



SASURIE
COLLEGE OF ENGINEERING
(Autonomous)

Vijayamangalam, Tiruppur - 638056



CURRICULUM AND SYLLABI

REGULATION 2026

DEPARTMENT OF
MECHANICAL ENGINEERING



SASURIE COLLEGE OF ENGINEERING

(Autonomous Institution Affiliated to Anna University, Chennai)



REGULATIONS, CURRICULUM & SYLLABI-2026

(CHOICE BASED CREDIT SYSTEM AND OUT COME BASED EDUCATION)

(For the students admitted from the academic year 2026-2027)

BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

Vision and Mission of the Institute

Our Vision

To become a leading professional institution by offering high-quality education, fostering successful graduates with strong employability prospects, advancing sustainable research through ethical practices and empowering young minds to contribute to the nation's growth in Engineering, Technology and Management.

Our Mission

- To deliver high-quality education that empowers students with the knowledge, skills and ethical values necessary for success in Engineering, Technology and Management.
- To develop graduates with strong employability potential, fostering innovation, leadership and a commitment to continuous learning.
- To advance sustainable research and development that addresses real-world challenges and drives societal progress.
- To inspire and shape young minds into responsible professionals dedicated to contributing to the nation's growth and development.

Vision and Mission of the Department

VISION

- To produce capable graduate engineers with an aptitude for research and leadership

MISSION

- Enrich the students' knowledge and computing skills through innovative teaching - learning process with state- of- art- infrastructure facilities.
- Endeavour students to become an entrepreneur and employable through adequate industry institute interaction.
- Inculcating leader ship skills, professional communication skills with moral and ethical values to serve the society and focus on students' overall development.

Program out Comes (POS)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.

PO6: The Engineer and the World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for
i) independent and life-long learning ii) adaptability to new and emerging technologies and
iii) critical thinking in the broadest context of technological change.

Program Educational Objectives (PEOs)

Bachelor of Mechanical Engineering curriculum is designed to impart Knowledge, Skill and Attitude on the graduates to

PEO 1 – Graduates will establish successful careers in Mechanical Engineering and allied industries by applying expertise in design, thermal engineering, materials, and manufacturing.

PEO 2 – Graduates will contribute to technological development through research and industrial practices, demonstrating effective communication, leadership, ethical values, and social responsibility.

PEO 3 – Graduates will adapt to evolving technologies and professional requirements through continuous learning, skill development, and lifelong learning.

Program Specific Outcomes (PSOs)

PSO1 Design and develop efficient Mechanical systems in real time applications

PSO2 Utilize modern techniques and tools for addressing engineering challenges in the fields of Mechanical Engineering, providing sustainable innovation solutions and implement ethical practices.

**B.E-MECHANICAL ENGINEERING
REGULATIONS 2026
For the students admitted from 2026 onwards
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR I - VIII SEMESTERS
SEMESTER I**

Sl. No.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1	U26EN121	English Proficiency - I	L	HSMC	0	0	2	0	1
2	U26MA101	Matrices and Calculus	T	BSC	3	1	0	0	4
3	U26EE101	Basic Electrical and Electronics Engineering	T	BSC	3	0	0	0	3
4	U26CS113	Problem Solving and Programming in Python	TwL	ESC	3	0	2	0	4
5	U26CY112	Chemistry for Mechanical Engineering	TwL	BSC	2	0	2	0	3
6	U26ME111	Engineering Graphics	TwL	BEC	2	0	2	0	3
7	U26ME121	Engineering Practices Laboratory	L	ESC	0	0	4	0	2
Total					13	1	14	0	21
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
8	U26MC101	Induction Program – Universal human Values I	T	MCC	Three Weeks				3
9	U26TA101	தமிழர் மரபு /Heritage of Tamils	T	MCC	1	0	0	0	1

SEMESTER II

Sl. No.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1	U26EN221	English Proficiency - II	L	HSMC	0	0	2	0	1
2	U26MA201	Differential Equation and Complex Analysis	T	BSC	3	1	0	0	4
3	U26PH212	Physics for Material Science	TwL	BSC	2	0	2	0	3
4	U26ME201	Engineering Mechanics	T	ESC	3	1	0	0	4
5	U26ME211	Manufacturing Technology - I	TwL	PCC	3	0	2	0	4
6	U26ME202	Engineering Materials and Metallurgy	T	PCC	3	0	0	0	3
7	U26CEC01	Design Thinking	TwL	PCC	1	0	2	0	2
Total					15	1	8	0	20
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
8	U26MC201	Universal human Values II	T	MCC	3	0	0	0	3
9	U26TA201	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	T	MCC	1	0	0	0	1

SEMESTER III

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE*	CATEGORY	L	T	P	J	C
1		English Proficiency - III	L	HSMC	0	0	2	0	1
2		Engineering Thermodynamics	T	PCC	3	1	0	0	4
3		Fluid Mechanics and Machinery	T	PCC	3	1	0	0	4
4		Environmental Science and Sustainability	T	BSC	2	0	0	0	2
5		Manufacturing Technology - II	TwL	PCC	3	0	2	0	4
6		Automobile Engineering	T	PCC	3	0	0	0	3
7		Fluid Mechanics and Machinery Laboratory	L	PCC	0	0	4	0	2
8		3D Modeling Laboratory	L	PCC	0	0	4	0	2
Total					14	2	12	0	22
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
9		Constitution of India	T	MCC	1	0	0	0	1

SEMESTER IV

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE*	CATEGORY	L	T	P	J	C
1		English Proficiency - IV	L	HSMC	0	0	2	0	1
2		Mechanics of Solids	TwL	PCC	3	0	2	0	4
4		Theory of Machines	T	PCC	3	1	0	0	4
5		Thermal Engineering - I	TwL	PCC	3	0	2	0	4
6		Open Elective – I	T	OEC	3	0	0	0	3
7		Computer Aided Modelling and Assembly Laboratory	L	PCC	0	0	4	0	2
8		Kinematics and Dynamics Laboratory	L	PCC	0	0	4	0	2
9		Design and Prototype - I	L	PCC	0	0	0	2	1
10		Professional Skill Training - I	L	EEC	0	0	4	0	2
Total					12	1	18	2	23
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
11		Essentials of Indian Traditional Knowledge	T	MCC	1	0	0	0	1

SEMESTER V

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1		Design of Machine Elements	T	PCC	3	1	0	0	4
2		Thermal Engineering - II	T	PCC	3	1	0	0	4
3		Open Elective – II	T	OEC	3	0	0	0	3
4		Computer Aided Manufacturing	T	PCC	3	0	0	0	3
5		Professional Elective – I	T	PEC	3	0	0	0	3
6		Thermal Engineering Laboratory	L	PCC	0	0	4	0	2
7		Design and Prototype - II	L	PCC	0	0	0	4	2
8		Professional Skill Training - II	L	EEC	0	0	4	0	2
Total					15	2	8	4	23

SEMESTER VI

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1		Engineering Metrology and Measurements	TwL	PCC	3	0	2	0	4
2		Heat and Mass Transfer	T	PCC	3	0	0	0	3
3		New Product Development	T	PCC	3	0	0	0	3
4		Additive Manufacturing	T	PCC	3	0	0	0	3
5		Professional Elective – II	T	PEC	3	0	0	0	3
6		Industrial Automation	T	PCC	3	0	0	0	3
7		Heat Transfer Laboratory	L	PCC	0	0	4	0	2
8		Project work Phase – I	L	PCC	0	0	4	0	2
Total					18	0	10	0	23

SEMESTER VII

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1		Mechatronics and IoT	TwL	PCC	3	0	2	0	4
2		Total Quality Management	T	HSMC	3	0	0	0	3
3		Industrial Management	T	PCC	3	0	0	0	3
4		Professional Elective – III	T	PCC	3	0	0	0	3
5		Professional Elective – IV	T	PCC	3	0	0	0	3
6		Industrial Robotics	T	PCC	3	0	0	0	3
7		Project Work Phase - I	TwP	EEC	0	0	0	4	2
Total					18	0	2	4	21

SEMESTER VIII

Sl. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	J	C
1		Internship / Industrial Training*	EEC	0	0	0	4	2
2		Project work Phase – II	EEC	0	0	0	20	10
TOTAL				0	0	0	24	12

TOTAL CREDITS: 165

SEMESTER I

U26EN121	ENGLISH PROFICIENCY – I (Common to All Programmes)	Category: HSMC				
		L	T	P	J	C
		0	0	2	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To build basic English communication skills through practical language activities.
- To improve pronunciation, vocabulary, and grammar for effective communication.

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Demonstrate the ability to understand and use basic English in everyday communication.	Understand
CO2	Apply appropriate grammar, vocabulary, and pronunciation in simple spoken and written contexts.	Apply
CO3	Interpret technical documents and case studies and communicate key insights gained from the life stories of scientists, innovators and entrepreneurs	Analyse

CO PO MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	-	1	-	-
CO2	-	-	-	-	-	-	-	1	2	-	-	-	-
CO3	-	2	-	-	-	-	-	1	3	-	1	-	1
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:

UNIT I READING AND INTERPRETATION

9

Vocabulary in Context – Discourse Markers – Reading Techniques – Oral, Reading: Rhythm and Intonation – Analytical Interpretation - Comprehension and Story Analysis – Evaluative Reading of Summaries and Findings from Journals / Articles / Online Content.

