GOJAN SCHOOL OF BUSINESS AND TECHNOLOGY

AN AUTONOMOUS INSTITUTION

APPROVED BY AICTE | AFFILIATED TO ANNA UNIVERSITY | ACCREDITED BY NAAC

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U.G. Regulation 2026

Curriculum

B.E. Mechanical and Automation Engineering

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GOJAN SCHOOL OF BUSINESS AND TECHNOLOGY

(AN AUTONOMOUS INSTITUTION, AFFILIATED TO ANNA UNIVERSITY)

Programme: B.E., Mechanical and Automation Engineering **Regulations: 2026**

Abbreviations:

HUM– Humanities (Languages, Management, Heritage, and others)

BS –Basic Science (Mathematics, Physics, Chemistry)

ES –Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

SD –Skill Development

SL –Self Learning

CDP –Capstone Design Project

OE –Open Elective

L –Laboratory Course

T –Theory

LIT –Laboratory Integrated Theory

PW –Project Work

IPW –Internship cum Project Work

DIC –Department Introductory Course

TCP –Total Contact Period(s)

Program Outcomes

1. **Engineering Knowledge**: Apply math, science, and engineering fundamentals to complex problems.
2. **Problem Analysis**: Identify and analyze complex problems using research and sustainability principles.
3. **Design Solutions**: Design systems and processes considering health, safety, cost, culture, and environment.
4. **Investigations**: Use experiments, modelling, and data analysis to reach valid conclusions.
5. **Engineering Tools**: Apply modern tools for modelling and problem-solving, recognizing their limits.
6. **Society & Environment**: Assess societal, legal, and environmental impacts of engineering solutions.
7. **Ethics**: Commit to ethics, human values, diversity, and legal compliance.
8. **Teamwork**: Work effectively as an individual and in multidisciplinary teams.
9. **Communication**: Communicate clearly in reports, presentations, and documentation across diverse groups.
10. **Management & Finance**: Apply management and economic principles in projects and teamwork.
11. **Lifelong Learning**: Engage in continuous learning, adapt to new technologies, and think critically.

Program Specific Outcome (PSO)

PSO 1: Graduates will be able to design, develop and implement new automation system for the replacement of traditional system to conserve energy and cost.

PSO 2: Optimization and Sustainability: Graduates will be able to develop economy and environmental friendly solutions for the problems by taking excessive measures.

Program Educational Objectives (PEOs)

Graduates will be able to:

PEO 1: Graduates will have sound knowledge in the fundamentals of engineering to deliver the skills required in core areas and allied fields.

PEO 2: Graduates will be successful placement and career in industries besides, pursuing higher studies.

PEO 3: Graduates will be able to exhibit skills like entrepreneurial, ethical, communication, team work and lifelong learning in their profession.

Semester – I							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
1.	26MAT101	Applied Calculus	T	3-1-0	4	4	BS
2.	26ECT001	Basic Electrical and Electronics Engineering	T	3-0-0	3	3	ES (G)
3.	26MEI101	Engineering Graphics	LIT	2-0-4	6	4	ES (G)
4.	26PHI101	Applied Physics – I	LIT	2-0-2	4	3	BS
5.	26CYI101	Applied Chemistry – I	LIT	2-0-2	4	3	BS
6.	26TAT101	தமிழர் மரபு / Heritage of Tamils	T	1-0-0	1	1	HUM
7.	26ENT101	English Essentials – I	T	2-0-0	2	2	HUM
8.	26CSI101	Computer Programming: C	LIT	2-0-2	4	3	ES (PC)
9.	26MEL002	Makerspace	L	0-0-4	4	2	SD
10.	26UCT101	Life Skills for Engineers – I	T	1-0-0	1	1	HUM
Total Credits					**33**	**26**	**---**

Semester – II							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
1.	26MAT201	Linear Algebra	T	3-1-0	4	4	BS
2.	26MET201	Engineering Mechanics	T	3-1-0	4	4	ES (G)
3.	26CSI001	Computer Programming: Python	LIT	2-0-2	4	3	ES (PC)
4.	26PHT202	Applied Physics (ME) – II	T	2-1-0	3	3	BS
5.	26CYT201	Applied Chemistry (ME) – II	T	2-0-0	2	2	BS
6.	26TAT201	தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology	T	1-0-0	1	1	HUM
7.	26MEL001	Re-Engineering for Innovation	L	0-0-4	4	2	SD
8.	26ENI201	English Essentials – II	LIT	1-0-2	3	2	HUM
9.	26UCT201	Life Skills for Engineers – II	T	1-0-0	1	1	HUM
10.	26UCT202	Foreign Language- Japanese	LIT	1-0-0	1	1	HUM
Total Credits					**27**	**23**	**---**

Semester – III							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
1.	26MAT302	Computational Differential Equations	T	3-1-0	4	4	BS
2.	26MEI301	Strength of Materials	LIT	3-0-2	5	4	ES (PC)
3.	26MEI302	Manufacturing Processes	LIT	3-0-2	5	4	ES (PC)
4.	26MEI303	Engineering Thermodynamics	LIT	3-0-2	5	4	ES (PC)
5.	26ECT307	Electrical Drives and Actuators	T	3-0-0	3	3	ES (PC)
6.	26ENL301	English Communication Skills Laboratory – I	L	0-0-2	2	1	HUM
7.		Skill Development Course – I	LIT	1-0-2	3	2	SD
				Total Credits	**27**	**22**	---

Semester – IV							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
1.	26CST404	Applied Data Science	T	3-0-0	3	3	ES (ET)
2.	26MEI401	Kinematics and Dynamics of Machines	LIT	3-0-2	5	4	ES (PC)
3.	26MEI402	Fluid Power Systems	LIT	3-0-2	5	4	ES (PC)
4.	26MET401	CNC Technology	T	3-0-0	3	3	ES (PC)
5.	26ECT404	Embedded Systems	T	3-0-0	3	3	ES (G)
6.	26ECT405	Sensors and Transducers	T	3-0-0	3	3	ES (PC)
7.	26MET402	Standards in Mechanical and Automation Engineering	T	1-0-0	1	1	ES (PC)
8.	26ENL401	English Communication Skills Laboratory – II	L	0-0-2	2	1	HUM
9.		Skill Development Course – II	LIT	1-0-2	3	2	SD
				Total Credits	**28**	**24**	---

Semester – V						
		Course Name		Periods / Week	Credits	Category

S. No.	Course Code		Course Type	L-T- P	TCP		
1.	26MET501	Design of Machine Elements	T	3-0-0	3	3	ES (PC)
2.	26ECT302	Control Systems	T	3-0-0	3	3	ES (PC)
3.	26RAT504	Robot Dynamics	T	3-0-0	3	3	ES (PC)
4.	26MEI501	Computer Aided Design and Analysis	LIT	3-0-2	5	4	ES (PC)
5.	26MEI502	Industrial Automation	LIT	2-0-2	4	3	ES (PC)
6.		Open Elective	-	-	-	3	OE
7.		Programme Elective – I	-	-	-	3	ES (PE)
8.		Skill Development Course – III	LIT	1-0-2	3	2	SD
9.		Industry Oriented Course - I	LIT	1-0-2	3	1	SD
Total Credits					**25**	**25**	**---**
For Honours Degree							
1.		Capstone Design Project – Level I	CDP	0-0-12	12	6	SD
OR							
1.		Honours Elective – I	T	3-0-0	3	3	
2.		Honours Elective – II	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective – I	T	3-0-0	3	3	
2.		Minor Elective – II	T	3-0-0	3	3	

Semester – VI

S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T-P	TCP		
1.	26MET601	Smart Manufacturing	T	3-1-0	4	4	ES (PC)
2.	26RAI601	Robotic Vision and Intelligence	LIT	3-0-2	5	4	ES (PC)
3.	26MEI601	Metrology and Automated Inspection	LIT	3-0-2	5	4	ES (PC)
4.	26GET601	Climate Change and Sustainability	T	2-0-0	2	2	HUM
5.		Programme Elective – II	T	3-0-0	3	3	ES (PE)
6.	26MEL601	Smart Manufacturing Practices Laboratory	L	0-0-4	4	2	ES (PC)
7.		Self-Learning Course	T	1-0-0	0	1	SL
8.		Industry Oriented Course - II	LIT	1-0-2	3	1	SD
Total Credits					**26**	**21**	---
For Honours Degree							
1.		Capstone Design Project – Level II	CDP	0-0-12	12	6	SD
OR							
1.		Honours Elective – III	T	3-0-0	3	3	
2.		Honours Elective – IV	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective – III	T	3-0-0	3	3	
2.		Minor Elective – IV	T	3-0-0	3	3	

Semester – VII

S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T-P	TCP		
1.	26GEI701	Engineering Entrepreneurship Development	LIT	2-0-2	4	3	HUM
2.	26MEI701	Mechatronics System Design	LIT	2-0-2	4	3	ES (PC)
3.		Programme Elective – III	T	3-0-0	3	3	ES (PE)
4.		Programme Elective – IV	T	3-0-0	3	3	ES (PE)
5.		Programme Elective – V	T	3-0-0	3	3	ES (PE)
6.	26BAT701	Project Management	T	2-0-0	2	2	HUM
7.		Industrial Training	L	0-0-2	2	1	SD
Total Credits					**21**	**18**	**---**
For Honours Degree							
1.		Capstone Design Project – Level III	CDP	0-0-12	12	6	SD
OR							
1.		Honours Elective – V	T	3-0-0	3	3	
2.		Honours Elective – VI	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective – V	T	3-0-0	3	3	
2.		Minor Elective – VI	T	3-0-0	3	3	

Semester – VIII							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T-P	**TCP**		
1	26MEPW801	Project Work / Internship cum Project Work	PW / IPW	0-0-16	16	8	SD
Total Credits					**16**	**8**	**---**

Total Credits :167

PROGRAMME ELECTIVE COURSES – STREAMS

PROGRAMME ELECTIVE COURSES: VERTICALS						
VERTICAL 1	**VERTICAL 2**	**VERTICAL 3**	**VERTICAL 4**	**VERTICAL 5**	**VERTICAL 6**	**VERTICAL 7**
Automation	**Applied Robotics**	**Computational Engineering**	**Digital and Green Manufacturing**	**Product and Process Development**	**Diversified Courses Group 1**	**Diversified Courses Group 2**
Object Oriented Programming in C++	Industrial Robotics	Computational Solid Mechanics	Digital Manufacturing and IoT	Value Engineering	Embedded system and Programming	Automobile Engineering
Power Electronics	Drone Technologies	Computational Fluid Dynamics and Heat transfer	Lean Manufacturing	Additive Manufacturing	Finite Element Analysis	Micro Electro Mechanical Systems
Computer Architecture and Organization	Micro robotics	Theory on Computation and Visualization	Modern Robotics	CAD/CAM	Refrigeration and Air Conditioning	Non-Traditional Machining Process
Virtual Instrumentation	Agricultural Robotics and Automation	Computational Bio-Mechanics	Green Manufacturing Design and Practices	Design For X	Design for Manufacturing	Design Concepts in Engineering
Industrial Network Protocols	Collaborative Robotics	Advanced Statistics and Data Analytics	Environment Sustainability and Impact Assessment	Ergonomics in Design	Process Planning and Cost Estimation	Composite Materials and Mechanics
Motion Control System	Robot Operating Systems	CAD and CAE	Energy Saving Machinery and Components	New Product Development	Design of Jigs and Fixtures	Renewable Energy Technologies
Total Integrated Automation	Medical Robotics	Machine Learning for Intelligent Systems	Green Supply Chain Management	Product Life Cycle Management	Gas Dynamics and Jet Propulsion	Metal and Powder Forming Techniques
Digital Twin and Industry 5.0	Humanoid Robotics	Computer Aided Inspection	Computer Integrated Manufacturing	Operational Research	Industry 4.0	Fundamentals of Nano science

Registration of Programme Elective Courses from Verticals:

Programme Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. Students are permitted to choose all the Programme Electives from a particular vertical or from different verticals. Further, only one Programme Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also.

