



SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE (Autonomous)

Gobichettipalayam, Erode -638455

Regulation 2025(UG)
(Students admitted AY 2025-26)
Curriculum and Syllabus
BE-Mechanical Engineering

I. Program Educational Objective (PEO)

- PEO1: Technical Excellence:** Graduates will apply Mechanical Engineering knowledge, modern engineering tools, and emerging technologies to develop innovative, sustainable, and industry-oriented solutions for real-world engineering problems.
- PEO2: Professional Growth:** Graduates will pursue higher education, research, entrepreneurship, and lifelong learning to enhance their professional competence and adapt to evolving technological advancements.
- PEO3: Leadership & Ethics:** Graduates will demonstrate leadership, teamwork, communication skills, professional ethics, and social responsibility while contributing effectively to industry, society, and sustainable development.

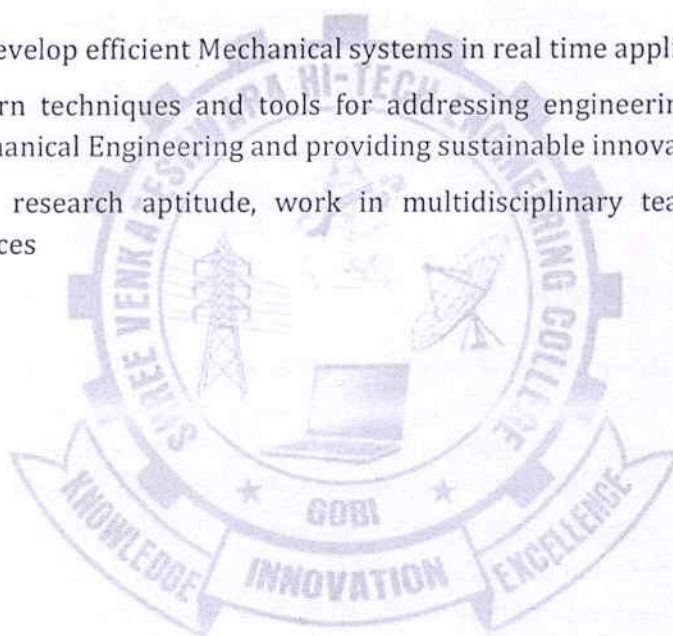
II. Program Outcomes (POs)

- Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8)
- Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)
- Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

8. **Individual and Collaborative Teamwork:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams
9. **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
10. **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments
11. **Life-Long Learning:** Recognize the need for, and have the preparation and ability for (i) Independent and life-long learning (ii) adaptability to new and emerging technologies and (iii) Critical thinking in the broadest context of technological change. (WK8)

III. Program Specific Outcomes (PSOs)

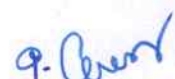
- PSO1:** Design and develop efficient Mechanical systems in real time applications
- PSO2:** Utilize modern techniques and tools for addressing engineering challenges in the fields of Mechanical Engineering and providing sustainable innovation solutions
- PSO3:** Demonstrate research aptitude, work in multidisciplinary teams and implement ethical practices