UNIT II PRINT MEDIA AND LITERATURE

9

Print Media Study: Editorials, Views and Feature Articles – Short Story: “*The Last Leaf*” – O. Henry – Science Fiction: “*The Time Machine*” – H.G. Wells.

UNIT III CASE STUDIES AND INSPIRING INNOVATORS

9

Reading Technical Documents (Guidelines & Manuals) – Case Study Review (Field- Based Learning)

- A Case Analysis – Life Stories of Renowned Scientists and Innovators – Inspiring Journeys of Entrepreneurs and Emerging Ventures

Contact Periods:

Lecture: - Periods

Tutorial: - Periods

Practical: 30 Periods

Total: 30 Periods

TEXT BOOKS:

1. O. Henry. *The Complete Short Stories of O. Henry*. Dover Publications, 1996. Comprehensive collection of O. Henry's stories, including *The Last Leaf*.
2. H. G. Wells. *The Time Machine*. Penguin Classics, 2005. Standard academic edition with notes and analysis for study

REFERENCES:

1. Wells, H. G. *The Time Machine*. Penguin Classics, 2012. https://openlibrary.org/books/OL26970973M/The_Time_Machine_%28Penguin_Classics%29
2. McWhorter, Kathleen, and Brette M. Sember. *College Reading and Study Skills*. 14th ed., Pearson, 2021. <https://www.pearson.com/en-us/pearsonplus/p/9780137530809>

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EVALUATION PATTERN:

Continuous Assessments		End Semester Examinations	
Practical / Project		Practical / Project	
Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	Test / Report Evaluation	Presentation & Viva
60 %		40%	
45(100)	15(100)	30 (80)	10 (20)

PRE-REQUISITES:

- Nil

- COURSE OBJECTIVES:**

- COURSE OUTCOMES:**

CO PO MAPPING:

COs	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01
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1. Engineering Mathematics – S. Narayanan, T. K. Manicavachagom Pillay & G. Ramanaiah, (Latest Reprint), S. Viswanathan Publishers.
2. Engineering Mathematics – B. K. Pal & K. Das, (Latest Edition), Oxford University Press India.
3. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition (2018), Wiley India
4. Grewal B.S., "Higher Engineering Mathematics" 45th Edition, Khanna Publishers, New Delhi, 2024

EVALUATION PATTERN:

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

U26EE101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	Category: BSC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

Nil

COURSE OBJECTIVES:

The course aims to:

1. To introduce the basics of electric circuits and analysis
2. To impart knowledge in the basics of working principles and application of electrical machines
3. To introduce analog devices and their characteristics
4. To educate on the fundamental concepts of digital electronics
5. To introduce the functional elements and working of measuring instruments

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Compute the electric circuit parameters for simple problems.	Apply
CO2	Explain the working principle and applications of electrical machines.	Understand
CO3	Analyze the characteristics of analog electronic devices.	Apply
CO4	Explain the basic concepts of digital electronics.	Understand
CO5	Explain the operating principles of measuring instruments.	Understand

CO PO MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	2	-	-	-	-	-	-	-	1
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:**UNIT I – ELECTRICAL CIRCUITS****9**

DC Circuits: Circuit components – conductor, resistor, inductor, capacitor – Ohm's law – Kirchhoff's laws – independent and dependent sources– nodal analysis – mesh analysis with independent sources only. Introduction to AC circuits and parameters: waveforms – average value – RMS value – instantaneous value, real power, reactive power and apparent power, power factor – steady state analysis

of RLC circuits.

UNIT II – ELECTRICAL MACHINES

9

Construction and working principle of DC Generator– EMF equation, types and applications. Working principle of DC motor –Torque Equation,types and applications. Construction, working principle and applications of Transformer, Alternator,Synchronous motor and Three phase Induction motors.

UNIT III – ANALOG ELECTRONICS

9

Semiconductor materials: silicon and germanium – PN junction diode,Zener diode – characteristics and applications – BJT,JFET,SCR,MOSFET,IGBT-types,characteristics and applications.Rectifier and Inverters.

UNIT IV – DIGITAL ELECTRONICS

9

Review of number systems ,binary codes ,error detection and correction codes,combinational logic – representation of logic functions – SOP and POS forms ,K-map representations – minimization using K-maps.

UNIT V – MEASUREMENTS AND INSTRUMENTATION

9

Functional elements of an instrument – operating principle,types – moving coil and moving iron meters – measurement of three phase power, energy meter — DSO- block diagram – data acquisition. **Contact**

Periods:

Lecture: 45 Periods

Tutorial: -0

Practical: 0

Total: 45 Periods

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, Second Edition, McGraw Hill Education, 2020
2. S.K.Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson Education, Second Edition, 2017.
3. A.K. Sawhney, Puneet Sawhney ‘A Course in Electrical & Electronic Measurements & Instrumentation’, Dhanpat Rai and Co, 2015.

REFERENCES:

1. Kothari DP and I.J Nagrath, “Basic Electrical Engineering”, Fourth Edition, McGraw Hill Education, 2019.
2. Thomas L. Floyd, ‘Digital Fundamentals’, 11th Edition, Pearson Education, 2017.
3. Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 7th edition, 2017.

EVALUATION PATTERN:

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

U26CS113	PROBLEM SOLVING AND PROGRAMMING IN PYTHON	Category: ESC				
		L	T	P	J	C
		3	0	2	0	4

COURSE OBJECTIVES:

- To equip engineering students with the foundational knowledge and practical skills in Python programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

COURSE OUTCOMES:

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

COURSE OUTCOMES:

At the end of the course the students would be able to		BT Mapped (Highest Level)
CO1	Develop algorithms, flowcharts and pseudocode to analyze computational problems.	Apply
CO2	Apply control structures and functions to build modular Python programs.	Understand
CO3	Apply string and collection (list/tuple/dictionary) operations to manipulate data.	Analyze
CO4	Perform file handling operations to read, write and process formatted data.	Apply
CO5	Use Python packages (NumPy, SciPy, Pandas, Scikit-learn) to solve engineering problems.	Understand

CO PO MAPPING:

[illegible]

UNIT I INTRODUCTION TO PYTHON 9

Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, Interactive and Script Mode, Indentation, Comments, Error messages, Variables, Reserved Words, Data Types, Arithmetic operators and expressions, Built-in Functions, Importing from Packages.

Practical: Problem Analysis Chart, Flowchart and Pseudocode Practices. (Minimum three)

UNIT II CONTROL STRUCTURES & FUNCTIONS 9

if, if-else, nested if, multi-way if-elif statements, while loop, for loop, nested loops, pass statements. Hiding redundancy, complexity; Parameters, arguments and return values; formal vs actual arguments, named arguments, Recursive & Lambda Functions.

Practical: Usage of conditional logics in programs. (Minimum three) & Usage of functions in programs. (Minimum three)

UNIT III STRINGS & COLLECTIONS 9

String Comparison, Formatting, Slicing, Splitting, Stripping, Lists, tuples, and dictionaries, basic list operators, searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values.

Practical: String manipulations and operations on lists, tuples, sets, and dictionaries. (Minimum three)

UNIT IV FILE OPERATIONS 9

Create, Open, Read, Write, Append and Close files. Manipulating directories, OS and Sys modules, reading/writing text and numbers, from/to a file; creating and reading a formatted file (csv, tab-separated, etc.). Practical: Opening, closing, reading and writing in formatted file format and sort data. (Minimum three)

UNIT V PACKAGES 9

Built-in modules, User-Defined modules, Numpy, SciPy, Pandas, Scikitlearn. Practical: Usage of modules and packages to solve problems. (Minimum three), Project (Minimum Two)

TOTAL: 45 PERIODS

References:

1. Matthes, E. (2019). Python crash course: A hands-on, project-based introduction to programming. No Starch Press.
2. Brown, M. C. (2018). Python: The complete reference. McGraw Hill Publishers.
3. Guttag, J. V. (2016). Introduction to computation and programming using Python: With applications to understanding data. MIT Press.

4. McKinney, W. (2017). Python for data analysis: Data wrangling with pandas, NumPy, and IPython. Shroff/O'Reilly.

E-resources:

2. Official Python Documentation – <https://docs.python.org/3/>
3. Python Tutorials – <https://www.w3schools.com/python/>
4. NumPy – <https://numpy.org/doc/>
5. SciPy – <https://scipy.org/>
6. Google's Python class – <https://developers.google.com/edu/python/>

EVALUATION PATTERN:

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	
35 %			15 %		
15(60)	15(60)	5(40)	10(75)	5(25)	50(100)

SYLLABUS

UNIT -I ELECTROCHEMISTRY

6

Electrochemistry: Introduction - cells - types - representation of galvanic cell – Electrode potential – Nernst equation (derivation of cell EMF) – Calculation of cell EMF from single electrode potential – EMF series and its applications- potentiometric titrations (redox) – conductometric titrations mixture of weak and strong acid vs strong base.