PROGRAMME ELECTIVE COURSES- AUTOMATION							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
1.	26CS030	Object Oriented Programming in C++	T	3-0-0	3	3	ES (PE)
2.	26EC031	Power Electronics	T	3-0-0	3	3	ES (PE)
3.	26CS031	Computer Architecture and Organization	T	3-0-0	3	3	ES (PE)
4.	26EC032	Virtual Instrumentation	T	3-0-0	3	3	ES (PE)
5.	26EC033	Industrial Network Protocols	T	3-0-0	3	3	ES (PE)
6.	26EC034	Motion Control System	T	3-0-0	3	3	ES (PE)
7.	26ME001	Total Integrated Automation	T	3-0-0	3	3	ES (PE)
8.	26ME002	Digital Twin and Industry 5.0	T	3-0-0	3	3	ES (PE)

PROGRAMME ELECTIVE COURSES- APPLIED ROBOTICS							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
1.	26RA003	Robots and Systems in Smart Manufacturing	T	3-0-0	3	3	ES (PE)
2.	26AETOE02	Drone Technologies	T	3-0-0	3	3	ES (PE)
3.	26RA001	Micro robotics	T	3-0-0	3	3	ES (PE)
4.	26RA003	Agricultural Robotics and Automation	T	3-0-0	3	3	ES (PE)
5.	26RA004	Collaborative Robotics	T	3-0-0	3	3	ES (PE)
6.	26RA005	Robot Operating Systems	T	3-0-0	3	3	ES (PE)

7.	26RA006	Medical Robotics	T	3-0-0	3	3	ES (PE)
8.	26RA007	Humanoid Robotics	T	3-0-0	3	3	ES (PE)

PROGRAMME ELECTIVE COURSES- COMPUTATIONAL ENGINEERING							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26ME003	Computational Solid Mechanics	T	3-0-0	3	3	ES (PE)
2.	26ME004	Computational Fluid Dynamics and Heat transfer	T	3-0-0	3	3	ES (PE)
3.	26ME005	Theory on Computation and Visualization	T	3-0-0	3	3	ES (PE)
4.	26ME006	Computational Bio- Mechanics	T	3-0-0	3	3	ES (PE)
5.	26ME007	Advanced Statistics and Data Analytics	T	3-0-0	3	3	ES (PE)
6.	26ME008	CAD and CAE	T	3-0-0	3	3	ES (PE)
7.	26ME009	Machine Learning for Intelligent Systems	T	3-0-0	3	3	ES (PE)
8.	26ME010	Computer Aided Inspection and Testing	T	3-0-0	3	3	ES (PE)

PROGRAMME ELECTIVE COURSES- DIGITAL AND GREEN MANUFACTURING							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26ME011	Digital Manufacturing and IoT	T	3-0-0	3	3	ES (PE)
2.	26ME012	Lean Manufacturing	T	3-0-0	3	3	ES (PE)
3.	26RA026	Modern Robotics	T	3-0-0	3	3	ES (PE)
4.	26ME013	Green Manufacturing Design and Practices	T	3-0-0	3	3	ES (PE)
5.	26GET001	Environment Sustainability and Impact Assessment	T	3-0-0	3	3	ES (PE)
6.	26ME014	Energy Saving Machinery and Components	T	3-0-0	3	3	ES (PE)
7.	26ME015	Green Supply Chain Management	T	3-0-0	3	3	ES (PE)
8.	26ME016	Computer Integrated Manufacturing	T	3-0-0	3	3	ES (PE)

PROGRAMME ELECTIVE COURSES- PRODUCT AND PROCESS DEVELOPMENT							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26ME017	Value Engineering	T	3-0-0	3	3	ES (PE)
2.	26ME018	Additive Manufacturing	LIT	2-0-2	4	3	ES (PE)
3.	26ME019	CAD/CAM	T	3-0-0	3	3	ES (PE)
4.	26ME020	Design For X	T	3-0-0	3	3	ES (PE)
5.	26ME021	Ergonomics in Design	T	3-0-0	3	3	ES (PE)
6.	26ME022	New Product Development	T	3-0-0	3	3	ES (PE)
7.	26ME023	Product Life Cycle Management	T	3-0-0	3	3	ES (PE)
8.	26MAT001	Operational Research	T	3-0-0	3	3	ES (PE)

PROGRAMME ELECTIVE COURSES- DIVERSIFIED COURSES GROUP 1							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26EC035	Embedded system and Programming	T	3-0-0	3	3	ES (PE)
2.	26ME024	Finite Element Analysis	T	3-0-0	3	3	ES (PE)
3.	26ME025	Refrigeration and Air Conditioning	T	3-0-0	3	3	ES (PE)
4.	26ME026	Design for Manufacturing	T	3-0-0	3	3	ES (PE)
5.	26ME027	Process Planning and Cost Estimation	T	3-0-0	3	3	ES (PE)
6.	26ME028	Design of Jigs and Fixtures	T	3-0-0	3	3	ES (PE)
7.	26ME029	Gas Dynamics and Jet Propulsion	T	3-0-0	3	3	ES (PE)
8.	26ME030	Industry 4.0	T	3-0-0	3	3	ES (PE)

PROGRAMME ELECTIVE COURSES- DIVERSIFIED COURSES GROUP 2							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26ME031	Automobile Engineering	T	3-0-0	3	3	ES (PE)
2.	26ME032	Micro Electro Mechanical Systems	T	3-0-0	3	3	ES (PE)
3.	26ME033	Non-Traditional Machining Process	T	3-0-0	3	3	ES (PE)
4.	26ME034	Design Concepts in Engineering	T	3-0-0	3	3	ES (PE)
5.	26ME035	Composite Materials and Mechanics	T	3-0-0	3	3	ES (PE)
6.	26ME036	Renewable Energy Technologies	T	3-0-0	3	3	ES (PE)
7.	26ME037	Metal and Powder Forming Techniques	T	3-0-0	3	3	ES (PE)
8.	26ME038	Fundamentals of Nano science	T	3-0-0	3	3	ES (PE)

OPEN ELECTIVE COURSES							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26ECIOE02	Augmented Reality /Virtual Reality	LIT	2-0-2	4	3	OE
2.	26ECIOE01	IoT Concepts and Applications	LIT	2-0-2	4	3	OE
3.		Data Science Fundamentals	LIT	2-0-2	4	3	OE
4.	26METOE01	Hydraulics and Pneumatics	T	3-0-0	3	3	OE
5.	26METOE02	Reverse Engineering	T	3-0-0	3	3	OE
6.	26METOE03	Electric and Hybrid Vehicles	T	3-0-0	3	3	OE
7.	26AETOE01	Space Engineering	T	3-0-0	3	3	OE
8.	26METOE04	Introduction to non-destructive testing	T	3-0-0	3	3	OE
9.		Project Report Writing	T	3-0-0	3	3	OE
10.	26METOE05	Industrial Design & Rapid Prototyping Techniques	T	3-0-0	3	3	OE
11.	26METOE06	Batteries and Management system	T	3-0-0	3	3	OE
12.	26METOE07	Industrial Safety	T	3-0-0	3	3	OE
13.	26AETOE03	Fundamentals of Aeronautical Engineering	T	3-0-0	3	3	OE
14.		English for Competitive Examinations	T	3-0-0	3	3	OE
15.	26METOE08	Energy Technology	T	3-0-0	3	3	OE

ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same Programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other Programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.

VERTICALS FOR MINOR DEGREE (In addition to all the verticals of other programmes)

Fintech and Block Chain	Entrepreneurship	Public Administration	Business Data Analytics	Environment and Sustainability
Financial Management	Foundations of Entrepreneurship	Principles of Public Administration	Statistics for Management	Sustainable infrastructure Development
Fundamentals of Investment	Team Building and Leadership Management for Business	Constitution of India	Datamining for Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity and Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Administrative Theories	Marketing and Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation and Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

NPTEL COURSES							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods / Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.		Product Design and Development	T				ES (PE)
2.		Product Design Using Value Engineering	T				ES (PE)
3.		Selection of Nanomaterials for Energy Harvesting And Storage Application	T				ES (PE)
4.		Structural Analysis of Nanomaterials	T				ES (PE)
5.		Foundations of Cognitive Robotics	T				ES (PE)
6.		Principles of Vibration Control	T				ES (PE)
7		Manufacturing Processes - Casting and Joining	T				ES (PE)
8		Foundation of Computational Fluid Dynamics	T				ES (PE)
9		Mechanics and Control of Robotic Manipulators	T				ES (PE)
10		Fluid Dynamics and Turbo-machines	T				ES (PE)
11		Principles of Metal Forming Technology	T				ES (PE)
12		Power Plant Engineering	T				ES (PE)
13		Refrigeration and Air-conditioning	T				ES (PE)
14		Introduction to Mechanical Vibration	T				ES (PE)
15		Basics of Finite Element Analysis - I	T				ES (PE)
16		Robotics	T				ES (PE)
17		Welding Application Technology	T				ES (PE)
18		Steam Power Engineering	T				ES (PE)
19		Thermal Management of Electronics	T				ES (PE)
20		Optical Methods for Solid and Fluid Mechanics	T				ES (PE)
21		Engineering Economic Analysis	T				ES (PE)
22		Weldability of Metals	T				ES (PE)
23		Design Practice - II	T				ES (PE)

24		Biomechanics of Joints and Orthopaedic Implants	T				ES (PE)
25		Mechanism and Robot Kinematics	T				ES (PE)
26		High Performance Computing for Scientists and Engineers	T				ES (PE)
27		Advanced Machining Processes	T				ES (PE)
28		Laser Based Manufacturing	T				ES (PE)
29		Advances in Welding and Joining Technologies	T				ES (PE)

B.E. MECHANICAL AND AUTOMATION ENGINEERING

S. No	Course Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HUM	04	05	01	01		02	05		18
2	BS	10	09	04						23
3	ES (G, PC, PE, ET)	10	07	15	21	19	17	12		101
4	SD	02	02	02	02	03	01	01	08	21
5	SL						01			01
6	OE					03				03
Total		26	23	22	24	25	21	18	8	167

Academic Planning Committee

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Approved By

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IQAC

Semester I

26MAT101	APPLIED CALCULUS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To learn the concepts of functions, limits, continuity, differentiation, and optimization of single-variable functions.
- To learn partial differentiation techniques for analyzing multivariable functions and solving optimization problems.
- To learn integration techniques for evaluating definite, indefinite, and improper integrals.
- To learn the applications of integral calculus in finding areas, arc lengths, surface areas, and related engineering quantities.
- To learn double integrals and triple integrals for evaluating areas, volumes, and solving multivariable integration problems.

UNIT I	**DIFFERENTIAL CALCULUS**	**12 (H)**
	Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorems. **Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software (Geogebra).	
UNIT II	**FUNCTIONS OF SEVERAL VARIABLES**	**12 (H)**
	Partial derivatives, Total derivative, Euler's theorem, Jacobian, Taylor series functions of two variables, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers. **Activities:** Maxima and Minima of a function of two variables using open-source software (Geogebra).	
UNIT III	**INTEGRAL CALCULUS – I**	**12 (H)**
	Definite and Indefinite integrals – Substitution rule – Techniques of Integration: Integration by parts, Trigonometric integrals, Integration of rational functions by partial fraction, Improper integrals. **Activities:** Calculate integration values using python.	
UNIT IV	**APPLICATIONS OF INTEGRALS**	**12 (H)**
	Fundamental theorem of Calculus, The Net Change Theorem, Arc Length, Area of Region, Area of surface of revolution. **Activities:** Determination of area of the region using python.	
UNIT V	**MULTIPLE INTEGRALS**	**12 (H)**
	Iterated integrals and Fubini's theorem, Change of order of integration, Change of variables between Cartesian and polar co-ordinates, Volume as Triple Integration. **Activities:** Double and triple integrals using python.	
		TOTAL: 60 HOURS
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.		
Assessment Methodology: Internal Examinations, Activities (Quiz, Assignment: Application - Oriented Problem Solving Using Software).		