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Mapping of Course Outcome and Programme Outcome																
Year	Sem	Course name	PO											PSO		
			1	2	3	4	5	6	7	8	9	10	11	1	2	3
I	I	Induction Programme														
		Communication English - I	-	-	-	2	-	1	-	-	2	3	-	-	-	-
		Matrices & Calculus	3	3	1	1	-	-	-	-	2	-	2	-	-	-
		Engineering Physics	3	3	2	1	2	-	-	-	-	-	-	-	-	-
		Engineering Chemistry	3	2	2	1	1	2	3	-	-	-	-	-	-	-
		Problem Solving Using C Programming	2	3	3	3	2	-	-	-	-	-	2	3	3	3
		Heritage of Tamils	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Idea Lab	3	2	3	2	2	-	-	2	2	2	2	2	2	-
	II	Communicative English - II	-	1	1	-	-	-	1	1	2	3	-	-	-	-
		Numerical Methods and Differential Equations	3	3	1	1	1	-	-	-	2	-	2	-	-	-
		Materials Science	3	2	1	-	-	-	-	-	-	-	-	-	-	-
		Basic Electrical and Electronics Engineering	3	1	2	-	2	-	-	-	-	3	-	2	2	-
		Python Programming	3	3	2	2	-	-	-	-	-	1	-	3	3	2
		Engineering Graphics	3	1	2	-	2	-	-	-	3	-	2	2	2	-
		Tamils and Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Vision Creation Lab	3	2.6	2.4	3	3	2	2.2	2.2	2.4	2	1.2	3	2	2
	III	Transforms and Partial Differential Equations	3	3	1	1	-	-	-	2	-	-	3	-	-	-
		Engineering Mechanics	3	2	2.6	1	1	-	-	-	-	-	-	2.8	2.4	2.8
		Engineering Thermodynamics	3.0	2.8	2.0	2.0	2.2	1.5	-	-	-	-	1.4	2.2	2.2	1.7
		Metallurgy and Materials Science	2.8	2.2	1.6	1.0	1.2	0.6	0.4	-	-	1.0	2.0	2.8	2.2	1.2
		Manufacturing Processes - I	3	-	2	-	2	2	1	1	-	-	1	3	1	-
		Fluid Mechanics and Machinery	2.8	2.6	2	2.5	2	-	-	-	-	-	2	2.75	2.33	3
		Computer Aided Machine Drawing	1	2	-	-	3	-	-	3	-	-	3	2	2	2
	IV	Hydraulics and Pneumatics	2.8	2.4	1.8	1.6	2	-	-	1.5	1.5	1	1	2.6	2.4	1
		Kinematics and Dynamics of Machines	3	2	2	-	2	-	1	-	-	-	1	3	1	-
		Thermal Engineering	2.4	2.8	2.8	1	2.6	-	-	2.6	-	-	-	3	2	-
		Strength of Materials	2.4	2.8	2.8	2.8	-	2	-	-	-	-	1	2	2	3
		Manufacturing Processes - II	3	3	3	1	1	1	-	-	3	-	2	3	2	2
		Embedded Systems														
		Soft and Analytical skills - I														
		Standards in Mechanical Engineering														

1 -low, 2-medium, 3-high, '-'-no correlation


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SUMMARY OF CREDITS

S.No	Course Category	Credits per Semester								Total Credits	Credits in %	Credits as per AU Curriculum	AU Credits in %
		I	II	III	IV	V	VI	VII	VIII				
1	BS	11	6	4	-	-	-	-	-	21	12.21	23	13.45
2	HUM	5	4	-	-	-	2	6	-	17	9.88	21	12.28
3	ES(G)	-	8	4	3	-	-	-	-	15	8.72	14	8.19
4	ES(PC)	4	4	16	20	12	10	8	-	74	43.02	68	39.77
5	ES(PE)	-	-	-	-	6	6	6	-	18	10.48	15	8.77
6	OE	-	-	-	-	-	-	3	-	3	1.74	3	1.75
7	SL	-	-	-	-	-	1	-	-	1	0.58	1	0.59
8	SD	2	2	-	1	4	4	-	10	23	13.37	23	13.45
9	MC	-	-	✓	✓	-	-	-	-				
Total Credits / Semester		22	24	24	24	22	23	23	10	172	100	171	100

CATEGORIZATION OF COURSES

- i. **BS** – Basic Science (Mathematics, Physics, Chemistry)
- ii. **HUM** – Humanities (Languages, Management, Heritage, and others)
- iii. **ES** – Engineering Science
 - General (G)
 - Programme Core (PC)
 - Programme Elective (PE)
 - Emerging Technology (ET)
- iv. **OE** – Open Elective
- v. **SL** – Self Learning
- vi. **SD** – Skill Development
- vii. **MC** – Mandatory courses
- viii. **VA** – Value Added Courses
- ix. **OC** – Off Campus Courses

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 stream or a combination of different streams 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 stream from any one of the other programmes.