UNIT-II CORROSION & ITS CONTROL METHODS

6

Corrosion: Introduction - chemical corrosion - Pilling-Bedworth rule - electrochemical corrosion (types) - galvanic corrosion - differential aeration - galvanic series - factors - weight loss method. Control: sacrificial anodic protection - protective coatings – pre treatment-Coatings: electroplating - electroless hot dipping (tinning, galvanizing) - anodizing - paints - ceramic coatings.

UNIT III BATTERIES & FUEL CELLS

6

Batteries: Introduction - charging and discharging - characteristics - battery rating - tests - types primary (silver button cell) - secondary (Ni-Cd) - lithium-ion - maintenance - EV applications-Fuel Cells: Introduction - importance - classification - principle - components - applications - H₂-O₂ fuel cell alkaline - molten carbonate - direct methanol fuel cell.

UNIT IV COMBUSTION

6

Calorific values - gross and net calorific values - flue gas analysis (Orsat method) - solid fuels - coal and its varieties - ultimate analysis - significance - metallurgical coke - Otto-Hoffman method Liquid fuels - refining of petroleum - synthetic petrol - hydrogenation of coal - Bergius process - knocking (SI engine) - octane number - knocking (CI engine) - cetane number-Gaseous fuels - water gas.

UNIT V CHEMISTRY OF ENGINEERING MATERIALS

6

Adhesives – Introduction- classification advantages and disadvantages of adhesive bonding adhesive action - industrial applications. Lubricants - Introduction - classification - properties: viscosity - viscosity index - flash and fire point - cloud and pour point - oiliness - aniline point - carbon residue-Explosives - Introduction- classification - manufacture (TNT - GTN - RDX) - rocket propellants introduction - properties – classification. Abrasives - Introduction - properties - types: natural (diamond corundum - quartz) - synthetic (silicon carbide) - applications - adhesives - introduction - classification advantages - disadvantages - adhesive action - industrial applications.

LIST OF EXPERIMENTS :

- 1 Estimation of total hardness of water by EDTA method.
- 2 Determination of rate of corrosion of mild steel by weight loss method.
- 3 Determination of chloride content in water sample by argentometric method.
- 4 Determination of pK_a of a weak acid using glass electrode (pH sensor).
- 5 Determination of strength of HCl acid by using pH meter.

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- 6 Estimation of Ferrous iron by potentiometric Titration.
- 7 To find Viscosity of a Transparent Liquid (Virtual lab).(<https://bop-iitk.vlabs.ac.in/exp/liquid-viscosity/index.html>)

Contact Periods:

Lecture: 30 Periods Tutorial: - Periods Practical: 30 Periods **Total: 60 Periods**

TEXT BOOKS:

- 1 Engineering Chemistry, P. C. Jain & Trishla Jain, 2023, 17th Edition, Dhanpat Rai & Co. (P) Ltd., New Delhi.ISBN-13: 978-9352165728
- 2 Engineering Chemistry, **S. S. Dara & S. S. Umare**, 2022 Edition, S. Chand Publications, New Delhi.ISBN-13: 978-9352533241.

REFERENCE BOOKS

- 1 Friedrich Emich, "Engineering Chemistry", 2nd Edition, Scientific International Pvt. Ltd, New Delhi, 2014.
- 2 Prasanta Rath, "*Engineering Chemistry*", 1st Edition, Cengage Learning India, Pvt. Ltd, Delhi, 2015
- 3 V. Raghavan & J. R. Gopalakrishnan, *Engineering Chemistry*, McGraw-Hill Education.
- 4 Linden & Reddy, Handbook of Batteries, McGraw-Hill Education.
- 5 *Energy storage and conversion devices*, Anurag Gaur, A. L. Sharma, Anil Arya, 1st Edition, 2021,CRC Press, Taylor and Francis Group.

EVALUATION PATTERN:

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	
35 %			15 %		
15(60)	15(60)	5(40)	10(75)	5(25)	50(100)

U26ME111	ENGINEERING GRAPHICS	Category: ESC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To impart knowledge on dimensions and drawing standards.
- To explore the orthographic projection of lines and solids.
- To provide the understanding of orthographic, isometric and perspective views.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to		BT Mapped (Highest Level)
CO1	Explain the advantages of engineering drawing in engineering applications.	Understand
CO2	Apply the concepts of projections in formulating various solid parts in engineering systems.	Apply
CO3	Analyse the various view and interpret the engineering drawings	Analyze
CO4	Use CAD tools for creation of various models.	Apply
CO5	Critically think and develop innovative models.	Apply

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	2	-
CO3	-	3	-	-	-	-	-	-	2	-	-	2	-
CO4	-	-	-	-	3	-	-	-	-	-	-	2	2
CO5	-	-	2	-	2	-	-	-	-	-	-	3	2
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:**MODULE I: Fundamentals****12**

Drawing instruments, Drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Free hand sketching of 2D & 3D objects, Conics – Ellipse, Parabola and Hyperbola.

Activities: Virtual Demonstration of Conics and Cycloids.

MODULE II: Orthographic Projection**12**

First angle projection, Projection of points, straight lines and planes.

Activities: Virtual Demonstration of Points, Lines and Planes.

MODULE III: Projection of Solids**12**

Simple Solids, Section of Solids, Development of Surfaces.

Activities: Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.**MODULE IV: Isometric Projection****12**

Isometric Scale, Projection of Simple solids.

Activities: Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.**MODULE V: Perspective Projection****12**

Simple solids projection.

Activities: Virtual demonstration of perspective views.

TOTAL: 60 PERIODS

References:

1. Natarajan, K. V. (2025). A Text Book of Engineering Graphics. Dhanalakshmi Publisher.
2. Venugopal, K., & Prabhu Raja, V. (2022). Engineering Drawing + AutoCAD. New Age International Publishers.

E-Resources:

1. CAD Software – <https://www.freecadweb.org/>
2. Engineering Drawing and Computer Graphics, Prof. Rajaram Lakkaraju (IIT Kharagpur) – https://onlinecourses.nptel.ac.in/noc22_me105/preview.
3. MIT Design Handbook: Engineering Drawing and Sketching – https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/

EVALUATION PATTERN:

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	
15(60)	15(60)	5(40)	10(75)	5(25)	50(100)

U26ME121	ENGINEERING PRACTICES LABORATORY	Category: PCC				
		L	T	P	J	C
		0	0	4	0	2

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

The course aims to:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.
2. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
3. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB Wiring various electrical joints in common household electrical wire work.

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household woodwork.	Apply
CO2	Wire various electrical joints in common household electrical wire work	Apply
CO3	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	Apply
CO4	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.	Apply

CO PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	1	1	1	-	-	-	-	2	-
CO2	3	2	-	3	1	1	1	-	-	-	-	2	-
CO3	3	2	-	2	1	1	1	-	-	-	-	2	-
CO4	3	2	-	2	1	1	1	-	-	-	-	2	-
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:**GROUP – A (CIVIL & ELECTRICAL)****PART I CIVIL ENGINEERING PRACTICES****15****PLUMBING WORK**

- Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- Preparing plumbing line sketches.
- Laying pipe connection to the suction side of a pump
- Laying pipe connection to the delivery side of a pump.
- Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances

WOOD WORK

- Sawing.
- Planing.
- Making joints like T-Joint, Mortise joint, Tenon joint and Dovetail joint.

Wood Work Study:

- Studying joints in door panels and wooden furniture.
- Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES**15**

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

WELDING WORK:

Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Practicing gas welding.

BASIC MACHINING WORK:

a) simple Turning.

b) simple Drilling.

c) simple Tapping

ASSEMBLY WORK:

a) Assembling a centrifugal pump.

b) Assembling a household mixer.

c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONICS ENGINEERING PRACTICES**SOLDERING WORK:**

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

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

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone.