Textbooks:

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.
2. Ron Larson and David C. Falvo,(2013), Calculus: an Applied Approach. Cengage Learning. Page 9 of 47
3. Stewart, J., Clegg, D., & Watson, S. (2019). Calculus: Early transcendentals.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). Thomas' calculus: Early transcendentals. Pearson.

References:

1. Singh, K. (2019). Engineering mathematics through applications. Bloomsbury Publishing.
2. Grewal, B. S. (2012). Higher engineering mathematics. Khanna Publishers.
3. McKinney, W. (2017). Python for data analysis: Data wrangling with pandas, NumPy, and Python (Modules I–V). O'Reilly Media.
4. Ordinary Differential Equations with SCILAB by Gilberto E. Urroz.

E-Resources:

1. https://people.math.wisc.edu/~angenent/Free-Lecture-Notes/free221.pdf
2. https://www.youtube.com/watch?v=FK8yUzr_YuI
3. https://www.youtube.com/watch?v=gQ-u_HlSKNk

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Explain the concepts of functions, limits, continuity, derivatives, and Mean Value Theorems.	K2
CO2	Apply partial derivatives, Jacobians, Taylor series, and Lagrange's multipliers to solve problems involving functions of several variables.	K3
CO3	Apply various integration techniques to evaluate definite, indefinite, and improper integrals.	K3
CO4	Explain the Fundamental Theorem of Calculus and its applications in finding arc lengths, areas, and surface areas of revolution.	K2
CO5	Apply multiple integration techniques and coordinate transformations to evaluate double and triple integrals and compute volumes.	K3

CO-PO/PSO MAPPING

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

26ECT001	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart foundational knowledge of DC electrical circuits, including basic electrical quantities, circuit laws, and series-parallel network analysis.
- To introduce the fundamental concepts of AC circuits, electromagnetic induction, sinusoidal signals, and three-phase systems.
- To develop an understanding of the construction, working principles, characteristics, and applications of electrical machines.
- To impart knowledge of semiconductor devices, timers, and operational amplifiers and their basic applications.
- To introduce the principles of digital electronics, logic circuits, arithmetic circuits, multiplexers, demultiplexers, and microcontrollers.

UNIT I	**DC FUNDAMENTALS**	**9 (H)**
	Basic Concepts - Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Voltage Divider and Current Divider Rules, Series and parallel network reduction, Kirchhoff's law. **Activities:** Virtual Demonstration of electrical laws & circuits, Hands-on Bread boarding, Solving GATE questions	
UNIT II	**AC FUNDAMENTALS**	**9 (H)**
	Faraday's Laws of Electro-Magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems. **Activities:** Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.	
UNIT III	**ELECTRICAL MACHINES**	**9 (H)**
	DC Machines- Construction and working principle of DC Generators and DC motors, EMF and Torque equations, types, characteristics, and applications, Construction and working principle of Single Phase Transformer. AC Machines- Synchronous Generators, Single Phase Induction Motors, Special Machines- Working Principle of Stepper Motor, BLDC Motor and its Applications. **Activities:** Virtual demonstration of step-up and step-down transformers, Virtual working BLDC	
UNIT IV	**SEMICONDUCTOR DEVICES**	**9 (H)**
	PN junction diodes, Zener Diode, BJT & JFET, Introduction to 555 Timers, Operational Amplifiers-Inverting & Non Inverting. **Activities:** Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Solving GATE questions.	
UNIT V	**DIGITAL ELECTRONICS AND MICROCONTROLLERS**	**9 (H)**
	Boolean algebra, Basic and Universal Gates, Adders – half adder and full adder, multiplexers, demultiplexers. Microcontrollers: Introduction, Block Diagram, Potential Applications. **Activities:** Online logic gate simulators, Solving GATE questions.	
		TOTAL: 45 HOURS

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Assessment Methodology: Internal Examinations, Activity (Quiz and GATE Questions).

Textbooks:

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", Second Edition, Pearson Education, 2017.

References:

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019
2. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
3. Moris Mano "Digital Design and Digital Logic and Computer Design",2024.

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Understand and explain basic electrical and electronic concepts.	K2
CO2	Analyse and interpret the fundamental principles of DC and AC circuits, and demonstrate appropriate electrical safety practices.	K4
CO3	Illustrate the construction and examine the operating principles of DC machines, transformers, induction motors, synchronous generators, and special-purpose motors.	K2
CO4	Analyse the characteristics of semiconductor devices and evaluate the performance of analog electronic circuits including diodes, transistors, voltage regulators, timers, and operational amplifiers.	K4
CO5	Analyse the fundamental principles of digital electronics and describe the architecture and potential applications of microcontrollers.	K4

CO-PO/PSO MAPPING

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

26MEI101	ENGINEERING GRAPHICS	L	T	P	C
		2	0	4	4

COURSE OBJECTIVES:

- To develop an understanding of engineering drawing standards, drawing instruments, dimensioning systems, and the construction of conic curves and cycloids.
- To develop the ability to apply orthographic projection principles for projecting points and straight lines and determining their true lengths and inclinations.
- To develop skills in representing simple and truncated solids through orthographic projections and freehand multi-view sketches.
- To develop an understanding of sectioning and surface development techniques for various engineering solids.
- To develop the ability to visualize and represent three-dimensional objects using isometric and perspective projection methods.

UNIT I	**FUNDAMENTALS AND PLANE CURVES**	**15 (H)**
	Drawing instruments, drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Conics – Ellipse, Parabola, Hyperbola and Cycloid. **Activities:** Virtual Demonstration of Conics and Cycloids	
UNIT II	**ORTHOGRAPHIC PROJECTION**	**15 (H)**
	First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces.	
UNIT III	**PROJECTION OF SOLIDS AND FREE HAND SKETCHING**	**15 (H)**
	Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Freehand sketching of multiple views from pictorial views of objects. **Activities:** Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.	
UNIT IV	**PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES**	**15 (H)**
	Sectioning of above solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids Prisms, pyramids cylinders and cones**.** **Activities:** Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.	
UNIT V	**ISOMETRIC PROJECTION AND PERSPECTIVE PROJECTION**	**15 (H)**
	Isometric Scale, Projection of Simple solids. Simple solids projection Perspective projection of simple solids	

List of Experiments:

1. Study of CAD Software Interface and Drawing Setup.
2. Drawing of Basic Geometric Shapes.
3. Drawing of Simple Engineering Figures Using Editing Commands.
4. Drawing of 2D Machine Components.
5. Drawing of Orthographic Views of Simple Objects.
6. Drawing of Sectional Views of Machine Components.
7. Drawing of Isometric Views of Simple Engineering Objects.
8. Preparation of a Dimensioned Working Drawing with Layers, Text, and Hatching.

TOTAL: 75 HOURS
Project: Development of 2D objects and 3D objects using CAD tools**.**
Weightage: Continuous Assessment: 50% End Semester Examinations: 50%
Assessment Methodology: Internal Examinations, Activities (Project, Assignments).

Textbooks:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natarajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

References:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Apply drawing instruments, lettering, dimensioning practices, and construct plane curves in engineering drawings.	K3
CO2	Apply the principles of first-angle orthographic projection to draw points and straight lines, and determine true lengths and true inclinations.	K3
CO3	Apply projection techniques to draw simple solids and prepare freehand orthographic sketches from pictorial views.	K3
CO4	Apply sectioning principles to obtain sectional views, true shapes, and develop the lateral surfaces of engineering solids.	K3
CO5	Apply isometric projection techniques and Perspective projection of simple solids.	K3

CO-PO/PSO MAPPING

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

26PHI101	APPLIED PHYSICS I	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To understand the structure and properties of crystalline materials and crystal imperfections.
- To understand the mechanical properties of materials and their engineering applications.
- To understand the principles of oscillations, ultrasonic waves, and their applications.
- To understand the fundamental concepts of quantum mechanics and their applications in modern physics.
- To understand the principles of fiber optics and lasers and their applications in engineering and communication systems.

UNIT I	**CRYSTAL PHYSICS**	**9 (H)**
	Crystal Parameters, Unit cell, Bravais Lattice, Lattice Planes, Miller indices, d-spacing in cubic lattice, Calculation of atoms per unit cell, Atomic Radius, Coordination number, Packing factor for SC, BCC, FCC and HCP, Crystal Imperfections. **Activities**: Virtual Demonstration of SC, BCC, FCC and HCP Crystal Structures. **Practical**: Ultrasonic Interferometer	
UNIT II	**PROPERTIES OF MATTER**	**9 (H)**
	Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method. **Activities:** Virtual Demonstration of Stokes Method. **Practical**: Youngs Modulus – Cantilever.	
UNIT III	**WAVES AND OSCILLATIONS**	**9 (H)**
	Oscillations: Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation. **Waves:** Ultrasonics, Piezo-electric Method, Acoustic grating **Activities:** Virtual Demonstration of SHM **Practical**: Determination of Rigidity modulus of the wire and Moment of Inertial of the disc by torsional pendulum.	
UNIT IV	**QUANTUM MECHANICS**	**9 (H)**
	Black body radiation, de Broglie hypothesis, Schrodinger Wave equation (Time dependent and independent), Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling. **Activities:** Virtual Demonstration of Scanning Transmission Electron Microscope. **Practical:** Determination of Planck's constant by Photoelectric effect.	
UNIT V	**APPLIED OPTICS**	**9 (H)**
	Interference: Air wedge (Theory & Application), Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement and pressure sensor, Einstein Co-efficient, Nd:YAG laser, CO_2 laser (construction, functioning and applications). **Activities:** Virtual Demonstration of Application of laser. **Practical:** Determination of ruling width of compact disc using laser.	
		TOTAL : 45 HOURS
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%		
Assessment Methodology: Internal Examinations, Practical, Activity (Quiz, Assignment)		

Books&References:

1. Pillai S.O., "Solid State Physics", New Age International Publications, New Delhi, 6th Edition, 2010.
2. Arumugam M., "Engineering Physics", Anuradha Agencies, Kumbakonam, 2nd Edition, 2005.
3. Young, H. D., & Freedman, R. A. (2026). University physics with modern physics. Pearson. 16th Edition, 2026.
4. Gaur, R. K., & Gupta, S. L. 8th Edition, 2022 Engineering physics. Dhanpat Rai Publications.
5. Mathur, D. S. 12th Edition, 2022 Elements of properties of matter. S. Chand Publishing.
6. Griffiths, D. J. 4th Edition, 2024 Introduction to quantum mechanics. Cambridge University Press.
7. Silfvast, W. T. (2008). Laser fundamentals (2nd ed.). Cambridge University Press.

E-Resources:

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview 3. CO2 Laser : https://onlinecourses.nptel.ac.in/noc25_ph03/preview
3. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
4. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
5. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
6. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
7. Scanning Tunnelling Electron Microscope https://www.youtube.com/watch?v=XNYZYbXNWQA

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Explain crystal structures, lattice parameters, Miller indices and crystal imperfections used in engineering materials.	K2
CO2	Apply concepts of elasticity, viscosity, surface tension and thermal properties in engineering applications.	K3
CO3	Analyze simple harmonic, damped and forced oscillations in mechanical systems.	K4
CO4	Interpret quantum mechanical concepts such as wave mechanics, particle in a box and quantum tunnelling.	K2
CO5	Explain crystal structures, lattice parameters, Miller indices and crystal imperfections used in engineering materials.	K2

CO-PO/PSO MAPPING

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

26CYI101	APPLIED CHEMISTRY – I	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To understand the principles of water quality, treatment methods, and desalination for domestic and industrial applications.
- To understand the synthesis, properties, and engineering applications of nanomaterials.
- To understand the principles of electrochemical systems, electrode processes, and electrolyte conductivity.
- To apply suitable principles and methods used to control corrosion.
- To understand the principles, working of batteries and green energy technologies.