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B.E.-Mechanical Engineering

SEMESTER I

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Map ping	Max.Marks		
				L	T	P				CA	ES	TM
Induction Programme												
1.	25IPA11	Induction Programme	-	-	-	-	-	0		-	-	-
Theory												
2.	25ENI11	Communicative English - I	HUM	3	0	2	5	4	4, 5, 8, 9, 16	50	50	100
3.	25MAT11	Matrices and Calculus	BS	3	0	0	3	3	4, 8, 9, 11	40	60	100
4.	25PHI11	Engineering Physics	BS	3	0	2	5	4	3, 4, 9, 11, 12	50	50	100
5.	25CYI11	Engineering Chemistry	BS	3	0	2	5	4	4, 6, 7	50	50	100
6.	25CSI11	Problem Solving using C Programming	ES(PC)	3	0	2	5	4	4, 8, 9, 10, 17	50	50	100
7.	25TAT11	Heritage of Tamils	HUM	1	0	0	1	1	3, 4, 8, 11, 16	40	60	100
Practicals												
8.	25MEL11	Idea Lab	SD	0	0	4	4	2	4, 9	60	40	100
Mandatory Course												
9.	25MDC11	Yoga for Human Excellence	MC	0	0	1	1	0	3, 4, 5, 10, 16	100	-	100
Total				16	0	13	29	22				

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SEMESTER II

S. No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Mapping	Max.Marks		
				L	T	P				CA	ES	TM
Theory												
1.	25ENI21	Communicative English - II	HUM	2	0	2	4	3	4, 5, 8, 9, 16	50	50	100
2.	25MAT21	Numerical Methods and Differential Equations	BS	3	0	0	3	3	4, 8, 9, 11	40	60	100
3.	25PHT22	Materials Science	BS	3	0	0	3	3	3, 7, 9, 11, 12, 13	40	60	100
4.	25EEI22	Basic Electrical and Electronics Engineering	ES(G)	3	0	2	5	4	4, 7, 9, 12	50	50	100
5.	25CSI21	Python Programming	ES(PC)	3	0	2	5	4	4, 8, 9, 10, 17	50	50	100
6.	25MEI21	Engineering Graphics	ES(G)	3	0	2	5	4	4, 9, 11	50	50	100
7.	25TAT21	Tamils and Technology	HUM	1	0	0	1	1	2, 4, 6, 9, 11	40	60	100
Practicals												
8.	25MEL21	Vision Creation Lab	SD	0	0	4	4	2	4, 7, 9, 12	60	40	100
Total				18	0	12	30	24				

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SEMESTER III

S. No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Mapping	Max.Marks		
				L	T	P				CA	ES	TM
Theory												
1.	25MAT32	Transforms and Partial Differential Equations	BS	3	1	0	4	4	4, 8, 9, 17	40	60	100
2.	25MET31	Engineering Mechanics	ES(G)	3	1	0	4	4	9, 11	40	60	100
3.	25MET32	Engineering Thermodynamics	ES(PC)	3	1	0	4	4	7, 9, 12	40	60	100
4.	25MET33	Engineering Materials and Metallurgy	ES(PC)	3	0	0	3	3	8, 9, 12	40	60	100
5.	25MET34	Manufacturing Processes - I	ES(PC)	3	0	0	3	3	8, 9, 12	40	60	100
6.	25MEI31	Fluid Mechanics and Machinery	ES(PC)	3	0	2	5	4	6, 7, 9, 11, 12, 13	50	50	100
Practicals												
7.	25MEL31	Computer Aided Machine Drawing	ES(PC)	0	0	4	4	2	4, 8, 9	60	40	100
Mandatory Course												
8.		Mandatory Courses – II &	MC	3	0	0	3	0		100	-	100
Total				21	3	6	30	24				

& Mandatory Courses-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Courses-II)