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop

Contact Periods:

Lecture: -

Tutorial :

Practical: 60 Periods

Total: 60 Periods

EVALUATION PATTERN:

Continuous Internal Assessments					End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		Total Internal Assessments	
Individual Assignment	Written Test	Individual Assignment	Written Test		
75	25	75	25		
Total				200	
				75	25
				100	

U26MC101	Induction Program – Universal human Values I	Category: MCC	
		3 Weeks	C
			3

COURSE OBJECTIVES:

- Development of a holistic perspective based on self-exploration about themselves (human beings), family, society, and nature/existence
- Understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
- Strengthening of self-reflection
- Development of commitment and courage to act

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Recognize the essentials of human values and skills	Understand
CO2	Analyse connection between profession and happiness	Understand
CO3	Develop appropriate technologies and management patterns to create harmony in family and society	Understand
CO4	Evaluate the significance of trust, mutually satisfying human behaviour, and enriching interaction with nature	Understand
CO5	Demonstrate professional and ethical responsibility	Understand

CO PO MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	2	1	-	-	-	-	-
CO2	-	-	-	-	-	-	2	-	1	-	-	-	-
CO3	-	-	-	-	-	2	2	-	-	-	-	-	-
CO4	-	-	-	-	-	2	3	-	-	-	-	-	-
CO5	-	-	-	-	-	-	3	2	-	-	-	-	-
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:**UNIT I: INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT, AND PROCESS FOR VALUE EDUCATION**

Purpose and motivation for the course – Self-Exploration: what is it – Its content and process; ‘Natural Acceptance’ and Experiential Validation as the mechanism for self-exploration – Continuous Happiness and Prosperity – A look at basic Human Aspirations – Right understanding, Relationship, and Physical Facilities – the basic requirements for the fulfillment of aspirations of every human being with their correct priority – Understanding Happiness and

Prosperity correctly – A critical appraisal of the current scenario – Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT II: HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF

Understanding human beings as a co-existence of the sentient 'I' and the material 'Body' – Understanding the needs of Self ('I') and 'Body' – Happiness and Convenience – Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer) – Understanding the harmony of I with the Body: Self-control and Welfare; correct appraisal of Physical needs – Meaning of Prosperity in detail – Programs to ensure Self-control and Welfare

UNIT III: HARMONY IN THE FAMILY AND SOCIETY

Understanding values in human – Human relationships: the meaning of Justice (nine universal values in relationships) and the program for its fulfillment to ensure satisfaction – Trust and Respect as the foundational values of relationship – Understanding the meaning of Trust – Difference between intention and competence – Understanding the meaning of Respect – The difference between respect and differentiation; and the other salient values in relationship – Understanding the harmony in the society (society being an extension of the family): Peace, Prosperity, Courage, and Coexistence as comprehensive Human Goals – Visualizing a universal harmonious order in society – Undivided Society – Universal Order from family to world family

UNIT IV: HARMONY IN THE NATURE AND EXISTENCE

Understanding the harmony in Nature, Interconnectedness, and mutual fulfillment among the four orders of nature – Recyclability and self-regulation in nature – Understanding Existence as a Co-existence of mutually interacting units in an all-pervasive space – Holistic perception of harmony at all levels of existence – Practice sessions to discuss human beings as the cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc

UNIT V: HARMONY ON PROFESSIONAL ETHICS

Natural acceptance of human values – Definiteness of Ethical Human Conduct – Basis for Humanistic Education – Humanistic Constitution, and Humanistic Universal Order – Competence in professional ethics – Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people, friendly and eco-friendly production systems, and Ability to identify and develop appropriate technologies and management patterns for the above production systems – Case studies of typical holistic technologies, management models, and production systems – Strategy for a transition from the present state to Universal Human Order – At the level of the individual: as socially and ecologically responsible engineers, technologists, and managers – At the level of society: as mutually enriching institutions and organizations

CONTACT PERIODS: Three weeks

TEXTBOOKS:

1. R R Gaur, R. Asthana, G P Bagaria, *A Foundation course in Human Values and Professional Ethics*, 3rd Edition, Excel Books, New Delhi, 2024
2. Prof. K. V. Subba Raju, *Success Secrets for Engineering Students*, Smart Student Publications, 3rd Edition, 2013

REFERENCES:

1. Ivan Illich, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA, 1974
2. E. F. Schumacher, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain, 1973.

Continuous Internal Assessments	
Assessments 1 (100 Marks)	
Total 100	

U26TA101	தமிழர்மரபு / Heritage of Tamils (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- தமிழின் செம் மொழி தன்மையையும் அதன் விரிவான இலக்கிய பாரம்பரியத்தையும் கற்றறிதல்.
- தமிழர் கலாச்சாரத்தில் உள்ள நுண்கலை மரபுகளைப் பரிசீலித்தல்.
- இந்திய விடுதலைப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணர்தல்.

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	தமிழ் மொழியின் விரிவான இலக்கியத்தையும் அதன் செம் மொழி தன்மையையும் புரிந்து கொள்ளுதல்.	Understand
CO2	பழங்கால மக்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகளின் பாரம்பரியத்தை புரிந்து கொள்ளுதல்.	Understand
CO3	தமிழர் நாட்டுப்புறக் கலைகள் மற்றும் போர்க்கலைகளை ஆய்வு செய்தல்.	Understand
CO4	திணை கருத்துக்கள், வர்த்தகம் மற்றும் சோழர் பேரரசின் வெற்றிகளை உணர்தல்.	Understand
CO5	இந்திய விடுதலைப் போராட்டத்தில் தமிழர்களின் பங்களிப்பு, சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்துவத்தின் முக்கியத்துவத்தை புரிந்து கொள்ளுதல்	Understand

CO PO MAPPING

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

Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)

SYLLABUS:**UNIT I மொழி மற்றும் இலக்கியம் 3**

இந்தியமொழிக் குடும்பங்கள்- திராவிட மொழிகள் -தமிழ் ஒரு செம்மொழி- தமிழ் செவ்விலக்கியங்கள் -சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை சங்க இலக்கியத்தில் பகிர்தல் அறம்- திருக்குறள் மேலாண்மை கருத்துக்கள்- தமிழ்காப்பியங்கள்- தமிழகத்தில் சமண பௌத்தவ சமயங்களில் தாக்கம் – பக்தி இலக்கியம் ஆழ்வார்கள் மற்றும் நாயன்மார்கள் சிற்றிலக்கியங்கள்- தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி- தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

UNIT II மரபு-பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள்**வரை- சிற்பக்கலை 3**

நடு கல் முதல் நவீன சிற்பங்கள் வரை ஐம்பொன் சிலைகள் பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள் பொம்மைகள் தேர் செய்யும் கலை சுடுமண் சிற்பங்கள் நாட்டுப்புற தெய்வங்கள் குமரிமுனையில் திருவள்ளூர் சிலை இசைக்கருவிகள் மிருதங்கம்,பறை,வீணை,யாழ்,நாதஸ்வரம்,தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோயில்களின் பங்கு.

UNIT III நாட்டுப்புறக் கலைகள் மற்றும்வீரவிளையாட்டுக்கள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து,ஒயிலாட்டம் ,தோல்பாவைகூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுக்கள்.

UNIT IV தமிழர்களின்திணைக்கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும் விலங்குகளும்-தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புற கோட்பாடுகள் தமிழர்கள் போற்றிய அறக்கோட்பாடுகள்-சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் சங்க கால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி-கடல் கடந்த நாடுகளின் சோழர்களின் வெற்றி.

UNIT V இந்திய தேசியஇயக்கம் மற்றும் இந்திய பண்பாட்டிற்கு தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு-இந்தியாவின் பிற பகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் சுயமரியாதை இயக்கம்-இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு கல்வெட்டுக்கள் கையெழுத்துப்படிகள்-தமிழ் புத்தகங்கள் அச்ச வரலாறு.

Lecture: 15 Periods

Tutorial: - Periods

Total: 15 Periods

TEXT BOOKS:

1. ஜெயந்தி ரவிகிருஷ்ணா K, தமிழர்களின் பாரம்பரியம், ஸ்ரீ கிருஷ்ணா பதிப்பகம், முதல்பதிப்பு, 2023.
2. எஸ். பிரியதர்ஷினி, தமிழர்களின்பாரம்பரியம், வி. கே. பதிப்பகம்

REFERENCES:

1. தமிழக வரலாறு மக்களும் பண்பாடும் - கே.கே. பிள்ளை, International Institute of Tamil Studies, C.P.T Campus, Chennai.
2. கணினித்தமிழ் - முனைவர். இல. சுந்தரம், விகடன்பிரசுரம், அண்ணாசாலை, சென்னை, திசம்பர் 2016.

B.E. – MECHANICAL ENGINEERING – R2026 – CBCS

U26TA101	தமிழர் மரபு / Heritage of Tamils (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- Learn the extensive literature of classical Tamil
- Review the fine arts heritage of Tamil culture
- Realize the contribution of Tamils in Indian freedom struggle

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Understand the extensive literature of Tamil and its classical nature	Understand
CO2	Understand the heritage of sculpture, painting and musical instruments of ancient people	Understand
CO3	Review on folk and martial arts of Tamil people	Understand
CO4	Realization of Thinaï concepts, trade and victory of Chozha dynasty	Understand
CO5	Understand the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha	Understand

CO PO MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	1	-	1	-	-	-	-
CO2	-	-	-	-	-	-	1	-	-	-	-	-	-
CO3	-	-	-	-	-	-	1	-	-	-	-	-	-
CO4	-	-	-	-	-	1	1	-	-	-	-	-	-
CO5	-	-	-	-	-	-	2	1	-	-	-	-	-
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:**UNIT I****LANGUAGE AND LITERATURE****3**

Language Families in India - Dravidian Languages - Tamil as a Classical Language - Classical Literature in Tamil - Secular Nature of Sangam Literature - Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land

- Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of

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Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART -
SCULPTURE****3**

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

UNIT III FOLK AND MARTIAL ARTS**3**

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

UNIT IV THINAI CONCEPT OF TAMILS**3**

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

**UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND
INDIAN CULTURE****3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India - Self Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine - Inscriptions & Manuscripts - Print History of Tamil Books. Contact

Lecture: 15 Periods**Tutorial: - Periods****Total: 15 Periods****TEXT BOOKS:**

1. Ravikrishna K, Heritage of Tamils, Sri Krishna publications, First Edition, 2023.
2. S. Priyadharshini, Heritage of Tamils, V. K. Publications.