UNIT I	**WATER TECHNOLOGY**	**9 (H)**
	Water quality parameters and standards. Requisites for Industrial feed water, Internal and External treatment of hard water, Municipal water treatment, Desalination of water by reverse osmosis. **Practical:** Analysis of hardness/alkalinity in given water sample **Activity:** Coagulation of water sample using Alum.	
UNIT II	**NANO-CHEMISTRY**	**9 (H)**
	Classification, Size dependent properties. Preparation of nanomaterials, Top-down and Bottom-Up approaches including laser ablation, Chemical -vapour deposition method, Sol-gel method, Electro-deposition method and Electro spinning method, Applications of nano materials. **Practical:** Preparation of nanoparticles by Sol-Gel method. **Activity:** Preparation of Barium Sulphate ($BaSO_4$) Nanoparticles by Chemical Precipitation Method.	
UNIT III	**ELECTROCHEMISTRY**	**9 (H)**
	Electrochemical cell, Electrode potential. Redox reaction. Nernst equation, Measurement of EMF of a cell, Conductivity of electrolytes, Factors affecting conductivity **Practical:** Conductometric titrations (Strong acid Vs Strong base), Conductometric titrations (Mixture of acids Vs strong base) **Activity:** Demonstration of Electrochemical cell.	
UNIT IV	**CORROSION & CONTROL**	**9 (H)**
	Types of Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection by sacrificial anodic protection and impressed current cathodic protection method, Organic and Inorganic coating. **Practical:** Corrosion study by weight loss method. Activities: Case study on Corrosion in pipelines, Control measures for a corroded metal.	
UNIT V	**BATTERIES & GREEN ENERGY SOURCES**	**9 (H)**
	Conventional, Contemporary and Emerging battery storage technologies, Primary battery -Alkaline battery, Secondary Batteries -Lead acid battery, Recent development of solar cells, Hydrogen – oxygen fuel cells. Batteries used in e-vehicles, Lithium-ion battery and sodium metal hydride battery. **Practical:** Measurement of EMF using potentiometer. **Activities:** Demonstration of Lead acid battery	
		TOTAL : 45 HOURS

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%

Assessment Methodology: Internal Examinations, Practical, Activities (Quiz, Assignments).

Textbooks:

1. Jain, P. C., & Jain, M. Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2025.
2. Agarwal, S. Engineering Chemistry: Fundamentals and Applications (2nd ed.). Cambridge University Press, 2019.
3. Sivasankar, B. Engineering Chemistry (6th ed.). Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2019.

References:

1. Dara, S. S., & Umare, S. S. A Textbook of Engineering Chemistry (12th ed.). S. Chand Publishing, 2018.
2. Sachdeva, M. V. Basics of Nano Chemistry. Anmol Publications Pvt. Ltd., 2011.
3. Emich, F. Engineering Chemistry. Scientific International Pvt. Ltd. (formerly Medtech Publications in some syllabi), 2014.
4. Atkins, P. W., de Paula, J., & Keeler, J. Atkins' Physical Chemistry (12th ed.). Oxford University Press, 2023.
5. Linden, D., Reddy, T. B., et al. (Eds.). Handbook of Batteries (5th ed.). McGraw-Hill Education, 2019.
6. Fontana, M. G. Corrosion Engineering (3rd ed.). McGraw-Hill Education, 1986.

E-Resources:

1. Water and Wastewater Engineering – Prof. Ligy Philip, IIT Madras (NPTEL) https://nptel.ac.in/courses/105106202
2. Electrochemical Energy Systems – Prof. S. Mitra, IIT Madras (NPTEL) https://nptel.ac.in/courses/113106028
3. Corrosion – Prof. Kallol Mondal, IIT Kanpur (NPTEL) https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems – Prof. V. R. Marathe, IIT Madras (NPTEL) https://nptel.ac.in/courses/115106130

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Understand water quality parameters, treatment methods, and their engineering significance in industrial and municipal treatment.	K2
CO2	Understand the principles of nano chemistry, synthesis methods and application of nanomaterials in various field.	K2
CO3	Understand electrochemical laws, electrode reactions, and factors affecting the conductivity of electrolytes.	K2
CO4	Apply suitable procedure to control corrosion by electrochemical methods, organic coating and inorganic coating.	K3
CO5	Understand the working principles of primary and secondary battery with their electrode reactions and green sources of energy for sustainable development.	K2

CO-PO/PSO MAPPING

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

26TAT101	தமிழர் மரபு/ HERITAGE OF TAMILS	L	T	P	C
		1	0	0	1

பாடநெறி நோக்கங்கள்:

- செவ்வியல் தமிழ் இலக்கியத்தின் வரலாறு மற்றும் வளர்ச்சியைப் பற்றி அறிந்துகொள்ளுதல்.
- தமிழர்களின் பாரம்பரியக் கலைகள், சிற்பக்கலை மற்றும் இசை மரபுகளைப் பற்றி கற்றறிதல்.
- தமிழர்களின் வீர விளையாட்டுகள் மற்றும் நாட்டுப்புறக் கலைகளைப் பற்றி அறிந்துகொள்ளுதல்.
- தமிழ் இலக்கியக் கோட்பாடுகள் மற்றும் தமிழர்களின் அறநெறி, ஒழுக்க நடைமுறைகளைப் பற்றி கற்றறிதல்.
- இந்தியப் பண்பாட்டிற்கும் சித்த மருத்துவத் துறைக்கும் தமிழர்களின் பங்களிப்பைப் பற்றி அறிந்துகொள்ளுதல்.

COURSE OBJECTIVES:

- To study about the history of classical Tamil literature.
- To learn about the traditional arts, sculptures and music of Tamils.
- To learn about the martial sports and folk arts of Tamils.
- To study about Tamil literary concepts and moral practices of Tamils.
- To know the contribution of Tamils in Indian culture and siddha medicine.

UNIT I	**மொழி மற்றும் இலக்கியம்/ LANGUAGE AND LITERATURE**	**3 (H)**
	இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள் தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு. 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.	
UNIT II	**மரபுக் கலைகள்/ HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**	**3 (H)**
	பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை: நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள், தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு. 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	**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்/ FOLK AND MARTIAL ARTS**	**3 (H)**
	தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள். Folk and Martial Arts: Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	
UNIT IV	**தமிழர்களின் திணைக் கோட்பாடுகள்/ THINAI CONCEPT OF TAMILS**	**3 (H)**
	தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும். சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி. Thinai Concept of Tamils: 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	**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு/ CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	**3 (H)**
	இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு. Contribution of Tamils to Indian National Movement 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.	
		TOTAL: 15 HOURS

Weightage : Continuous Assessment :40%, End Semester Examinations :60%

Assessment Methodology: Internal Examinations, Activities (Quiz, Assignment).

Textbooks:

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.
2. Ron Larson and David C. Falvo,(2013), Calculus: an Applied Approach. Cengage Learning. Page 9 of 47
3. Stewart, J., Clegg, D., & Watson, S. (2019). Calculus: Early transcendentals.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). Thomas' calculus: Early transcendentals. Pearson.

References/ தமிழ் நூல்கள்:

1. **தமிழக வரலாறு, மக்களும் பண்பாடும்** – மா. மா. பிள்ளை. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்.
2. **கணினித் தமிழ்** – முனைவர் இல. சுந்தரம். விகடன் பிரசுரம்.
3. **கீழடி: வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்** – தமிழ்நாடு அரசு தொல்லியல் துறை வெளியீடு.
4. **பொருநை: ஆற்றங்கரை நாகரிகம்** – தமிழ்நாடு அரசு தொல்லியல் துறை வெளியீடு.

English Books:

1. Pillay, K. K. Social Life of Tamils. Joint Publication of Tamil Nadu Textbook and Educational Services Corporation (TNTB & ESC) and Roja Muthiah Research Library (RMRL). (In Print).
2. Singaravelu, S. Social Life of the Tamils: The Classical Period. International Institute of Tamil Studies.
3. Subatamanian, S. V. & Thirunavukkarasu, K. D. Historical Heritage of the Tamils. International Institute of Tamil Studies.
4. Valarmathi, M. The Contributions of the Tamils to Indian Culture. International Institute of Tamil Studies.
5. Keeladi: Sangam City Civilization on the Banks of the River Vaigai. Joint Publication of the Department of Archaeology, Government of Tamil Nadu and Tamil Nadu Textbook and Educational Services Corporation.
6. Pillay, K. K. Studies in the History of India with Special Reference to Tamil Nadu. Published by the Author.
7. Porunai Civilization. Joint Publication of the Department of Archaeology, Government of Tamil Nadu and Tamil Nadu Textbook and Educational Services Corporation.
8. Balakrishnan, R. Journey of Civilization: Indus to Vaigai. Roja Muthiah Research Library (RMRL).

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Remember the classification of Tamil language and the history of Tamil literature.	K2
CO2	Explain about Arts, sculptures, Handicrafts and Music of Tamils.	K2
CO3	Explain about the folk arts and Martial sports.	K2
C04	Remember the Thinai concepts of Tamil and literacy and trade practices of Tamils.	K2
CO5	Summarize the contribution of Tamils to Siddha medicine and Indian culture.	K2

CO-PO/PSO MAPPING

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

26ENT101	ENGLISH ESSENTIALS - I	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- Develop effective speaking skills through self-introduction, conversations, and expressing opinions with appropriate grammar.
- Enhance listening skills by understanding conversations, speeches, and different accents while improving pronunciation.
- Strengthen reading skills by applying reading strategies and interpreting various texts with improved vocabulary and comprehension.
- Develop writing skills by composing meaningful paragraphs, informal letters, and emails using correct grammatical structures.
- Foster life skills such as goal setting, time management, teamwork, positive thinking, and professional etiquette for overall personality development.

UNIT I	**SPEAKING SKILLS**	**6 (H)**
	Self-Introduction (Adjectives), Expressing Opinions (Subject-Verb Agreement), Participating in Conversations (Speech Acts – agreeing & disagreeing – synonyms and antonyms) Parts of Speech, Articles **Activities:** Self-Introduction, Just a Minute (JAM) Video Recording, Situational Role Plays, Spell Bee, Word Substitution, Usage of Apps.	
UNIT II	**LISTENING SKILLS**	**6 (H)**
	Listening to Simple Conversations (Understanding Tone and Intent), Short Speeches / Stories, Extracting Information, Pronunciation, Listening to Various Accents, Tenses. **Activities:** Listening and Repeating, Gap Fill Exercises, Notetaking.	
UNIT III	**READING SKILLS**	**6 (H)**
	Reading Strategies – (Skimming, Scanning, Predicting), Intensive Reading – Short Passages and Long Passages on Suggested Themes (Sentence Patterns, Prefixes and Suffixes, Idioms and Phrases). Active and Passive Voice **Activities:** Reading – Newspaper and Digital Articles, Cloze, Reading Comprehension, Note Making and Summarising.	
UNIT IV	**PARAGRAPH DEVELOPMENT AND COMPOSITION**	**6 (H)**
	Word Substitution, Sentence Formation, Hints Development (Guided Writing), Writing Different Types of Paragraphs (Sentence Structure), Letter Writing / Emails (Informal), Direct and Indirect Speech **Activities:** Error Detection, Picture and Poster Description, Descriptive, Narrative and Comparative Paragraphs, Brainstorming and Mind Mapping, Informal Letters / Emails.	
UNIT V	**LIFE SKILLS FOR SUCCESS**	**6 (H)**
	Daily Routine, Hobbies and Interests, Goal Setting, Good Manners and Etiquette, Time Management, Healthy Lifestyle, Friendship and Teamwork, Positive Thinking. **Activities:** Talking about hobbies and good manners.	
		TOTAL: 30 HOURS

Weightage : Continuous Assessment :40%, End Semester Examinations :60%

Assessment Methodology: Internal Examinations, Activities (Quiz, Writing Task, Speaking Task),

Books & References:

1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.
3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning

E-Resources:

1. Cambridge English – https://www.cambridgeenglish.org/learningenglish/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Apply vocabulary and grammar appropriately to read and communicate in written and spoken forms and comprehend spoken English, take and draft notes.	K2
CO2	Listen and comprehend spoken English, take and draft notes.	K2
CO3	Analyze texts in different contexts using appropriate reading strategies.	K2
C04	Write clear, coherent and technically accurate documents for industry and academic.	K2
CO5	Develop communication skills relevant to engineering and technology to effectively convey thoughts and ideas in real life situations.	K2

CO-PO/PSO MAPPING

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

26CSI101	COMPUTER PROGRAMMING: C	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To introduce the fundamentals of C programming, problem-solving techniques, algorithms, flowcharts, data types, operators, and basic program development.
- To enable students to develop C programs using decision-making, looping constructs, and string handling techniques.
- To develop the ability to use pointers, arrays, structures, unions, and dynamic memory allocation for efficient data management.
- To equip students with the knowledge of functions, recursion, searching, and sorting techniques for modular and efficient programming.
- To enable students to perform file handling operations and effectively use standard and user-defined libraries in C programming.