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SEMESTER IV

S. No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Mapping	Max.Marks		
				L	T	P				CA	ES	TM
Theory												
1.	25MET41	Hydraulics and Pneumatics	ES(PC)	3	0	0	3	3	7, 8, 9, 12	40	60	100
2.	25MEI41	Kinematics and Dynamics of Machines	ES(PC)	3	0	2	5	4	7, 9	50	50	100
3.	25MEI42	Thermal Engineering	ES(PC)	3	0	2	5	4	7, 9, 13	50	50	100
4.	25MEI43	Strength of Materials	ES(PC)	3	0	2	5	4	4, 9, 11	50	50	100
5.	25MEI44	Manufacturing Processes - II	ES(PC)	3	0	2	5	4	4, 8, 9	50	50	100
6.	25ECT47	Embedded Systems	ES(G)	3	0	0	3	3	7, 9, 11, 12, 13	40	60	100
7.	25SDC41	Soft and Analytical skills - I	SD	1	0	0	1	1	4, 8, 10	100	-	100
8.		Standards in Mechanical Engineering	ES(PC)	1	0	0	1	1		100	-	100
Mandatory Course												
9.		Mandatory Courses – III &	MC	3	0	0	3	0		100	-	100
Total				23	0	8	31	24				

@ The students individually undergo training in reputed Firms/Research Institutes/Laboratories for the specified duration (2 weeks) during IV semester summer vacation. After completion of training, a detailed report should be submitted within ten days from the commencement of V semester.

& Mandatory Courses-III is a Non-credit Course (Student shall select one course from the list given under Mandatory Courses-III)

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SEMESTER V

S. No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Mapping	Max.Marks		
				L	T	P				CA	ES	TM
Theory												
1.	25MET51	Design of Machine Elements	ES(PC)	3	1	0	4	4	4, 8, 9, 12	40	60	100
2.	25MEI51	Measurements and Instrumentation	ES(PC)	3	0	2	5	4	4, 8, 9, 11	50	50	100
3.	25MEI52	Additive Manufacturing and Applications	ES(PC)	3	0	2	5	4	4, 8, 9, 12	50	50	100
4.	25MEI53	Industry oriented course - I	SD	1	0	2	3	2	8, 9	50	50	100
5.		Programme Elective - I*	ES(PE)	-	-	-	-	3		-	-	100
6.		Programme Elective - II*	ES(PE)	-	-	-	-	3		-	-	100
7.	25SDC51	Soft and Analytical Skills - II	SD	1	0	0	1	1	4, 8	100	-	100
Practicals												
8.	25MEL51	Summer Internship@	SD	0	0	0	0	1	8, 9, 11, 12, 13, 17	100	-	100
Total				11	1	6	18	22				

* Programme Elective - I & II shall be chosen from the list of Programme Elective Courses offered by same Programme

@ The students undergone summer internship during IV semester summer vacation and same will be evaluated in V semester.

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SEMESTER VI

S. No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Mapping	Max.Marks		
				L	T	P				CA	ES	TM
Theory												
1.	25MEI61	Heat and Mass Transfer	ES(PC)	3	0	2	5	4	4, 7, 8, 13	50	50	100
2.	25MEI62	Finite Element Analysis	ES(PC)	3	0	2	5	4	4, 8, 9, 11	50	50	100
3.	25MEI63	Industry oriented course - II	SD	1	0	2	3	2	8, 9	50	50	100
4.		Programme Elective III*	ES(PE)	-	-	-	-	3		-	-	100
5.		Programme Elective IV*	ES(PE)	-	-	-	-	3		-	-	100
6.	25CYT61	Climate Change and Sustainability	HUM	2	0	0	2	2	8, 9, 17	40	60	100
7.		Self Learning course	SL	1	0	0	1	1		-	-	-
Practicals												
8.	25MEL61	CAD Laboratory	ES(PC)	0	0	4	4	2	4, 8, 9, 11	60	40	100
9.	25MEL62	Mini Project	SD	0	0	4	4	2	8, 9, 11, 12	100	-	100
Total				10	0	14	24	23				

* Programme Elective - III & IV shall be chosen from the list of Programme Elective Courses offered by same Programme

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SEMESTER VII

S. No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Mapping	Max.Marks		
				L	T	P				CA	ES	TM
Theory												
1.	25MEI51	Mechatronics and IOT	ES(PC)	3	0	2	5	4	4, 8, 9, 11	50	50	100
2.	25MEI52	Computer Integrated Manufacturing	ES(PC)	3	0	2	5	4	4, 8, 9, 12	50	50	100
3.	25UHV71	Universal Human values - II	HUM	3	0	0	3	3		40	60	100
4.		Programme Elective V*	ES(PE)	-	-	-	-	3		-	-	100
5.		Programme Elective VI*	ES(PE)	-	-	-	-	3		-	-	100
6.	25EST71	Engineering Entrepreneurship Development	HUM	3	0	0	3	3	8, 9, 17	40	60	100
7.		Open Elective**	OE	3	0	0	3	3		40	60	100
Total				15	0	4	19	23				