REFERENCES:

1. History, People and Culture of Tamil Nadu – K.K. Pillai, International Institute of Tamil Studies, C.P.T Campus, Chennai.
2. Computer Tamil – Dr. Il. Sundaram, Vikatan Publications, Anna Salai, Chennai, December 2016.

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EVALUATION PATTERN:

Continuous Internal Assessments
Assessments 1 (100 Marks)
Total 100

SEMESTER II

U26EN221	ENGLISH PROFICIENCY – II (common to all programs)	Category: HSMC				
		L	T	P	J	C
		0	0	2	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To develop students' ability to comprehend, analyze, and articulate complex ideas effectively.
- To enable students to use English proficiently for research, presentations, technical documentation, and collaborative projects.

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Interpret advanced texts, research articles, and multimedia content to identify key ideas, arguments, and perspectives.	Apply
CO2	To do clear and well-structured oral presentations that effectively communicate ideas in academic and workplace contexts.	Understand
CO3	Analyse research findings, interpret data and communicate results effectively through written and oral communication.	Analyze

CO PO MAPPING:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	1	3	-	-	-	-
CO3	-	2	-	2	-	-	-	1	3	-	-	-	1
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:

UNIT I LISTENING & SPEAKING SKILLS: 9

Oral presentations: structuring arguments and persuasive speech - Listening comprehension: podcasts, interviews, and webinars analysis - Debates and role-plays on contemporary issues

UNIT II MEDIA & LITERATURE EXPLORATION 9

Science communication - Multimedia content: analyzing podcasts, TED Talks, and webinars - Film and documentary reviews: narrative techniques and critical perspectives

UNIT III RESEARCH & PRESENTATION SKILLS

9

Conducting mini-research in lab or field environments - Data interpretation and reporting findings in written and oral forms - Peer review sessions to enhance collaborative learning

Contact Periods:

Lecture: - Periods Tutorial: - Periods Practical: 30 Periods **Total: 30 Periods**

TEXT BOOKS:

1. Bailey, Stephen. *Academic Writing: A Handbook for International Students*. 5th ed., Routledge, 2018.
2. Rizvi, Ashraf M. *Effective Technical Communication*. 2nd ed., McGraw Hill Education, 2017.

REFERENCES:

1. Markel, Mike H., and Stuart A. Selber. *Technical Communication*. 12th ed., Bedford/St. Martin's, 2018.
2. Hall, Lynn, and Leah Wahlin. *A Guide to Technical Communications: Strategies & Applications*. Ohio State University Libraries, 2016.

EVALUATION PATTERN:

Continuous Assessments		End Semester Examinations	
Practical / Project		Practical / Project	
Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	Test / Report Evaluation	Presentation & Viva
60 %		40%	
45(100)	15(100)	30 (80)	10 (20)

U26MA201	DIFFERENTIAL EQUATION AND COMPLEX ANALYSIS (Common for ECE, EEE, MECH)	Category: BSC				
		L	T	P	J	C
		3	1	0	0	4

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- Apply appropriate methods to solve higher-order linear ordinary differential equations with constant coefficients and obtain complementary functions and particular integrals.
- To learn Laplace transforms and apply them in solving differential equations
- To understand the concepts of singularities in the various domains of engineering field.

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Understand the analytical methods of solving ordinary differential equations.	Understand
CO2	Apply the concept of ordinary differential equations to engineering problems.	Analyze
CO3	Apply Laplace transforms to solve linear ordinary differential equations and utilize properties such as shifting and convolution	Apply
CO4	Apply the concept of analytic functions in engineering problems	Apply
CO5	Evaluate complex integrals using Cauchy's integral theorem, residue theorem, and series expansions (Taylor and Laurent), and apply these methods to solve real integrals.	Apply

CO PO MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	-	-	1	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	1	-
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS

UNIT -I ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

9

Linear differential equations of second and higher order with constant coefficients - Particular Integrals for the types: $e^{ax} - \cos ax / \sin ax - x^n - e^{ax}x^n$, $e^{ax}\sin bx$ and $e^{ax}\cos bx$.

UNIT II APPLICATION OF ORDINARY DIFFERENTIAL EQUATIONS**9**

Differential Equations with variable coefficients: Euler-Cauchy's equation – Method of variation of parameters – Applications of differential equations: Simple Harmonic Motion – Electric circuits

UNIT-III LAPLACE TRANSFORM**9**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems – Initial and final value theorems- transform of periodic functions – Inverse transforms- partial fraction Method - convolution theorem.

UNIT IV ANALYTIC FUNCTIONS**9**

Functions of a complex variable – Analytic functions – Necessary and sufficient conditions (excluding proof) – Cauchy–Riemann equations (Statement only) – Properties of analytic function (Statement only) – Harmonic function – Construction of analytic function – Conformal mapping: $w = z + a$, az , $1/z$ – Bilinear transformation.

UNIT V COMPLEX INTEGRATION**9**

Introduction – Cauchy's theorem (without proof) – Cauchy's integral formula – Singularities – Classification – Taylor series – Laurent series – Cauchy's residue theorem (without proof)

Contact Periods:

Lecture: 45 Periods

Tutorial: 15 Periods

Practical: - Periods

Total: 60 Periods**TEXT BOOKS:**

1. Higher Engineering Mathematics – B. S. Grewal, (2024–2025), Khanna Publishers. 2. Advanced Engineering Mathematics – H. K. Dass & Er. Rajnish Verma, (2023), S. Chand Publishing
2. P. Kandasamy, K. Thilagavathi and K. Gunavathi, Engineering Mathematics, 4th Revised Edition, S. Chand & Company Ltd., New Delhi, 2001.

REFERENCES:

1. A Textbook of Engineering Mathematics – N. P. Bali & Manish Goyal, (2022/Latest Edition), Laxmi Publications.
2. Engineering Mathematics – S. Narayanan, T. K. Manicavachagom Pillay & G. Ramanaiah, (Latest Reprint), S. Viswanathan Publishers.

EVALUATION PATTERN:

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

U26PH212	PHYSICS FOR MATERIAL SCIENCE (Applicable for Mechanical Engineering)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- Understand the principles of photonics and the fundamental properties of matter, including reflection, refraction, total internal reflection, lasers, elasticity, stress, and strain.
- Explain the properties of semiconducting materials, including carrier concentration, transport mechanisms, and semiconductor devices.
- Explain the principles of heat transfer and the characteristics and applications of magnetic materials in data storage and sensing technologies.

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Describe the principles of photonics including reflection, refraction, total internal reflection, air wedge, and laser fundamentals.	Remember
CO2	Explain the properties of semiconducting materials, including carrier concentration, transport mechanisms, and semiconductor devices.	Understand
CO3	Explain the characteristics and applications of magnetic materials used in data storage and sensing technologies.	Understand
CO4	Understand the fundamental properties of matter such as elasticity, stress, strain, and related mechanical parameters.	Understand
CO5	Explain the principles of conduction, convection, radiation, and thermal conductivity.	Understand

CO PO MAPPING:

[illegible]

SYLLABUS**UNIT -I PHOTONICS****6**

Reflection and refraction of light waves – Theory of lasers: characteristics, spontaneous and stimulated emission – Einstein's coefficients, population inversion – Types of lasers: Nd-YAG laser- CO2 laser - semiconductor laser – Industrial applications of lasers.

UNIT-II SEMICONDUCTING MATERIALS**6**

Properties of semiconductors. Direct and indirect band gap semiconductors. Intrinsic and extrinsic semiconductors. Carrier concentration in n-type and p-type semiconductors. Carrier transport in semiconductors. Hall effect. Ohmic contacts and Schottky diode.

UNIT III MAGNETIC MATERIALS**6**

Classification of magnetic materials. Ferromagnetism and domain theory. Hysteresis. Soft and hard magnetic materials. Ferrites. GMR sensors. Magnetic bubble memory. Principle of magnetic recording. Magnetic storage devices.

UNIT -IV PROPERTIES OF MATTER**6**

Elasticity – Stress-strain diagram and its uses – factors affecting elastic modulus and tensile strength – torsional stress and deformations – torsion pendulum: theory and experiment – bending of beams – bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment.

UNIT V THERMAL PHYSICS**6**

Transfer of heat energy — thermal expansion of solids and liquids — expansion joints — bimetallic strips — thermal conduction, convection and radiation — heat conduction in solids — thermal conductivity — Forbes's and Lee's disc method: theory and experiment

LIST OF EXPERIMENTS :

- 1 Laser- Determination of the wave length of the laser using grating.
- 2 Post office box -Determination of Band gap of a semiconductor.
- 3 Optical fibre -Determination of Numerical Aperture and acceptance angle.
- 4 Young's Modulus by Non-Uniform Bending Method.
- 5 Determination of Thermal Conductivity of bad conductor using Lee's Disc method.