UNIT I	**INTRODUCTION TO C**	**9 (H)**
	Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, program structure, Compilation & Execution process, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Arithmetic, Relational, Logical, Bitwise, Assignment, Conditional operators, Input/Output Functions, Built-in Functions. **Practical:** Create Problem Analysis Charts, Flowcharts and Pseudocode for simple C programs (Minimum two).	
UNIT II	**CONTROL STRUCTURES AND STRINGS**	**9 (H)**
	Control Structures: if, if-else, nested if, switch-case, while, do-while, for, nested loops, Jump statements. String Handling: String declaration, input/output, string library functions, String Operations. **Practical:** Usage of conditional logics in programs. , string manipulations, array operations. (Minimum three)	
UNIT III	**POINTERS, STRUCTURES AND UNIONS**	**9 (H)**
	Defining and using structures, Array of structures, Pointers to structures, Unions and their uses, Enumerations. Array: One-dimensional and Multi-dimensional Arrays, Array operations and traversals. Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation. **Practical:** Program to use structures and unions, Programs using pointers, dynamic memory, pointer arithmetic, . (Minimum three)	
UNIT IV	**FUNCTIONS**	**9 (H)**
	Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files, Searching Algorithms (Linear, Binary), Sorting Algorithms (Selection, Insertion, Merge, Bubble). **Practical:** Usage of functions in programs. (Minimum three)	
UNIT V	**FILE OPERATIONS AND LIBRARIES**	**9 (H)**
	File Operations: Open, read, write, close file operations, Binary vs Text files, File pointers, Error handling in file operations. Standard Libraries & Header Files: Using standard libraries like stdio.h, stdlib.h, string.h, math.h, Creating and using user-defined header files and libraries. **Practical:** Use of standard and user-defined libraries in solving problems. (Minimum two), Project	
		TOTAL: 45 HOURS

Weightage: Continuous Assessment 50%, End Semester Examinations 50%

Assessment Methodology: Internal Examinations, Practical, Activities (Project, Assignment Programs)

References:

1. Thareja, R. (2021). Programming in C. Oxford University Press.
2. Balagurusamy, E. (2019). Programming in ANSI C. McGraw Hill Education.
3. Kanetkar, Y. (2020). Let us C. BPB Publications.
4. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. Apress.
5. Forouzan, B. A., & Afyouni, H. (2023). Computer science: A structured programming approach in C (4th ed.). Cengage.

E-Resources:

1. Learn-C.org - https://www.learn-c.org/
2. GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programming-language/
3. GNU C Library Documentation - https://www.gnu.org/software/libc/manual/
4. "Introduction to C Programming", Swayam MOOC Course, https://onlinecourses.swayam2.ac.in/imb25_mg71/

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOM	MAXIMUM BLOOM'S LEVEL
CO1	Understand the fundamental concepts of C programming including data types, variables, operators, and built-in functions to describe the structure of a C program.	K2
CO2	Apply control structures such as if-else, switch-case, looping constructs, and string handling functions to solve logical problems in C.	K3
CO3	Apply the concepts of pointers, structures, unions, and dynamic memory allocation to design and manipulate complex data representations.	K3
CO4	Apply functions including recursion, parameter passing mechanisms, and Algorithmic techniques to develop structured and reusable C programs.	K3
CO5	Understand file operations, standard library functions, and header files to implement data storage and retrieval mechanisms in C programs.	K2

CO-PO/PSO MAPPING

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

26MEL002	MAKERSPACE	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
- To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

ACTIVITY A	**DIS-ASSEMBLY & ASSEMBLY PRACTICES**	**6 (H)**
	(i) Tools and its handling techniques. (ii) Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine. (iii) Dis-assembly and assembly of Air-Conditioners & Refrigerators. (iv) Dis-assembly and assembly of a Bicycle.	
ACTIVITY B	**WELDING PRACTICES**	**6 (H)**
	(i) Welding Procedure, Selection & Safety Measures. (ii) Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes. (iii) Hands-on session of preparing base material & Joint groove for welding. (iv) Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Steel plates / pipes, for fabrication of a simple part.	
ACTIVITY C	**ELECTRICAL WIRING PRACTICES**	**6 (H)**
	(i) Electrical Installation tools, equipment & safety measures. (ii) Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box. (iii) Hands-on session of electrical connections for Lightings, Fans, Calling Bells. (iv) Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.	
ACTIVITY D	**ELECTRONICS COMPONENTS / EQUIPMENT PRACTICES**	**6 (H)**
	(i) Electronic components, equipment & safety measures. (ii) Dis-assembly and assembly of Computers. (iii) Hands-on session of Soldering Practices in a Printed Circuit Board. (iv) Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier. (v) Hands-on session of integration of sensors and actuators with a Microcontroller. (vi) Demonstration of Programmable Logic Control Circuit.	
ACTIVITY E	**CONTEMPORARY SYSTEMS**	**6 (H)**
	(i) Demonstration of Solid Modelling of components. (ii) Demonstration of Assembly Modelling of components. (iii) Fabrication of simple components / parts using 3D Printers. (iv) Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.	
		TOTAL: 30 HOURS
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%		
Assessment Methodology: Internal Examinations, Activities (Project, Assignment).		

References:

1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S \
CO1	Demonstrate proper use and handling of basic hand and power tools for disassembly, assembly, and fabrication.	K3
CO2	Apply safety measures and execute basic electrical wiring installations, connections, and repairs for domestic applications.	K3
CO3	Create solid and assembly models of components using software and fabricate them using 3D printing technology.	K6
CO4	Adapt and follow safety protocols and professional practices in a workshop/laboratory work environment.	K3

CO-PO/PSO MAPPING

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

26UCT101	LIFE SKILLS FOR ENGINEERS I	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To develop self-awareness, emotional intelligence, and empathy for enhancing personal and interpersonal effectiveness.
- To equip students with positive thinking, stress management, and resilience skills for maintaining emotional well-being.
- To enable students to apply goal setting, time management, and teamwork skills for achieving personal and collaborative success.
- To develop financial literacy and healthy lifestyle practices for responsible decision-making and sustainable well-being.
- To promote digital literacy, online safety, ethical values, and civic responsibility for becoming responsible digital citizens and contributing positively to society.

UNIT I	**KNOW YOURSELF**	**3 (H)**
	Self-awareness and personality - understanding what makes you, you - Emotional intelligence and empathy - understanding your feelings and other people's feelings **Activities:**Take a simple personality test (such as MBTI or DISC) and discuss the results - Write in a reflection journal after each topic - Take part in an "empathy circle" - listening to a classmate's story without judging it - Practise a difficult conversation through role-play	
UNIT II	**MASTER YOUR MINDSET**	**3 (H)**
	Positive thinking and the right attitude - choosing a helpful mindset - Stress management and anger management - staying calm under pressure - Growth mindset and resilience - learning from mistakes and bouncing back **Activities:**Try a guided mindfulness (calm-breathing) session - Build your own personal "stress relief toolkit" - Keep a resilience journal, writing down one setback and how you handled it	
UNIT III	**PLAN YOUR LIFE, WORK WITH OTHER**	**3 (H)**
	Goal-setting and time management - deciding what matters and making time for it **Activities:**Create a vision board for your goals - Track your own time for a week and build a weekly planner -Take part in a group challenge that tests teamwork under pressure.	
UNIT IV	**MANAGE YOUR MONEY AND HEALTH**	**3 (H)**
	Financial literacy - budgeting and saving money - Nutrition, health, and hygiene - looking after your body **Activities:** Create a simple monthly budget for yourself - Play a financial simulation game to practise saving and spending decisions - Take part in a meal-planning workshop - Try a short physical wellness challenge.	
UNIT V	**STAY SAFE, BE A GOOD CITIZEN**	**3 (H)**
	Digital literacy and online safety - using the internet wisely and safely - Civic responsibility and ethics - doing the right thing for your community **Activities:** Run a social media audit on your own accounts - Work through privacy and online-safety scenarios - Take part in a community service activity - Join a class debate on values and ethics	
		TOTAL: 15 HOURS

Weightage: Continuous Assessment: 100%

Assessment Methodology: Internal Examinations, Activities (Flipped Class &Quiz).

Textbooks:

1. ICT Academy of Kerala. Life Skills for Engineers. McGraw Hill Education (India) Private Limited, 2016.
2. Mitra, B. K. Personality Development and Soft Skills (2nd Edition). Oxford University Press, 2019.

References:

1. Khera, S. You Can Win. Macmillan Publishers India Ltd., Revised Edition, 2022.
2. Levesque, H. Life Skills 101: A Practical Guide to Leaving Home and Living on Your Own. Latest Edition.
3. Covey, S. R. The 7 Habits of Highly Effective People (30th Anniversary Edition). Simon & Schuster, 2020.
4. Goleman, D. Emotional Intelligence: Why It Can Matter More Than IQ (25th Anniversary Edition). Bloomsbury Publishing, 2020.

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Explain the concepts of self-awareness, personality, emotional intelligence, and empathy to enhance personal and interpersonal effectiveness	K2
CO2	Apply positive thinking, stress management, anger management, growth mindset, and resilience strategies to improve emotional well-being..	K3
CO3	Apply goal-setting, time management, and teamwork skills to achieve personal and collaborative objectives effectively..	K3
CO4	Analyze personal financial decisions, budgeting practices, and healthy lifestyle choices for sustainable well-being..	K4
CO5	Analyze digital safety practices, online ethics, and civic responsibilities to promote responsible digital citizenship and community participation.	K4

CO-PO/PSO MAPPING

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

Semester II

26MAT201	LINEAR ALGEBRA	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To provide a strong foundation in matrices, rank, and systems of linear equations for solving engineering problems.
- To develop an understanding of vector spaces, subspaces, basis, dimension, and linear dependence for mathematical modelling and analysis.
- To enable the analysis of linear transformations, eigenvalues, eigenvectors, and diagonalization for simplifying linear systems.
- To develop the ability to apply inner product concepts, norms, and orthogonalization techniques in vector analysis and engineering applications.
- To provide knowledge of matrix decomposition techniques and least-squares methods for solving computational and engineering problems.

UNIT I	**MATRICES AND SYSTEM OF LINEAR EQUATIONS**	**12 (H)**
	Matrices – Row echelon form – Rank of a matrix – System of linear equations - Consistency – Gauss elimination method – Cayley Hamilton Theorem. **Activities:** Rank of Matrices and Cayley Hamilton theorem by using Open-source software (SCILAB).	
UNIT II	**VECTOR SPACES**	**12 (H)**
	Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces. S **Activities:** Test linear dependence and independence, the dimension of subspaces by using Open-source software (SCILAB).	
UNIT III	**LINEAR TRANSFORMATIONS AND DIAGONALIZATION**	**12 (H)**
	Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability. **Activities:** compute eigenvalues and eigenvectors of a matrix by using Open-source software (SCILAB).	
UNIT IV	**INNER PRODUCT SPACES**	**12 (H)**
	Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to R^3). **Activities:** Compute inner products and vector norms by using Open-source software (SCILAB).	
UNIT V	**MATRIX DECOMPOSITION**	**12 (H)**
	Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- Simple problems (up to 3×3 $matrices$). **Activities:** Use open-source software (SCILAB) to compute QR decomposition and Singular Value Decomposition (SVD) of matrices using built-in functions.	
		TOTAL : 60 HOURS
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.		
Assessment Methodology: Internal Examinations, Activities (Quiz, Assignment: Application - Oriented Problem Solving Using Software).		
Textbooks:		

1. Friedberg, S. H., Insel, A. J., & Spence, L. E., *Linear Algebra*, 5th Edition, Pearson, 2022.
2. Strang, G., *Introduction to Linear Algebra*, 6th Edition, Wellesley-Cambridge Press, 2023.

