https://www.coursera.org/courses?query=remote%20sensing
20. https://www.udemy.com/course/google-earth-engine-gis-remote-sensing/?couponCode=ST8MT220425G3

sessment (Embedded course)

T, Open Book Test, Learning Tasks (Concept Maps, Diagnostic Questions), End Semester Examination (ESE).

o Workbook, Experimental Cycle tests, viva-voce.

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. **Saravanan Karuppasamy** Application Engineer at Autonomy & Positioning Division (Part Of Hexagon), Karnataka.	Dr. T Reshma Assistant Professor Department of Civil Engineering National Institute of Technology, Andhra Pradesh Tadepalligudam	12. Mr. S.Nishant /Civil 13. Mr.J.Viswanath

Recommended by BoS on	XX/YY/2024		
Academic Council Approval	No.	**Date**	XX/YY/2024

24CET208	Strength of Materials	L	T	P	J	C
		3	0	0	0	3
Professional Core		SDG	SDG No's. 04, 09 & 12			

Pre-requisite courses		Data Book / Code book (If any)	Nil

Course Objectives:	
The purpose of taking this course is to:	
1	**Acquire knowledge** of the fundamental concepts of stress, strain, deformation, and stability of materials.
2	**Develop skills** in analyzing various loading conditions on structural elements.
3	**Enhance competency** in solving engineering problems related to material behavior under different forces.
4	**Foster understanding** of the theoretical and practical aspects of indeterminate structures and energy principles.
5	**Prepare students** for real-world applications, aligning with industrial trends and sustainable development practices.

Course Outcomes		
After successful completion of this course, the students shall be able to		**Revised Bloom's Taxonomy Levels (RBT)**
CO 1	Explain the concepts of stress, strain, and energy principles.	U
CO 2	Apply principles of static equilibrium and energy methods to analyze indeterminate beams.	Ap
CO 3	Analyze the state of stress and strain in two-dimensional elements using mathematical models.	An
CO 4	Evaluate the critical loads for columns under various end conditions.	E
CO 5	Design structural elements considering advanced bending theories and sustainability aspects.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	CO1	3	3	2	1	2	1	1	1	1	2	1	3	2
2	CO2	3	3	3	2	2	2	1	2	1	1	2	3	2
3	CO3	3	3	3	3	3	2	1	2	1	2	1	3	3
4	CO4	3	3	2	2	2	2	1	2	1	1	2	3	3
5	CO5	3	3	3	3	3	2	3	2	2	3	2	3	3

Course Content

ENERGY PRINCIPLES	09 Hours
Concepts of strain energy, resilience, and work-energy principles - Applications of Castigliano's theorem and Maxwell's reciprocal theorem - Energy methods for deformation analysis.	

INDETERMINATE BEAMS Analysis of propped cantilever, fixed beam - Clapeyron's theorem of three moments for continuous beams.	**09 Hours**
GENERALIZED STATE OF STRESS AND STRAIN States of stress and strain – Differential equations of equilibrium of stress and strain - principal stresses and principal planes (3D) – Theories of elastic failure	**09 Hours**
COLUMNS Euler's theory of buckling - Members with eccentric loading - Rankine Gordon formula for eccentrically loaded columns - Practical design considerations for columns with different end conditions.	**09 Hours**
ADVANCED TOPICS IN BENDING OF BEAMS Non-linear bending behaviour and shear stresses in beams - Unsymmetrical bending and curved beams - Winkler Bach formula - Application of bending theories to engineering design - shear flow - shear centre - channel section - stress concentration	**09 Hours**

Theory Hours: 45	Tutorial Hours: 15	Practical Hours: 0	Project Hours: 0	Total Hours: 60

Learning Resources

Textbooks:

13. Gere, J.M., *Mechanics of Materials*, Cengage Learning, Stamford (2020).
14. Beer, F.P., Johnston, E.R., *Mechanics of Materials*, McGraw Hill, New York (2019).
15. R.K. Rajput, *Strength of Materials (Mechanics of Solids)*, S. Chand Publishing, 2022.

References:

24. Timoshenko, S.P., Goodier, J.N., Theory of Elasticity, McGraw Hill, New York (2021).
25. Boresi, A.P., Schmidt, R.J., Advanced Mechanics of Materials, Wiley, Hoboken (2019).

Online Educational Resources:

1. https://nptel.ac.in/courses/112103108
2. https://ocw.mit.edu/courses/mechanical-engineering/
3. https://www.khanacademy.org/
4. https://www.civilengineeringacademy.com
5. https://www.youtube.com/LearnEngineering
6. https://nptel.ac.in/courses/112107147
7. https://www.coursera.org/
8. https://swayam.gov.in/
9. https://www.engineeringtoolbox.com/column-buckling
10. https://www.edx.org/
11. https://ocw.tudelft.nl
12. https://civilengineeringhub.com

sessment (Theory course)

T, Activity and Learning Task(s)* , Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. Kannan Sagadevan Manager Structural Engineer SOBHA GLAZING AND METAL	Dr. D. Rajkumar Assistant Professor Civil Engineering	G. Karthikeyan Assistant Professor-II Civil Engineering

WORKS PRIVATE LIMITED Bengaluru, Karnataka, India	Thiagarajar College Of Engineering Madurai, Tamilnadu, India		Kumaraguru College of Technology Coimbatore, Tamilnadu, India
Recommended by BoS on	13/08/2024		
Academic Council Approval	No.27	**Date**	29/11/2024

24CET209	Concrete Technology	L	T	P	J	C
		3	0	2	0	4
Professional Core		SDG	9 - Industry, Innovation and Infrastructure.			