Contact Periods:

Lecture: 30 Periods

Tutorial: - Periods

Practical: 30 Periods

Total: 60 Periods**TEXT BOOKS:**

- 1 M.N. Avadhanulu, P.G. Kshirsagar, and T.V.S. Arun Murthy, "A Textbook of Engineering Physics", 11th edition, S. Chand Publishing, New Delhi, 2022.
- 2 Budinski, K.G. & Budinski, M.K., "Engineering Materials: Properties and Selection", 10th Edition, Pearson Education, 2020

REFERENCE BOOKS

- 1 Malik H.K and Singh A.K, "Engineering Physics", 2nd Edition McGraw-Hill Education, New Delhi, 2022
- 2 NPTEL, "Engineering Physics and Materials Science Courses", 2018–2025.
- 3 MIT OpenCourseWare, "Quantum Physics, Optics and Materials Science", 2018–2025

EVALUATION PATTERN:

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	
15(60)	15(60)	5(40)	10(75)	5(25)	50(100)

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U26ME201	ENGINEERING MECHANICS	Category: ESC				
		L	T	P	J	C
		3	1	0	0	4

Course Objectives

- To make the students to apply static equilibrium of rigid bodies both in two dimensions and also in three dimensions.
- To comprehend the effect of friction on equilibrium.
- To understand the geometrical properties of surfaces and solids.
- To understand various terms involved in Projectiles.
- To apply dynamic equilibrium of particles in solving basic problems.

Course Outcomes:

At the end of the course the students would be able to		BT Mapped (Highest Level)
CO1	Apply the fundamental laws and principles of mechanics to analyze and determine the resultant and equilibrium conditions of force systems in two and three dimensions.	Apply
CO2	Analyze forces in basic structural elements and frictional systems using equilibrium conditions, free body diagrams, and appropriate analytical methods such as method of joints, method of sections, and virtual work.	Analyze
CO3	Investigate geometrical properties of sections and solids by determining centroids, moments of inertia, and principal moments to assess their structural behavior under loading	Apply
CO4	Apply the principles of kinematics and kinetics to determine displacement, velocity, and acceleration for particles and rigid bodies in rectilinear and curvilinear motion.	Apply
CO5	Analyze the dynamic behavior of particles and rigid bodies using work-energy and impulse momentum principles to evaluate motion, impact, and energy transformations in mechanical systems.	Analyze

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-
CO2	3	3	1	-	1	-	-	-	-	-	-	1	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-
CO5	3	3	-	-	-	-	-	-	-	-	-	2	-
Correlation Levels: 1: Slight (Low) 2: Moderate(Medium) 3: Substantial(High)													

SYLLABUS:**UNIT I INTRODUCTION TO MECHANICS AND FORCE CONCEPTS 12**

Principles and Concepts - Laws of mechanics - system of forces - resultant of a force system – Lami's theorem - moment of a force – Varignon's theorem - resolution of a force into force and couple – force in space - equilibrium of a particle in space.

UNIT II BASIC STRUCTURAL ANALYSIS AND FRICTION 12

Beams and types of beams - Simple Trusses - Method of Joints - Method of Sections. Friction resistance - classification of friction - laws of friction - angle of repose - cone of friction - free

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body diagram - equilibrium of a body on a rough inclined plane - non concurrent force system
- ladder friction – rope friction - wedge friction - virtual work method.

UNIT III GEOMETRICAL PROPERTIES OF SECTION 12

Centroids - determination by integration - moment of inertia - product of inertia - principal moment of inertia of plane areas - radius of gyration - Mass moment inertia of simple solids.

UNIT IV BASICS OF DYNAMICS – KINEMATICS 12

Kinematics and kinetics - displacements, velocity and acceleration - equations of motion – rectilinear motion of a particle with uniform velocity, uniform acceleration, varying acceleration – curvilinear motion of particles - projectiles - angle of projection - range - time of flight and maximum height - kinematics of rigid bodies.

UNIT V BASICS OF DYNAMICS – KINETICS 12

Newton's second law of motion – D'Alembert's principle, dynamics equilibrium - work energy equation of particles - law of conservation of energy - principle of work and energy. Principles of impulse and momentum - equations of momentum - laws of conservation of momentum. Impact – time of compression, restitution, collision - co-efficient of restitution - collision of elastic bodies by direct central impact and oblique impact - collision of small body with a massive body - kinetic energy of a particle-kinetics of rigid body rotation.

Total: 60 Hours

Text Books:

1. F. P. Beer and E. R. Johnston, Vector Mechanics for Engineers, Vol I – Statics, Vol II, - Dynamics, 12th Edition, Tata McGraw Hill, 2019.
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

References

1. Beer F.P and Johnston Jr. E.R, Vector Mechanics for Engineers (In SI Units): Statics and Dynamics, 11th Edition, Tata McGraw Hill Publishing company, New Delhi, 2017.
2. Bhavikatti S. S. and Rajashekarappa, K.G, Engineering Mechanics, New Age International (P) Limited Publishers, 2021.
3. Hibbeler, R.C and Ashok Gupta, Engineering Mechanics: Statics and Dynamics, 11th Edition, Pearson Education 2010.
4. Irving H. Shames and Krishna MohanaRao. G., Engineering Mechanics - Statics and Dynamics, 4th Edition, Pearson Education, 2006.
5. Meriam J. L. and Kraige L. G, Engineering Mechanics- Statics - Volume 1, Dynamics Volume 2, 5th Edition, John Wiley & Sons, 2006.
6. www.nptel.iitm.ac.in/video.php?subjectId=122104015

EVALUATION PATTERN:

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

U26ME211	MANUFACTURING TECHNOLOGY - I	Category: PCC				
		L	T	P	J	C
		3	0	2	0	4

COURSE OBJECTIVES:

- To gain knowledge in material casting processes.
- To introduce students to foundry practices and product design considerations
- To provide an overview of sheet metal & welding processes.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to		BT Mapped (Highest Level)
CO1	Explain the pattern and molding methods with their associated merits and demerits	Apply
CO2	Understand the casting-melting process and testing methods	Understand
CO3	Understand the various welding processes	Understand
CO4	Understand the hot and cold working processes	Understand
CO5	Understand the various sheet metal working process	Understand

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	2	-
CO2	2	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	2	-
Correlation Levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)													

SYLLABUS:

UNIT I PATTERNS AND PATTERN MAKING

6

Introduction to Foundry - Steps involved in casting - Advantages - Limitations and applications of casting process. Pattern types - Allowances for pattern - Pattern materials - Color coding and storing of patterns **MOULDING:** Moulding methods and processes - Materials - Equipment - Moulding sand ingredients - Essential requirements - sand preparation and control - Testing - Cores and core making - Design considerations in casting
- Gating and Riser - Directional solidification in castings - Metallurgical aspects of Casting - Introduction to moulding software's

UNIT II METAL CASTING

6

Casting Processes: Sand castings - Pressure die casting - Permanent mould casting - Centrifugal casting - Precision investment casting - Shell moulding - Continuous casting - Squeeze casting - Electro slag casting - Fettling and finishing - Defects in Castings - Casting of non- Ferrous materials **Melting - Pouring and Testing:** Melting furnaces - Crucibles oil fired furnaces - Electric furnaces - Cupola - Selection of furnace - Degassification - Inoculation - Pouring techniques casting defects and Inspection of castings

UNIT III METAL JOINING

6

Basic Joining Processes: Cold welding - Diffusion bonding - Explosive welding - Ultrasonic welding - Friction welding - Forge welding - Roll welding and Hot pressure welding processes - Resistance welding (spot - Seam - Projection - Percussion - Flash types) - Atomic hydrogen arc welding - Thermit welding - Flame cutting – Use of Oxyacetylene - Modern cutting processes - Arc cutting - Robotic welding

UNIT IV FORMING PROCESSES

6

Elastic and plastic deformation - Concept of strain hardening - Operating principle - Equipment - Types - Merits - Demerits and applications of hot and cold working process - Rolling - Forging - Extrusion - Swaging - Wire and tube drawing - Load consideration of hot and cold working processes

UNIT V SHEET METAL WORKS

6

Introduction - Sheet metal characteristics - Shearing mechanisms - Formability of sheet metal - Testing methods - Basic sheet metal operations - Principle - Equipment - Types - Merits - Demerits and applications. Special forming process - Hydro forming - rubber pad forming - Metal spinning - Introduction to explosive forming - Magnetic pulse forming - Peen forming - Super plastic forming - Micro forming

Contact Periods:

Lecture: 45 Periods

Tutorial: Practical:

Periods

Project - Periods

Total: 30 Periods

LIST OF EXPERIMENTS

1. Taper Turning
2. External & Internal Thread cutting
3. Thread Cutting
4. Eccentric Turning
5. Knurling
6. Square and hexagonal head shaping
7. Fabrication of simple structural shapes using Gas Metal Arc Welding
8. Joining of plates and pipes using Gas Metal Arc Welding/ Arc Welding /Submerged arc welding
9. Preparation of green sand moulds
10. Manufacturing of simple sheet metal components using shearing and bending operations
11. Manufacturing of sheet metal components using metal spinning on a lathe

J component

1. Application in Fast production of gear prototypes - Case study/mini project

Contact Periods:

Lecture: - 30 Periods

Practical: 30 Periods

Total: 60 Periods

TEXT BOOKS:

1. Lindberg, "Processes and Materials of Manufacture" ", 4" edition, Prentice hall India (p) Ltd, 1999

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2. P.N.Rao - "Manufacturing Technology", 5" edition, MH Ltd.,2013

REFERENCES:

1. Serope Kalpakjian; Steven R.Schmid, "Manufacturing Engineering and Technology", 4" edition, Prentice Hall, 2000.
2. R.B Gupta, "Foundry Engineering" Satyaprakashan, 3d edition, Tata McGraw Hill Publishing Company Ltd, 2012.
3. Lal. O.P Mand Khanna A, "Text Book of Foundry Technology", 5' edition, Dhanpat Rai and Sons, 2013.