References:

1. Lay, D. C., Lay, S. R., & McDonald, J. J., *Linear Algebra and Its Applications*, 6th Edition, Pearson, 2021.
2. Anton, H. & Rorres, C., *Elementary Linear Algebra: Applications Version*, 12th Edition, Wiley, 2019.
3. Poole, D., *Linear Algebra: A Modern Introduction*, 5th Edition, Cengage Learning, 2019.
4. Nicholson, W. K., *Linear Algebra with Applications*, 2nd Edition, Lyryx Learning, 2022.
5. Kreyszig, E., *Advanced Engineering Mathematics*, 11th Edition, Wiley India, 2018.

E-Sources:

1. MIT OpenCourseWare, *Linear Algebra*, Massachusetts Institute of Technology. Available: https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/
2. NPTEL, *Linear Algebra*, Indian Institute of Technology. Available: https://nptel.ac.in
3. SCILAB Official Documentation. Available: https://help.scilab.org
4. SCILAB Open Source Software Platform. Available: https://www.scilab.org
5. Khan Academy, *Linear Algebra*. Available: https://www.khanacademy.org/math/linear-algebra

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Understand matrices, rank, systems of linear equations, Gaussian elimination, and the Cayley Hamilton theorem.	K2
CO2	Apply vector space concepts, basis, dimension, and linear dependence and independence to solve linear algebra problems.	K3
CO3	Apply linear transformations, eigenvalues, eigenvectors, and diagonalization to analyze linear algebraic systems.	K3
C04	Apply inner products, norms, the Cauchy–Schwarz inequality, and Gram–Schmidt orthogonalization to solve problems involving orthogonality.	K3
CO5	Apply QR decomposition, Singular Value Decomposition (SVD), and least-squares methods to solve computational and linear algebra problems.	K3

CO-PO/PSO MAPPING

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

26MET201	ENGINEERING MECHANICS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To understand the principles of statics and analyze the equilibrium of particles under various force systems.
- To analyze the equilibrium of rigid bodies using free body diagrams, moments, couples, and equivalent force systems.
- To determine the centroids and centre of gravity of simple, composite, and three-dimensional bodies.
- To evaluate the moments of inertia and radii of gyration of plane areas and three-dimensional bodies.
- To apply the laws of friction to analyze engineering systems involving wedges, ladders, belts, and related applications.

UNIT I	**STATICS OF PARTICLES**	**12 (H)**
	Resultant of Forces, Resolution and composition of forces, Resultant of coplanar force systems, Equilibrium of a particle in a plane, Addition of concurrent forces in space, Equilibrium of a particle in space, Free body diagrams of particles, Applications in engineering problems. **Activities:** Assignments and quizzes on resultant forces, Solving GATE and competitive examination problems.	
UNIT II	**STATICS OF RIGID BODIES**	**12 (H)**
	Concept of rigid body, Free Body Diagram (FBD), Equivalent force systems, Principle of transmissibility, Moment of a force about a point and an axis, Couples and force-couple systems, Equilibrium in two and three dimensions, Principle of virtual work. **Activities:** Virtual demonstration of rigid body equilibrium, Solving GATE problems.	
UNIT III	**CENTROIDS AND CENTRE OF GRAVITY**	**12 (H)**
	Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus Guldinus, Distributed Loads on Beams, Centre of Gravity of a Three-Dimensional Body, Composite Bodies.	
UNIT IV	**MOMENTS OF INERTIA**	**12 (H)**
	Moments of Inertia of Areas and Mass, Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration. **Activities:** Virtual simulation of moments of inertia, Principal axes determination, Solving GATE problems.	
UNIT V	**FRICTION**	**12 (H)**
	Laws of friction, Coefficient of friction, Angle of friction and angle of repose, Types of friction problems, Wedge friction, Ladder friction, Belt friction, Applications in engineering systems. Activities: Demonstration of friction in belts and pulleys, Solving GATE problems.	
		TOTAL: 60 HOURS
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%		
Assessment Methodology: Internal Examinations Activity (Quiz, Assignments, Solving of GATE questions)		

Textbooks:

1. R.C. Hibbeler, Engineering Mechanics: Statics, 16th Edition, Pearson Education, 2026.
2. F.P. Beer, E.R. Johnston Jr., D.F. Mazurek and P.J. Cornwell, Vector Mechanics for Engineers: Statics (SI Edition), 13th Edition, McGraw-Hill Education, 2025.
3. J.L. Meriam, L.G. Kraige and J.N. Bolton, Engineering Mechanics: Statics (SI Version), John Wiley & Sons (India), 2017.
4. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 12thEdition, 2019.
5. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

Reference:

1. Beer, F. P., Johnston Jr., E. R., DeWolf, J. T., & Mazurek, D. F. (2015). Mechanics of Materials. McGraw-Hill Education.
2. Meriam, J. L., & Kraige, L. G. (2018). Engineering Mechanics: Statics and Dynamics. Wiley.
3. Pytel, A., & Kiusalaas, J. (2014). Engineering Mechanics (Indian Edition). Cengage Learning India.

E-Resources:

1. Engineering Mechanics -Statics and Dynamics – Dr. Mahesh V Panchagnul, IIT Madras (NPTEL)
   https://nptel.ac.in/courses/112106180
2. Engineering Mechanics – Prof. Manoj K Harbola (IIT Kanpur)
   https://www.nptel.ac.in/courses/122104015

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Apply the principles of statics to analyze the equilibrium of particles under various force systems.	K3
CO2	Solve the equilibrium of rigid bodies using force systems, moments, couples, and free body diagrams.	K3
CO3	Solve the centroids and centre of gravity of simple and composite bodies using analytical methods.	K3
CO4	Solve the moments of inertia and radii of gyration of plane areas and three-dimensional bodies.	K3
CO5	Apply the laws of friction to analyze and solve engineering problems involving frictional forces.	K3

CO-PO/PSO MAPPING

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

26CSI001	COMPUTER PROGRAMMING: PYTHON	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To introduce the fundamentals of Python programming, problem-solving techniques, algorithms, flowcharts, data types, operators, and basic program development.
- To enable students to develop Python programs using decision-making, looping constructs, and user-defined functions.
- To develop the ability to manipulate strings and effectively use Python sequence data types such as lists, tuples, dictionaries, and sets with exception handling.
- To equip students with the knowledge of file handling, modules, packages, and Python libraries for data processing and problem-solving.
- To enable students to design and develop Python applications that interact with databases using SQL operations and database connectivity.

UNIT I	**INTRODUCTION TO PYTHON**	**9 (H)**
	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 AND FUNCTION**	**9 (H)**
	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, functions in programs. (Minimum two).	
UNIT III	**STRINGS AND SEQUENCE TYPES**	**9 (H)**
	String Comparison, Formatting, Slicing, Splitting, Stripping, Lists, tuples, dictionaries and set, basic list operators, searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values, Exception Handling. **Practical:** String manipulations and operations on lists, tuples, sets, and dictionaries. (Minimum two).	
UNIT IV	**FILE OPERATIONS AND PACKAGES**	**9 (H)**
	Create, Open, Read, Write, Append and Close files. reading/writing text and numbers, from/to a file; creating and reading a formatted file (csv, tab-separated, etc.), Built-in modules, User-Defined modules, Numpy, SciPy, Pandas, Scikitlearn. **Practical:** Opening, closing, reading and writing in formatted file format and sort data. Usage of modules and packages to solve problems. (Minimum three)	
UNIT V	**PYTHON WITH DATABASE CONNECTIVITY**	**9 (H)**
	Introduction to Python Database API (DB-API), Data, Database, Database Management System (DBMS), File System vs DBMS, Database Users, Database Architecture, Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL), Table Creation, Data Insertion, Update, Delete and Query Operations. Establishing Database Connections, Creating Tables using Python. **Practical:** Usage of Python with database connectivity (Minimum two), Project.	
		TOTAL: 45 HOURS

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%

Assessment Methodology: Internal Examinations, Practical, Activities (Assignment Programs, Project).

References:

1. Eric Matthes (2023). Python Crash Course: A Hands-On, Project-Based Introduction to Programming (3rd edition), No Starch Press.
2. Charles R. Severance (2016). Python for Everybody: Exploring Data in Python 3(1st edition), CreateSpace.
3. John V. Guttag (2021). Introduction to Computation and Programming Using Python: With Application to Understanding Data (3rd edition), MIT Press.
4. Wes McKinney2022). Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter (3rd edition), O'Reilly Media.
5. Al Sweigart (2025). Automate the Boring Stuff with Python: Practical Programming for Total Beginners (3rd edition), No Starch Press.

E-resources:

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

COURSE OUTCOME

COURSE OUTCOME	DISCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL FOR EACH CHAPTER
CO1	Understand the fundamental concepts of Python programming, including syntax, variables, data types, operators, control structures, and built-in functions for developing simple programs.	K2
CO2	Apply control structures, functions, parameter passing mechanisms, and lambda expressions to design and implement modular Python programs.	K3
CO3	Apply string manipulation techniques and sequence data structures such as lists, tuples, dictionaries, and sets to solve computational problems effectively.	K3
CO4	Apply file handling operations, modules, and packages to develop reusable and maintainable Python applications.	K3
CO5	Understand database concepts and apply Python database connectivity techniques to create, manipulate, and retrieve data from relational databases.	K2

CO-PO/PSO MAPPING

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

26PHT202	APPLIED PHYSICS (ME&TECH) – II	L	T	P	C
		2	1	0	3

COURSE OBJECTIVES:

- To understand the concepts of centre of mass, moment of inertia, and the dynamics of rotating rigid bodies used in engineering applications.
- To study heat conduction, methods of measuring thermal conductivity, and the fundamental laws of thermodynamics.
- To understand phase transformations, phase diagrams, and heat treatment processes for engineering materials.
- To learn the properties and engineering applications of advanced functional materials, including ceramics, composites, shape memory alloys, biosensors, and carbon nanotubes.
- To understand the principles, properties, and engineering applications of superconducting materials and devices.

UNIT I	**RIGID BODY DYNAMICS**	**9 (H)**
	Centre of mass – Moment of inertia (circular disc, solid cylinder, hollow cylinder, solid sphere, hollow sphere), Gear, shaft, gyroscope **Activities:** Demonstration of moment of inertia of Gear, shafts and Gyroscopes.	
UNIT II	**THERMAL PHYSICS**	**9 (H)**
	Thermal conductivity –Transient plane source method, Transient Line Source method – Lees disc Method - Forbe's method - conduction through compound media, Laws of Thermodynamics . **Activities:** Demonstration of thermal conductivity of insulators	
UNIT III	**PHASE TRANSITIONS**	**9 (H)**
	Solid solutions - single component system, binary phase diagrams - iron-carbon equilibrium diagram, T-T-T-diagram - heat treatment of steels – hardening techniques **Activities:** Demonstration of Hardening of steels	
UNIT IV	**FUNCTIONAL MATERIALS**	**9 (H)**
	Ceramics – Composites, Fiber Reinforced Plastics - Metallic Glasses - Shape Memory alloys – Bio-Sensors – CNT (Carbon Nano tubes) **Activities:** Demonstration of 3D Structures of CNTs.	
UNIT V	**SUPERCONDUCTING MATERIALS**	**9 (H)**
	Superconducting Materials – Zero resistance and Meissner effect – Type I and II Superconductors – BCS Theory (Qualitative) – High Tc Superconductors – Applications – SQUID, Cryotron, Magnetic levitation. **Activities:** Demonstration of Superconductors.	
		TOTAL : 45 HOURS
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%		
Assessment Methodology: Internal Examinations, Activity (Quiz, Assignments, Flipped Class)		

References & Textbooks:

1. Mathur, D. S. (2008). *Elements of properties of matter*. S. Chand.
2. Brij Lal, & Subramaniyan, N. (2018). *Heat, thermodynamics and statistical physics*. S.Chand.
   Raghavan, V. (2009). *Physical metallurgy: Principles and practice*. PHI Learning.
3. Askeland, D. (2022). 8TH Edition *Materials science and engineering*. Brooks/Cole.