* Programme Elective - V & VI shall be chosen from the list of Programme Elective Courses offered by same Programme

** Open Elective shall be chosen from the list of open electives offered by other Programmes

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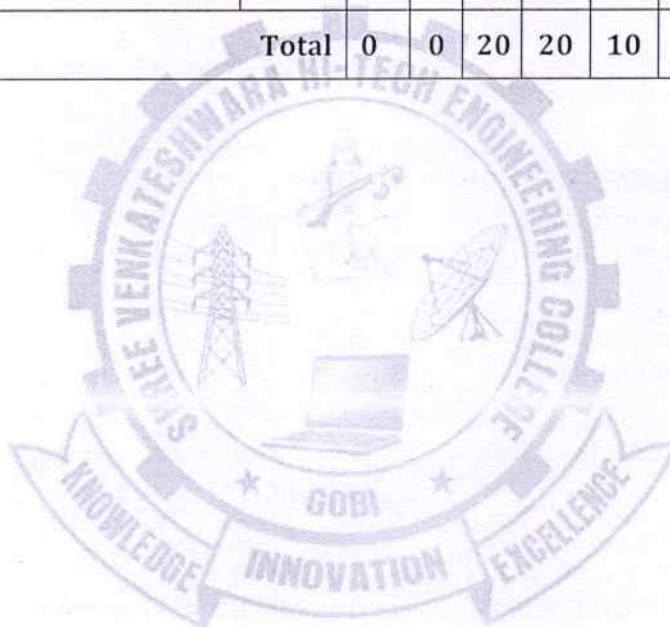
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SEMESTER VIII

S. No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	SDG Mapping	Max.Marks		
				L	T	P				CA	ES	TM
Practicals												
1.	25MEL81	Project Work	SD	0	0	20	20	10	4, 8, 9, 10, 17	60	40	100
Total				0	0	20	20	10				

TOTAL CREDITS: 172



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MANDATORY COURSES - II

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MDC31	Introduction to Women and Gender Studies	MC	3	0	0	3	0	100	-	100
2.	25MDC32	Elements of Literature	MC	3	0	0	3	0	100	-	100
3.	25MDC33	Film Appreciation	MC	3	0	0	3	0	100	-	100
4.	25MDC34	Disaster Risk Reduction and Management	MC	3	0	0	3	0	100	-	100

MANDATORY COURSES - III

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MDC41	Well Being with Traditional Practices -Yoga, Ayurveda and Siddha	MC	3	0	0	3	0	100	-	100
2.	25MDC42	History of Science and Technology in India	MC	3	0	0	3	0	100	-	100
3.	25MDC43	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0	100	-	100
4.	25MDC44	State, Nation Building and Politics in India	MC	3	0	0	3	0	100	-	100
5.	25MDC45	Industrial Safety	MC	3	0	0	3	0	100	-	100

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PROGRAMME ELECTIVE COURSES: STREAMS