EVALUATION PATTERN:

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	
35 %			15 %		
15(60)	15(60)	5(40)	10(75)	5(25)	50(100)

U26ME202	ENGINEERING MATERIALS AND METALLURGY				Category: PCC				
					L	T	P	J	C
					3	0	0	0	3

Course Objectives

- To acquire knowledge about phase diagrams, salient features of iron-carbon system and heat treatment process.
- To apply mechanism of plastic deformation, principle of strengthening methods.
- To utilize the mechanical behavior of materials and learn about failure analysis.
- To identify about structure, properties and applications of metals and non-metals.
- To acquire knowledge about properties and applications of advanced engineering materials.

Course Outcomes:

At the end of the course the students would be able to		BT Mapped (Highest Level)
CO1	Interpret binary phase diagram, describe the micro-constituents in iron-carbon system, Effect of heat treatment and surface hardening on the properties of material.	Apply
CO2	Explain different strengthening mechanisms, concepts related to plastic deformation	Analyze
CO3	Discuss the failure of engineering materials, material testing and characterization techniques	Apply
CO4	Classify metals and non-metals for various engineering application	Apply
CO5	Apply advanced materials for specific applications based on their properties and describe computational methods related to materials	Analyze

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	3	-	2	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	2	-
CO5	2	3	-	-	2	-	-	-	-	-	2	2	2
Correlation Levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)													

SYLLABUS:

UNIT I Phase Diagram and Heat Treatment

9

Crystal structure, Imperfection in solids, Solid solutions – Types, factors governing solubility rules. Phase diagram – cooling curve, phase rule, types and interpretation. Iron- carbide (Fe-Fe₃C) phase diagram, Microstructural aspects and invariant reactions in Fe-Fe₃C diagram. Effect of alloying elements on Fe-Fe₃C diagram. TTT and CCT diagrams. Various heat treatment and surface hardening process.

UNIT II Elastic and Plastic Behaviour of Material 9

Stress Strain relation in elastic and plastic region, Mechanism of plastic deformation – slip and twinning, Slip systems, critically resolved shear stress, Shear strength of perfect and real crystals. Dislocation – climb, interaction, multiplication and pile ups. Strengthening mechanisms – Solid solution, Grain boundary, Dispersion, Precipitation, Fiber, Martensite strengthening, Strain aging and Strain hardening.

UNIT III Characterization of Material 9

Types of fracture in metals, Griffith's theory of brittle fracture, Stress intensity factor, Fracture toughness, Theory of Ductile to brittle transition. Creep – Creep curve, mechanism of creep deformation. Fatigue - S-N curve, low and high cycle fatigue, stages of fatigue. Sources of failure, Procedure of failure analysis. Hardness: Rockwell, Brinell, Vickers hardness, Nano-Indentation Technique. Introduction to characterization of materials - XRD, SEM and TEM

UNIT IV Properties of Advanced Material 9

Properties of plain carbon steel, Tool steel, Stainless steel, Cast iron. Need of microalloying, HSLA steel - Dual phase steel, TRIP steel. Aluminium alloys – classifications, properties, applications, Titanium alloys. Polymers – Types, Properties and applications of PE, PP, PVC. Ceramics – Types, Properties and applications of Al₂O₃, ZrO₂, SiC. Composites – classification, Reinforcement and matrix material, Rule of Mixture. Properties and applications of MMC, CMC and PMC. Functionally graded materials.

UNIT V Futuristic Materials and Computational Materials Design 9

Smart materials – Types, Shape memory alloys. Nanomaterials: Carbon nanotubes, Graphene – properties and applications. Metallic foams, Metallic glasses, Super alloys, High entropy alloys, biomaterials, Multi- scale materials modelling. Integrated Computational Materials Engineering with application to Industry 4.0. Materials Informatics, Machine learning for design of materials, Property Optimization

Total: 45 Hours

Text Books:

1. Flake.C Campbell, Elements of Metallurgy and Engineering Alloys, ASM International, 2008
2. Dieter.G.E, Mechanical Metallurgy, McGraw Hill, Singapore, 2017
3. Budinski.K.G, Budinski.M.K, Engineering Materials Properties and selection, Edition 9, Pearson Publication, 2010

References

1. ASM Hand book, Failure analysis and prevention, Vol: 11, 2021
2. Reza Abbaschian, Lara Abbaschian & Robert E. Reed-Hill, Principles of Physical Metallurgy, Cengage Learning, 2013
3. Chaudhery Mustansar Hussain, "Smart Materials and New Technologies", Springer, 2022.
4. James F. Shackelford et.al. CRC Materials Science and Engineering Handbook, Taylor & Francis, 2015.

B.E. – MECHANICAL ENGINEERING – R2026 – CBCS**EVALUATION PATTERN:**

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

U26CEC01	DESIGN THINKING	Category: MCC				
		L	T	P	J	C
		1	0	2	0	2

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To introduce the fundamental principles, mindset, and phases of Design Thinking for problem-solving.
- To develop the ability to understand user needs through empathy-driven research methods.
- To enable students to apply creative ideation and experimentation techniques for innovative solutions.
- To equip learners with skills to engage stakeholders and communicate ideas effectively.
- To provide knowledge on evaluating, refining, and implementing solutions using strategic and analytical tools.

COURSE OUTCOMES:

On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Explain the principles, phases, and tools of Design Thinking and apply them to real-world problems .	Understand
CO2	Apply empathy-based techniques such as field observation, interviews, and persona development to identify user needs	Apply
CO3	Generate innovative ideas using ideation techniques like SCAMPER and develop prototypes.	Apply
CO4	Demonstrate effective communication through storytelling, storyboarding, and user engagement methods .	Apply
CO5	Analyze and evaluate solutions using strategic tools such as viability analysis, activity systems, and innovation frameworks	Analyze

CO PO MAPPING

[illegible]

B.E. – MECHANICAL ENGINEERING – R2026 – CBCS
SYLLABUS:

UNIT I DESIGN THINKING **3**

Key Principles and Mindset – Five Phases, Methods and Tools of Design Thinking – User Guide – Foundation Building for Design Thinking – Explore: Methods & Tools – STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing.

UNIT II EMPATHIZE **3**

Methods & Tools – Field Observation – Deep User Interview – Empathy Map – User Journey Map - Need Finding – User Insights - User Persona Development.

UNIT III EXPERIMENT **3**

Methods & Tools – Ideation – SCAMPER – Analogous Inspiration – Deconstruct & Reconstruct – User Experience Journey – Prototyping– Idea Refinement.

UNIT IV ENGAGE **3**

Methods & Tools – Story Telling – Art of Story Telling – Storyboarding – Co-Creation with Users – Collect Feedback from Users.

UNIT V EVOLVE **3**

Methods & Tools – Concept Synthesis – Strategic Requirements – Evolved Activity Systems – Activity System Integration – Viability Analysis – Innovation Tools using User Needs, CAP, 4S – Change Management - Quick Wins.

LIST OF EXPERIMENTS / PRACTICAL EXERCISES

1. Study and analysis of a real-world problem using STEEP Analysis.
2. Perform Stakeholder Mapping for a selected case study.
3. Develop an Activity System Map for an existing product/service.
4. Conduct Field Observation and document findings.
5. Perform a Deep User Interview and analyze responses.
6. Create an Empathy Map based on collected data.
7. Generate ideas using Brainstorming and SCAMPER techniques.
8. Apply Analogous Inspiration for innovative thinking.
9. Perform Deconstruct & Reconstruct exercise on an existing product.
10. Develop a Storytelling script for a design solution.
11. Create a Storyboard representing the user experience.
12. Conduct Co-creation sessions with users.
13. Perform Concept Synthesis for final solution design.
14. Define Strategic Requirements for implementation.
15. Develop an Evolved Activity System.