Pre-requisite courses	Building Materials and Construction Practices	Data Book / Code book (If any)	IS 10262, IS 456, IS 383, IS 516

Course Objectives:

The purpose of taking this course is to:

1	Acquire knowledge about the properties and testing of cement and aggregates.
2	Develop skills in selecting and evaluating chemical and mineral admixtures for concrete.
3	Gain competency in designing concrete mixes for various applications.
4	Understand testing methods and interpret test results for concrete workability and strength.
5	Explore and apply special concrete types for specific construction challenges.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	Apply the knowledge of cement and aggregates to evaluate their suitability for different concrete applications.	Ap
CO2	Analyze the effects of chemical and mineral admixtures on concrete properties to optimize mix designs for specific requirements.	An
CO3	Apply mix design principles to prepare concrete mixes for varying construction scenarios.	Ap
CO4	Interpret test results for workability and strength to assess the quality of both fresh and hardened concrete.	An
CO5	Apply the use of special concretes to demonstrate solutions for construction challenges.	Ap
CO1	Apply the knowledge of cement and aggregates to evaluate their suitability for different concrete applications.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	2	1	1	2	1	1	1	1	1	1	3	2	1
2	3	3	2	2	2	1	1	1	1	1	1	3	3	2
3	3	2	3	2	2	1	1	2	1	2	1	3	2	1
4	3	3	2	3	2	1	1	2	2	2	1	3	3	2
5	3	2	2	2	3	2	2	2	2	2	2	3	3	3

Course Content

MODULE Name: CEMENT AND AGGREGATES — **09 Hours**

Types, composition, hydration of cement - Properties: setting time, strength, fineness - Aggregate types and properties - Tests: sieve analysis, impact, crushing, abrasion

Practical Component: — **06 Hours**

- Fineness test on cement
- Setting time of cement

• Sieve analysis of aggregates	
MODULE Name: ADMIXTURES IN CONCRETE Chemical admixtures: plasticizers, retarders, accelerators - Mineral admixtures: fly ash, silica fume, GGBS - Impact on workability, strength, and durability. **Practical Component:** • Effect of superplasticizer on concrete workability	**09 Hours** **06 Hours**
MODULE Name: CONCRETE MIX DESIGN 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. **Practical Component:** • Mix design for M20 and M30 grades	**09 Hours** **06 Hours**
MODULE Name: PROPERTIES OF CONCRETE Workability tests: slump, compaction factor - Hardened concrete: compressive, split tensile, flexural strength - NDT methods: rebound hammer, UPV **Practical Component:** • Slump test • Compressive strength test • Rebound hammer test	**09 Hours** **06 Hours**
MODULE Name: SPECIAL CONCRETES Light weight concrete - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete – Self compacting concrete - Shotcrete – Polymer concrete - High performance concrete- Geo-polymer Concrete – 3D concrete printing. **Practical Component:** • Casting and testing of fiber-reinforced concrete • Casting and testing of SCC concrete	**09 Hours** **06 Hours**

Theory Hours:	**45**	**Tutorial Hours:**		**Practical Hours:**	**30**	**Project Hours:**		**Total Hours:**	**75**

Learning Resources

Textbooks:

1. Shetty, M.S., *Concrete Technology*, S. Chand & Company, New Delhi (2019).
2. Neville, A.M., *Properties of Concrete*, Pearson Education, Delhi (2012).

References:

1. Mehta, P.K., Monteiro, P.J.M., *Concrete: Microstructure, Properties and Materials*, McGraw Hill Education, New York (2014).
2. IS Codes: IS 10262, IS 456, IS 383, IS 516 (BIS Publications).

Online Educational Resources:

1. https://nptel.ac.in/courses/105/102/105102012/
2. https://swayam.gov.in/nd1_noc20_ce31/preview

sessment (Theory course)

T, Activity and Learning Task(s)* , Mini project, MCQ, End Semester Examination (ESE)

sessment (Embedded course)

T, Activity and Learning Task(s)* , Mini project, MCQ, End Semester Examination (ESE) Workbook, Experimental Cycle tests, viva-voce, etc…

sessment (Practical course)
Workbook, Experimental Cycle tests, viva-voce, etc…

Course Curated by			
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**	
[Name, Organization]	[Name, Institution]	Mr.P.Nandhakumar	
Recommended by BoS on	XX/YY/2024		
Academic Council Approval	No.	**Date**	XX/YY/2024