MODERN MOBILITY SYSTEMS	PRODUCT AND PROCESS DEVELOPMENT	ROBOTICS AND AUTOMATION	COMPUTATIONAL ENGINEERING	DIVERSIFIED COURSES GROUP 1	DIVERSIFIED COURSES GROUP 2
Automotive Materials, Components, Design & Testing	Value Engineering	Sensors and Instrumentation	Computational Solid Mechanics	Automobile Engineering	Digital Manufacturing and IoT
Conventional and Futuristic Vehicle Technology	Process Planning and Cost Estimation	Electrical Drives and Actuators	Computational Fluid Dynamics and Heat transfer	Advanced Internal Combustion Engineering	Lean Manufacturing
Renewable Powered Off Highway Vehicles and Emission Control Technology	CAD and CAE	Embedded Systems and Programming	CAD/CAM	Gas Dynamics and Jet Propulsion	Casting and Welding Processes
Vehicle Health Monitoring, Maintenance and Safety	Design For X	Robotics	Computational Bio-Mechanics	Non-traditional Machining Processes	Green Manufacturing Design and Practices
CAE and CFD Approach in Future Mobility	Ergonomics in Design	Smart Mobility and Intelligent Vehicles	Advanced Statistics and Data Analytics	Renewable Energy Technologies	Energy Storage Devices
Hybrid and Electric Vehicle Technology	New Product Development	Haptics and Immersive Technologies	Theory on Computation and Visualization	Casting and Welding Processes	Power Plant Engineering
Thermal Management of Batteries and Fuel Cells	Product Life Cycle Management	Drone Technologies	Machine Learning for Intelligent Systems	Design of Transmission System	Refrigeration and Air Conditioning

Registration of Programme Elective Courses from Streams:

Programme Elective Courses will be registered in Semesters V, VI and VII. These courses are listed in groups called streams that represent a particular area of specialisation / diversified group. Students are permitted to choose all the Programme Electives from a particular stream or from different streams. 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. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2025 (Clause 18 & 19).

STREAM 1 : MODERN MOBILITY SYSTEMS

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MEE11	Automotive Materials, Components, Design & Testing	ES(PE)	3	0	0	3	3	40	60	100
2.	25MEE12	Conventional and Futuristic Vehicle Technology	ES(PE)	3	0	0	3	3	40	60	100
3.	25MEE13	Renewable Powered Off Highway Vehicles and Emission Control Technology	ES(PE)	3	0	0	3	3	40	60	100
4.	25MEE14	Vehicle Health Monitoring, Maintenance and Safety	ES(PE)	3	0	0	3	3	40	60	100
5.	25MEE15	CAE and CFD Approach in Future Mobility	ES(PE)	3	0	0	3	3	40	60	100
6.	25MEE16	Hybrid and Electric Vehicle Technology	ES(PE)	3	0	0	3	3	40	60	100
7.	25MEE17	Thermal Management of Batteries and Fuel Cells	ES(PE)	3	0	0	3	3	40	60	100

STREAM 2 : PRODUCT AND PROCESS DEVELOPMENT

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MEE21	Value Engineering	ES(PE)	3	0	0	3	3	40	60	100
2.	25MEE22	Process Planning and Cost Estimation	ES(PE)	3	0	0	3	3	40	60	100
3.	25MEE23	CAD and CAE	ES(PE)	3	0	0	3	3	40	60	100
4.	25MEE24	Design For X	ES(PE)	3	0	0	3	3	40	60	100
5.	25MEE25	Ergonomics in Design	ES(PE)	3	0	0	3	3	40	60	100
6.	25MEE26	New Product Development	ES(PE)	3	0	0	3	3	40	60	100
7.	25MEE27	Product Life Cycle Management	ES(PE)	3	0	0	3	3	40	60	100

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STREAM 3 : ROBOTICS AND AUTOMATION

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MEE31	Sensors and Instrumentation	ES(PE)	3	0	0	3	3	40	60	100
2.	25MEE32	Electrical Drives and Actuators	ES(PE)	3	0	0	3	3	40	60	100
3.	25MEE33	Embedded Systems and Programming	ES(PE)	3	0	0	3	3	40	60	100
4.	25MEE34	Robotics	ES(PE)	3	0	0	3	3	40	60	100
5.	25MEE35	Smart Mobility and Intelligent Vehicles	ES(PE)	3	0	0	3	3	40	60	100
6.	25MEE36	Haptics and Immersive Technologies	ES(PE)	3	0	0	3	3	40	60	100
7.	25MEE37	Drone Technologies	ES(PE)	3	0	0	3	3	40	60	100