E-Resources:

1. Thermal conductivity -Understanding Thermal Conductivity in Solids – https://youtu.be/VcFqqdGcwrw-
2. White LED_ https://archive.nptel.ac.in/courses/108/108/108108122/
3. Shape memory alloys: https://nescacademy.nasa.gov/video/00a31561480547248033a1c2df6f87831d
4. Moment of Inertia: https://youtu.be/fDJeVR0o__w
5. Conduction: http://kcl.digimat.in/nptel/courses/video/112106155/L32.html
   Iron –Carbon phase diagram - https://archive.nptel.ac.in/courses/113/104/113104068
6. Gyroscope_ https://www.youtube.com/watch?v=FydJu1A1oeM gyroscope-131127011945-phpapp02.pdf
7. Hardening Techniques_ https://www.youtube.com/watch?v=ckCN9jGsdUY

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Explain the concepts of centre of mass, moment of inertia, gears, shafts, and gyroscopes and apply them to analyze rigid body dynamics problems.	K2
CO2	Apply the principles of thermal conductivity and laws of thermodynamics to solve engineering problems involving heat transfer through different media.	K3
CO3	Interpret phase transformations using phase diagrams, T-T-T diagrams, and heat treatment processes in steels.	K2
CO4	Examine the properties, characteristics, and engineering applications of ceramics, composites, metallic glasses, shape memory alloys, biosensors, and carbon nanotubes.	K4
CO5	Explain the fundamentals of superconductivity, distinguish between different types of superconductors, and evaluate their engineering applications.	K3

CO-PO/PSO MAPPING

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

26CYT201	APPLIED CHEMISTRY-II	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- To understand the types, properties and applications of functional materials for sustainable technologies.
- To apply formula to calculate calorific value of the fuel and flue gas analysis.
- To understand the constituents, classification, properties, and engineering applications of composite materials.
- To understand the types, properties, mechanisms, and applications of lubricants used in engineering systems.
- To understand the adhesion mechanism, types and industrial applications of adhesives.

UNIT I	**FUNCTIONAL MATERIALS**	**6 (H)**
	Types, Smart coatings, Mechanisms, Sustainable energy materials. **Activities:** Seminar on recent development in functional materials (e.g., smart coatings, self-cleaning surfaces), Infographic Design of functional nanomaterials.	
UNIT II	**FUELS &COMBUSTION**	**6 (H)**
	Fuels: Calorific value - Alternative Fuels - Natural gas benefits, Power alcohol and biodiesel **Combustion**:, Knocking and Anti-knocking agents, Octane and cetane number, Hydrogen combustion, Flue Gas analysis **Activities:** Comparison of efficiency and emissions in fuels, Virtual simulation of flue gas analysis.	
UNIT III	**COMPOSITES**	**6 (H)**
	Constituents of composites, types of composites, Hybrid composites, Engineering applications. **Activities:** Seminar on composite materials used for a real engineering application (e.g., lightweight bike frame).	
UNIT IV	**LUBRICANTS**	**6 (H)**
	Types, Functions. Key properties, Synthetic lubricants, Mechanisms, Emerging lubricants. **Activities:** Collection of lubricants used in real-world engineering systems (e.g., gears, engines, bearings).	
UNIT V	**ADHESIVES**	**6 (H)**
	Adhesion Mechanisms, Classification, Bond strength, Industrial adhesives. **Activities:** Preparation of some natural adhesives.	
		TOTAL : 30 HOURS

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Assessment Methodology: Internal Examinations, Activity (Quiz, Assignments)

Textbooks:

1. Jain, P. C., & Jain, M. Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2025.
2. Palanna, O. G. Engineering Chemistry (2nd ed.). McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2017.

References:

1. Cheong, K. Y., Impellizzeri, G., & Fraga, M. A. (Eds.). Emerging Materials for Energy Conversion and Storage. Elsevier, 2018.

2. Sharma, S. C. Composite Materials. Narosa Publishing House, Latest Reprint (2022).
3. Atkins, P. W., de Paula, J., & Keeler, J. Atkins' Physical Chemistry (12th ed.). Oxford University Press, 2023.
4. Mang, T., Dresel, W., & Wei, L. Lubricants and Lubrication (4th ed.). Wiley-VCH, 2017.
5. Pizzi, A., & Mittal, K. L. (Eds.). Handbook of Adhesive Technology (3rd ed.). CRC Press, 2018.

E-Resources:

1. **NPTEL –** Engineering Chemistry and Materials Science Courses. https://nptel.ac.in
2. **SWAYAM –** Online Courses on Engineering Chemistry, Materials Science, and Sustainable Energy. https://swayam.gov.in
3. **MIT OpenCourseWare –** Materials Science and Engineering, Chemistry, and Energy-related Courses. https://ocw.mit.edu

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Understand the types and applications of functional materials, smart coatings and sustainable energy materials to meet future demands.	K2
CO2	Apply formula to calculate the calorific value of the fuel and flue gas analysis in engineering applications.	K3
CO3	Understand the constituents, types, properties and their engineering applications.	K2
CO4	Understand the types, properties, mechanisms, and applications of lubricants in engineering systems.	K2
CO5	Understand adhesion mechanisms, types, and their industrial applications.	K2

CO-PO/PSO MAPPING

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

26TAT201	தமிழர்களும் தொழில்நுட்பமும் \ TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

பாடநெறி நோக்கங்கள்:

- பழந்தமிழர்களின் அறிவியல் மற்றும் தொழில்நுட்ப அறிவைப் பற்றி அறிந்துகொள்ளுதல்.
- தமிழர்களின் வடிவமைப்பு மற்றும் கட்டுமானத் தொழில்நுட்பத்தைப் பற்றிக் கற்றல்.
- தமிழர்களின் உற்பத்தித் தொழில்நுட்பம் குறித்து விழிப்புணர்வு பெறுதல்.
- தமிழர்கள் பயன்படுத்திய பாரம்பரிய வேளாண்மை மற்றும் நீர்ப்பாசன முறைகளைப் பற்றி விரிவாக அறிந்து கொள்ளுதல்.
- அறிவியல் தமிழ் மற்றும் கணினித் தமிழின் முக்கியத்துவத்தைப் புரிந்து கொள்ளுதல்.

COURSE OBJECTIVES:

- To study about the scientific and technological knowledge of ancient Tamils.
- To learn about the design and construction technology of Tamils.
- To aware about the manufacturing technology of Tamils.
- To study about traditional agriculture and irrigation systems used by Tamils.
- To know the importance of scientific Tamil and modern Tamil computing

UNIT - I	**நெசவு மற்றும் பானைத் தொழில்நுட்பம் / WEAVING AND CERAMIC TECHNOLOGY**	**3 (H)**
	சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்புப் பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள். Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.	
UNIT - II	**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்/ DESIGN AND CONSTRUCTION TECHNOLOGY**	**3 (H)**
	சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம்,	

	திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள் மற்றும் பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரசெனிக் கட்டிடக் கலை. 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 Nayaka Mahal, Chetti Nadu Houses, Indo, Saracenic architecture at Madras during British Period.	
UNIT - III	**உற்பத்தித் தொழில்நுட்பம்/ MANUFACTURING TECHNOLOGY**	**3 (H)**
	கப்பல் கட்டும் கலை – உலோகவியல் - இரும்புத் தொழிற்சாலை இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள்-நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள்-தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள். 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 Stonebeads, Glass beads, Terracotta beads, Shell beads / bone beats, Archeological evidences, Gem stone types described in Silappathikaram	
UNIT-IV	**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்/ AGRICULTURE AND IRRIGATION TECHNOLOGY**	**3 (H)**
	அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் கடல்சார் அறிவு -மீன்வளம் முத்து மற்றும் முத்துக்குளித்தல் பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம் . Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof 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	**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்/ SCIENTIFIC TAMIL & TAMIL COMPUTING**	**3 (H)**
	அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் 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

TOTAL: 15 HOURS

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Assessment Methodology: Internal Examinations, Activities (Quiz, Assignment).

References:

தமிழ் நூல்கள்:

1. தமிழக வரலாறு, மக்களும் பண்பாடும், மக. மக. பிள்ளை. (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம். (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils – Dr. K. K. Pillay. A Joint Publication of Tamil Nadu Textbook and Educational Services Corporation (TNTB & ESC) and Roja Muthiah Research Library (RMRL).

English Books:

1. Social Life of the Tamils – The Classical Period – Dr. S. Singaravelu. Published by International Institute of Tamil Studies.
2. Historical Heritage of the Tamils – Dr. S. V. Subatamanian & Dr. K. D. Thirunavukkarasu. Published by International Institute of Tamil Studies.
3. The Contributions of the Tamils to Indian Culture – Dr. M. Valarmathi. Published by International Institute of Tamil Studies.
4. Keeladi – Sangam City Civilization on the Banks of the River Vaigai. Jointly Published by Department of Archaeology & Tamil Nadu Textbook and Educational Services Corporation, Tamil Nadu.
5. Studies in the History of India with Special Reference to Tamil Nadu – Dr. K. K. Pillay. Published by The Author.
6. Porunai Civilization. Jointly Published by Department of Archaeology & Tamil Nadu Textbook and Educational Services Corporation, Tamil Nadu.
7. Journey of Civilization: Indus to Vaigai – R. Balakrishnan. Published by Roja Muthiah Research Library (RMRL).

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	தமிழர்களின் நெசவு மற்றும் மண்பாண்டத் தொழில்நுட்பத்தைப் புரிந்துகொள்ளுதல். Understand the contribution of Tamils in various fields. Explain about the weaving and pottery technology of Tamils.	K2
CO2	தமிழர்களின் கட்டுமானத் தொழில்நுட்பத்தை விளக்குதல். Explain about the design and construction technology of Tamils.	K2
CO3	தமிழர்களின் உற்பத்தித் தொழில்நுட்பத்தை விளக்குதல். Explain about the manufacturing technology of Tamils.	K2
CO4	தமிழர்களின் வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பத்தைப் புரிந்துகொள்ளுதல். Understand the agriculture and irrigation technology of Tamils.	K2
CO5	அறிவியல் தமிழ் மற்றும் தமிழ் கணினியியலின் வளர்ச்சியை அறிதல். Define the growth of scientific Tamil and Tamil computing.	K2

CO-PO/PSO MAPPING

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

26MEL001	RE-ENGINEERING FOR INNOVATION	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

BOOTCAMP 1	**INTRODUCTION TO PRODUCT DEVELOPMENT & REVERSE ENGINEERING**	**10 (H)**
	• Overview of the product lifecycle. • Hands-on disassembly of simple products. • Practice basic measurements and sketching. • Introduction to CAD modeling of disassembled parts. • Virtual assembly of parts.	
BOOTCAMP 2	**EMBEDDED SYSTEM PROGRAMMING**	**10 (H)**
	• Open-source platforms (e.g., Arduino). • Practice of interfacing sensors, reading data. • Automation in home, healthcare and agriculture.	
ACTIVITY	**REVERSE ENGINEERING & PROTOTYPING**	**10 (H)**
	• Sketch and prototype alternative designs. • Group brainstorming sessions. • Manufacture prototype parts using 3D printing and / or workshop tools. • Assemble prototype product.	
		TOTAL: 30 HOURS

Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%

Assessment Methodology: Internal Examinations, Activities (Project, Assignment).