B.E. – MECHANICAL ENGINEERING – R2026 – CBCS**Contact Periods:**

Lecture:15 Periods

Tutorial: -

Practical: 30 Periods

Total: 45 Periods**EVALUATION PATTERN:**

Continuous Assessments					End Semester Examinations	
Theory			Practical / Project		Practical / Project	
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc., / Review for Project presentation	Lab Test	Test / Report Evaluation	Presentat ion & Viva
25%			25 %		50%	
10(30)	10(30)	5(40)	15(75)	10(25)	40(80)	10(20)

U26MC201	Universal human Values II	Category: MCC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

1. To facilitate the development of a holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the human reality and the rest of existence.
2. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

COURSE OUTCOMES:

After completion of the course, students will be able to:		BT Mapped (Highest Level)
CO1	Evaluate the significance of value inputs in formal education and start applying them in life and profession	Understand
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	Apply
CO3	Analyze the value of harmonious relationships based on trust and respect in life and profession	An
CO4	Examine the role of a human being in ensuring harmony in society and nature.	Apply
CO5	Apply the understanding of ethical conduct to formulate strategies for ethical life and profession.	Apply

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	2	-	-	-	1	-	-
CO2	-	-	-	-	-	-	2	1	-	-	-	-	-
CO3	-	-	-	-	-	-	2	2	1	-	-	-	-
CO4	-	-	-	-	-	2	2	-	-	-	-	-	-
CO5	-	-	-	-	-	-	3	1	-	-	-	-	-
Correlation Levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)													

SYLLABUS:

UNIT I: INTRODUCTION – BASIC HUMAN ASPIRATION, ITS FULFILLMENT THROUGH ALL ENCOMPASSING RESOLUTION

The basic human aspirations and their fulfillment through Right Understanding and Resolution – Right understanding and Resolution as the activities of the Self (self being central to Human Existence) – All-encompassing Resolution for a Human Being – Its details and solution of problems in the light of Resolution.

UNIT II: RIGHT UNDERSTANDING – KNOWER, KNOWN & THE PROCESS

The domain of right understanding starting from understanding the human being and extending up to understanding nature/existence – its interconnectedness and co-existence – and finally understanding the role of human being in existence (human conduct).

UNIT III: UNDERSTANDING HUMAN BEING

Understanding the human being comprehensively as the first step and the core theme of this course – Human being as co-existence of the self and the body – The activities and potentialities of the self – basis for harmony/contradiction in the self.

UNIT IV: UNDERSTANDING NATURE AND EXISTENCE

A comprehensive understanding about the existence – Nature being included – The need and process of inner evolution – Particularly awakening to activities of the Self: Realization – Understanding and Contemplation in the Self.

UNIT V: UNDERSTANDING HUMAN CONDUCT, ALL-ENCOMPASSING RESOLUTION & HOLISTIC WAY OF LIVING

Understanding Human Conduct – Different aspects of all encompassing Resolution – Holistic way of living for Human Being with all encompassing resolution covering all four dimensions of human endeavor viz., realization, thought, behavior and work leading to harmony at all levels from Self to Nature and entire Existence.

CONTACT PERIODS

Lecture: 30 Periods Tutorial: 15 Periods Practical: – Project: – Total: 45 Periods

TEXTBOOKS

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.

REFERENCES

1. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.
2. M Govindarajan, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (Including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
3. B P Banerjee, Foundations of Ethics and Management, Excel Books, 2005.
4. B L Bajpai, Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted 2008.

EVALUATION PATTERN:

Continuous Internal Assessments
Assessments 1 (100 Marks)
Total 100

CO PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	-	-
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:**UNIT I நெசவுமற்றும்பானைதொழில்நுட்பம் 3**

சங்க காலத்தில் நெசவுத் தொழில் பானை தொழில் நுட்பம்- கருப்பு சிவப்பு பாண்டங்கள் பாண்டங்களில் கீறல் குறியீடுகள்.

UNIT II மரபு-பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை- சிற்பக்கலை 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் சங்க காலத்தில் வீட்டு பொருட்களில் வடிவமைப்பு சங்க காலத்தில் கட்டுமான பொருட்களும் நடுக்கல்லும் சிலப்பதிகாரத்தில் மேடைவடிவமைப்பு பற்றிய விவரங்கள் மாமல்லபுரம் கோவில்கள் சிற்பங்களும் கோவில்களும் சோழர் காலத்தில் சோழர் காலத்துப் பெருங் கோவில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் நாயக்கர் கால கோவில்கள் மாதிரி கட்டமைப்புகள் பற்றி அறிதல் மீனாட்சியம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் செட்டி நாட்டு வீடுகள் பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோசாராசெனிக் கட்டிடக்கலை.

UNIT III உற்பத்தித்தொழில்நுட்பம் 3

கப்பல் கட்டும் கலை -உலோகவியல் இரும்புதொழிற்சாலை - இரும்பு உருக்குதல் -எஃகு -வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள்- நாணயங்கள் அச்சடித்தல் -மணிஉருவாக்குதல் -தொழிற் சாலைகள்- கல்மணிகள் கண்ணாடி மணிகள் சுடுமண் மணிகள் சங்குமணிகள் -எலும்புதுண்டுகள் -தொல்லியல் சான்றுகள்- சிலப்பதிகாரத்தில் மணிகளின் வகைகள்

UNIT IV வேளாண்மை மற்றும்நீர் பாசன தொழில்நுட்பம் 3

அனை,ஏரி, குளங்கள், மதகு – சோழர் கால குமிழித்தூம்பின் முக்கியத்துவம்- கால்நடை பராமரிப்பு -கால் நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்- வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல் சார்ந்த அறிவு மீன்வளம் -முத்து மற்றும் முத்துகுளித்தல் -பெருங்கடல் குறித்து பண்ணைய -அறிவுசார் சமூகம்.

UNIT V அறிவியல் தமிழ் மற்றும் கணித் தமிழ் 3

அறிவியல் தமிழின் வளர்ச்சி -கணித தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல்- தமிழ் மென் பொருட்கள் உருவாக்கம் – தமிழ் இணைய கல்விக் கழகம்- தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள்-சொற்குவைத் திட்டம்.

Lecture: 15 Periods

Tutorial: - Periods

Total: 15 Periods

TEXT BOOKS:

1. கே. ஜெயந்தி ரவிகிருஷ்ணா, தமிழர்கள் மற்றும் தொழில்நுட்பம், ஸ்ரீ கிருஷ்ணா பதிப்பகம், மகாலட்சுமி நகர், வேலப்பஞ்சாவடி, சென்னை- 600 007, முதல்பதிப்பு, 2023..
2. எஸ். பிரியதர்ஷினி, தமிழர்கள் மற்றும் தொழில் நுட்பம், வி. கே. பதிப்பகம், 55, கோபுரம் காலனி, சிவகாசி-626 124.

REFERENCES:

3. தமிழக வரலாறு – மக்களும் பண்பாடும் - கே.கே. பிள்ளை, International Institute of Tamil Studies, C.P.T Campus, Chennai.
4. கணினித் தமிழ் - முனைவர். இல. சுந்தரம், விகடன் பிரசுரம், அண்ணாசாலை, சென்னை, திசம்பர் 2016.

U26TA201	தமிழரும் தொழில் நுட்பமும் Tamils and Technology (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- தமிழர்களின் நெய்தல்,மண் பாண்டம் மற்றும் கட்டிடத் தொழில் நுட்பங்களை அறிதல்.
- தமிழர்களின் வேளாண்மை, பாசன மற்றும் உற்பத்தித் தொழில் நுட்பங்களை புரிதல்.
- அறிவியல் தமிழ் மற்றும் தமிழ் கணினி வளர்ச்சியை உணர்தல்.

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	பண்டைய தமிழர்களின் நெய்தல் மற்றும் மண்பாண்டத் தொழில் நுட்பத்தை புரிதல்	Understand
CO2	சங்ககால கட்டிடத் தொழில்நுட்பம், கட்டிடப் பொருட்கள் மற்றும் சம்பவ ஆய்வுகளை புரிதல்	Understand
CO3	உலோக செயல்முறை, நாணயம் மற்றும் மணிகள் தயாரிப்பை தொல்பொருள் ஆதாரங்களுடன் விளக்கமாக அறிதல்	Understand
CO4	வேளாண்மை முறைகள், பாசனத் தொழில்நுட்பம் மற்றும் முத்துப் பிடித்தலை உணர்தல்	Understand
CO5	அறிவியல் தமிழ் மற்றும் தமிழ் கணினி அறிவை பயன்படுத்துதல்	Understand

SYLLABUS:

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

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

UNIT III MANUFACTURING TECHNOLOGY 3

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

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - The role of journals in the development of scientific Tamil - Scientific Tamil vocabulary - Tamil computing - Digitalization of Tamil Books - Development of Tamil Software - Tamil Virtual Academy - Tamil Digital Library - Online Tamil Dictionaries - Sorkuvai Project.

Lecture: 15 Periods

Tutorial: - Periods

Total: 15 Periods

TEXT BOOKS:

1. Tamils and Technology, K. Jayanthi Ravikrishna, Sri Krishna publications, Mahalakshmi Nagar, Velappanchavadi, Chennai - 600 007, First Edition 2023.
2. Tamils and Technology, S. Priyadharshini, V. K. Publications, 55, Gopuram Colony, Sivakasi - 626 124.

REFERENCES:

1. History of Tamil Nadu – People and Culture – K.K. Pillai, International Institute of Tamil Studies, C.P.T Campus, Chennai.
2. Computer Tamil – Dr. Il. Sundaram, Vikatan Publications, Anna Salai, Chennai, December 2016.

EVALUATION PATTERN:

Continuous Internal Assessments
Assessments 1 (100 Marks)
Total 100