References:

1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd ed.). O'Reilly Media.

E-Resources:

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing.	K2
CO2	Apply reverse engineering techniques to analyze and document existing products.	K3
CO3	Collaborate in teams to fabricate prototypes using appropriate tools.	K5
CO4	Engage in independent learning and continuously adapt to emerging technologies in product design.	K4

CO-PO/PSO MAPPING

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

26ENI201	ENGLISH ESSENTIALS - II	L	T	P	C
		1	0	2	2

COURSE OBJECTIVES:

- Develop effective oral communication skills for interpersonal, group, and professional interactions.
- Enhance listening skills and the ability to provide and receive constructive feedback effectively.
- Build competency in business correspondence through professional emails, formal letters, and meeting documentation.
- Develop academic writing skills by practicing paraphrasing, summarizing, essays, and technical writing.
- Foster teamwork, leadership, negotiation, and problem-solving skills for academic and professional success.

UNIT I	**ORAL COMMUNICATION**	**6 (H)**
	Types (Verbal and Nonverbal), Interpersonal and group communication, Telephonic conversation. **Activities:** Short presentations, Debates, Formal Speeches (Welcome, Vote of Thanks and introducing guests), Listen and respond to short podcasts.	
UNIT II	**LISTENING AND FEEDBACK SKILLS**	**6 (H)**
	Types of listening (Active, Passive, Critical, Empathetic) Barriers to effective listening. Giving Constructive Feedback – Specific vs vague feedback, Feedback on behaviour, not person. Receiving Feedback Positively – Handling criticism without defensiveness. **Activities:** Note-taking, Story sharing, Two stars and a wish (After a presentation, each student gives 2things the presenter did well + 1 suggestion to improve) Speed Feedback (2 mins per pair, student A shares work, Student B gives feedback, then swap. Rotate 3-4 times)	
UNIT III	**BUSINESS CORRESPONDENCE**	**6 (H)**
	Email Communication, Formal Letters (Types), Business Meeting. **Activities:** Email and letter writing (Complaint, request, permission), Agenda, minutes of the meeting.	
UNIT IV	**ACADEMIC WRITING**	**6 (H)**
	Paraphrasing, Summarizing, Essay Writing, Instructions and Recommendations. **Activities:** Essay writing (Cause and effect, argumentative, persuasive), User guides/ manuals, policy document.	
UNIT V	**TEAM WORK**	**6 (H)**
	Leadership Skills (Team building, Team Leader, Team player), Negotiation and Problem solving skills **Activities:** SWOT Analysis, Brainstorming and Group discussions.	
		TOTAL: 30 HOURS

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%

Assessment Methodology: Internal Examinations, Activity (Group Activity, Report Writing)

References:

1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra .V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.

E-Resources:

1. Communication for Business Success - https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Demonstrate effective oral communication in interpersonal, group, and professional settings.	K2
CO2	Apply active listening techniques and provide constructive feedback in various communication contexts.	K2
CO3	Prepare professional emails, formal letters, agendas, and minutes of meetings using appropriate formats.	K2
CO4	Produce clear and well-organized academic and technical documents using effective writing strategies.	K2
CO5	Demonstrate leadership, teamwork, negotiation, and problem-solving skills in collaborative activities.	K2

CO-PO/PSO MAPPING

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

26UCT201	LIFE SKILLS FOR ENGINEERS-II	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To develop creative thinking skills by applying imagination, lateral thinking, and collaborative approaches to generate innovative solutions.
- To develop effective decision-making and problem-solving skills through convergent and divergent thinking and critical analysis.
- To apply analytical, logical, and structured problem-solving techniques to address real-world engineering challenges.
- To develop leadership, communication, and decision-making skills for effective collaboration and responsible professional practice.
- To enhance teamwork, conflict resolution, empathy, and shared vision for achieving common goals in multidisciplinary environments.

UNIT I	**FOUNDATIONS OF CREATIVE THINKING**	**3 (H)**
	Creativity, critical thinking, and collaboration - the building blocks of good thinking Imagination, intuition, and experience as sources of creativity - Lateral thinking and busting common myths about creativity **Activities:** Two-Brainstorm method on a real problem -Take on the "30 Circles" creativity challenge - Solve lateral-thinking riddles and puzzles- Take part in "Creativity Myth Busters" - spotting false beliefs about creativity	
UNIT II	**THINKING STYLE AND DECISION MAKING**	**3 (H)**
	Problem solving and decision making - Convergent thinking (narrowing down to one answer) vs divergent thinking (opening up many ideas) - Critical reading and the idea of "multiple intelligences" people are smart in different ways **Activities:** Work through a "Desert Survival" team simulation -Write short "What If?" scenario stories -Play a "Fast vs Slow Thinking" game	
UNIT III	**PROBLEM-SOLVING TOOLBOX**	**3 (H)**
	Problem-solving techniques: Six Thinking Hats, Mind Mapping, Forced Connections - Analytical thinking - Logical thinking **Activities:** Analyse a real-world case study - Take part in an "Escape Room" challenge that needs logical problem solving	
UNIT IV	**TEAMWORK,CONFLICT,AND VISION**	**3 (H)**
	Leadership styles, and assessing your own natural style - Communication and active listening Decision-making and taking responsibility **Activities:** Take part in a "Crisis Leadership" simulation - Role-play real "Leadership Dilemmas	
UNIT V	**PROBLEM-SOLVING TOOLBOX TEAMWORK, CONFLICT, AND VISION**	**3 (H)**
	Teamwork and delegation -sharing work fairly -Empathy, integrity, and handling conflict Vision, motivation, and goal-setting for a team **Activities:** Classic "Tower Challenge" (building something as a team under a time limit) - Build a Team Vision Board together	
		TOTAL: 15 HOURS

Weightage: Continuous Assessment: 100%

Assessment Methodology: Internal Examinations, Activities (Quiz, Flipped Class).

Textbooks:

1. Edward de Bono, Lateral Thinking: Creativity Step by Step, Revised Edition, Harper Perennial, 2015.

2. Daniel Kahneman, Thinking, Fast and Slow, Farrar, Straus and Giroux, 2011.
3. David A. Whetten and Kim S. Cameron, Developing Management Skills, 9th Edition, Pearson Education, 2016.
4. Richard Paul and Linda Elder, The Miniature Guide to Critical Thinking: Concepts and Tools, 9th Edition, Foundation for Critical Thinking Press, 2020.

References:

1. Edward de Bono, Six Thinking Hats, Revised Edition, Little, Brown Book Group, 2017.
2. Peter A. Facione, Critical Thinking: What It Is and Why It Counts, Insight Assessment, 2015.
3. Tony Buzan and Barry Buzan, The Mind Map Book, BBC Active/Pearson Education, Updated Edition, 2018.
4. Peter G. Northouse, Leadership: Theory and Practice, 10th Edition, Sage Publications, 2024.
5. Stephen R. Covey, The 7 Habits of Highly Effective People, 30th Anniversary Edition, Simon & Schuster, 2020.
6. Carol S. Dweck, Mindset: The New Psychology of Success, Updated Edition, Ballantine Books, 2016.

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Apply creative thinking, imagination, and lateral thinking techniques to generate innovative ideas for solving engineering and real-world problems.	K3
CO2	Analyze problems using appropriate thinking styles and decision-making strategies to select effective solutions	K4
CO3	Apply structured problem-solving tools and logical reasoning techniques to solve practical engineering challenges.	K3
CO4	Demonstrate leadership, communication, and decision-making skills for effective collaboration in professional environments.	K3
CO5	Evaluate teamwork, conflict resolution, and goal-setting strategies to enhance collaboration and achieve shared objectives in multidisciplinary teams.	K5

CO-PO/PSO MAPPING

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

26UCT202	FOREIGN LANGUAGE - JAPANESE	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To introduce the fundamentals of the Japanese language, including Hiragana, Katakana, pronunciation, and basic vocabulary.
- To develop the ability to communicate using simple Japanese expressions in everyday situations such as greetings, self-introduction, and classroom interactions.
- To enable learners to apply basic Japanese grammar, sentence patterns, and commonly used vocabulary in oral and written communication.
- To provide an understanding of elementary Japanese conversational skills for daily life, including asking questions, giving directions, and making polite requests.
- To familiarize learners with Japanese culture, customs, and etiquette to promote effective and culturally appropriate communication.

UNIT I	**WRITING SYSTEMS & PRONUNCIATION**	**3 (H)**
	Introduction to the Japanese language – Hiragana: vowels and basic characters – Reading and writing Hiragana – Introduction to Katakana: basic characters and usage – Pronunciation and sound patterns. **Activities**: Flashcard games, Hiragana writing drills, Katakana reading practice, Audio-based pronunciation exercises**.**	
UNIT II	**BASIC COMMUNICATION**	**3 (H)**
	Greetings and farewells (こんにちは, おはようございます, さようなら) – Self-introduction (Name, nationality, age) – Basic sentence structure (Subject–Object–Verb) – Numbers (1–100) – Days of the week – Classroom expressions. **Activities**: Self-introduction, Greeting practice, Number and date matching, Listening exercises.	
UNIT III	**GRAMMAR & VOCABULARY**	**3 (H)**
	Particles: は (wa), を (wo), の (no), へ (e), に (ni) – Present tense verbs: です and ます forms – Negative forms (ではありません, ません) – Question words: なに, どこ, だれ, いつ – Vocabulary related to family, food, colours, and common actions. **Activities:** Verb conjugation drills, Particle exercises, Picture description, Shopping vocabulary practice.	
UNIT IV	**EVERYDAY CONVERSATION**	**3 (H)**
	Describing people and objects using い and な adjectives – Talking about daily routines and schedules – Time expressions – Asking and giving simple directions – Ordering food and making polite requests – Expressing likes and dislikes. **Activities**: Role-plays, Daily schedule presentation, Restaurant conversation, Dialogue practice.	
UNIT V	**JAPANESE CULTURE & PRACTICAL COMMUNICATION**	**3 (H)**
	Listening to short conversations – Identifying key expressions – Introduction to formal and informal speech – Basic Japanese etiquette and cultural practices – Revision of Hiragana and Katakana – Beginner-level conversation practice. **Activities:** Group discussion on Japanese etiquette, Listening comprehension, Vocabulary quiz, Oral presentation, Conversation practice**.**	
		TOTAL:15 HOURS

Weightage: Continuous Assessment: 100%

Assessment Methodology: Internal Examinations, Activities (Quiz).

Textbooks:

1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2020). *Genki I: An Integrated Course in Elementary Japanese* (3rd Edition). Tokyo: The Japan Times Publishing.
2. The Japan Foundation. (2020). *Marugoto: Japanese Language and Culture – Starter A1 (Katsudoo & Rikai)*. Tokyo: The Japan Foundation.

References:

1. Makino, S., & Tsutsui, M. (2022). *A Dictionary of Basic Japanese Grammar* (Revised Edition). Tokyo: The Japan Times Publishing.
2. The Japan Foundation. (2022). *IRODORI: Japanese for Life in Japan – Starter (A1)*. Tokyo: The Japan Foundation.
3. Hadamitzky, W., & Spahn, M. (2023). *Japanese Hiragana & Katakana for Beginners* (Latest Edition). Tuttle Publishing.
4. Alma Publishing. (2021). *Minna no Nihongo Elementary I – Main Textbook* (2nd Edition, English Translation). 3A Corporation.

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL FOR EACH CHAPTER
CO1	Understand the basic Hiragana and Katakana writing systems, pronunciation, and essential Japanese vocabulary.	K2
CO2	Understand simple Japanese greetings, self-introduction, numbers, dates, and classroom expressions for everyday communication	K2
CO3	Apply basic Japanese grammar, particles, verb forms, and sentence structures to construct simple sentences.	K3
CO4	Apply basic Japanese conversational skills in everyday situations such as shopping, asking directions, ordering food, and expressing preferences.	K3
CO5	Understand Japanese cultural practices and etiquette for appropriate communication in simple real-life contexts	K2

CO-PO/PSO MAPPING

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