STREAM 4 : COMPUTATIONAL ENGINEERING

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MEE41	Computational Solid Mechanics	ES(PE)	3	0	0	3	3	40	60	100
2.	25MEE42	Computational Fluid Dynamics and Heat transfer	ES(PE)	3	0	0	3	3	40	60	100
3.	25MEE43	CAD/CAM	ES(PE)	3	0	0	3	3	40	60	100
4.	25MEE44	Computational Bio- Mechanics	ES(PE)	3	0	0	3	3	40	60	100
5.	25MEE45	Advanced Statistics and Data Analytics	ES(PE)	3	0	0	3	3	40	60	100
6.	25MEE46	Theory on Computation and Visualization	ES(PE)	3	0	0	3	3	40	60	100
7.	25MEE47	Machine Learning for Intelligent Systems	ES(PE)	3	0	0	3	3	40	60	100

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STREAM 5 : DIVERSIFIED COURSES GROUP 1

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MEE51	Automobile Engineering	ES(PE)	3	0	0	3	3	40	60	100
2.	25MEE52	Advanced Internal Combustion Engineering	ES(PE)	3	0	0	3	3	40	60	100
3.	25MEE53	Gas Dynamics and Jet Propulsion	ES(PE)	3	0	0	3	3	40	60	100
4.	25MEE54	Non-traditional Machining Processes	ES(PE)	3	0	0	3	3	40	60	100
5.	25MEE55	Renewable Energy Technologies	ES(PE)	3	0	0	3	3	40	60	100
6.	25MEE56	Casting and Welding Processes	ES(PE)	3	0	0	3	3	40	60	100
7.	25MEE57	Design of Transmission System	ES(PE)	3	0	0	3	3	40	60	100

STREAM 6 : DIVERSIFIED COURSES GROUP 2

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	25MEE61	Digital Manufacturing and IoT	ES(PE)	3	0	0	3	3	40	60	100
2.	25MEE62	Lean Manufacturing	ES(PE)	3	0	0	3	3	40	60	100
3.	25MEE63	Casting and Welding Processes	ES(PE)	3	0	0	3	3	40	60	100
4.	25MEE64	Green Manufacturing Design and Practices	ES(PE)	3	0	0	3	3	40	60	100
5.	25MEE65	Energy Storage Devices	ES(PE)	3	0	0	3	3	40	60	100
6.	25MEE66	Power Plant Engineering	ES(PE)	3	0	0	3	3	40	60	100
7.	25MEE67	Refrigeration and Air Conditioning	ES(PE)	3	0	0	3	3	40	60	100

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BoS / Mech

25IPA11
SDG No. 3,4,10,11,16

INDUCTION PROGRAMME
(Common to B.E./B.Tech. all Branches)

L	T	P	C
-	-	-	0

This is a mandatory **2 week programme** to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. " Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Ice breaking :

Ice-breaking activities were conducted within the respective departments/branches to facilitate interaction among students. These sessions helped participants become acquainted with one another, fostered a sense of belonging, and encouraged teamwork and effective communication. The activities created a friendly and engaging learning environment.

(ii) Creative Arts and Physical Activities:

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression and it would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later. Physical Activities would involve a daily routine of physical activity with games and sports, gardening, etc.

(iii) Universal Human Values:

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human

Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don't's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity:

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules:

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People:

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area:

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations:

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities:

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop.

For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

(x) Life at SVHEC and its activities:

A campus tour was organized to familiarize students with the college infrastructure and facilities. During the tour, students visited various academic blocks, laboratories, library, seminar halls, sports facilities, administrative offices, and other important locations within the campus. The session helped students gain a better understanding of the resources available to support their academic and personal development while fostering a sense of comfort and belonging in the new environment.

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A session on college activities was conducted to introduce students to the various academic, co-curricular, and extracurricular opportunities available on campus. Students were informed about clubs, professional societies, cultural events, sports activities, community service initiatives, and skill development programmes. The session encouraged active participation and highlighted the importance of holistic development alongside academic excellence.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

REFERENCES:

1. Guide to Induction program from AICTE

COURSE OUTCOMES:

At the end of the course the students will be able

- CO1:** To listen to and understand general and complex academic information
- CO2:** To listen to and understand different points of view in a discussion
- CO3:** To speak fluently and accurately in formal and informal communicative contexts
- CO4:** To describe products and processes and explain their uses clearly as well as accurately
- CO5:** To express their opinions effectively in both formal and informal discussions

E. RESOURCES:

- <https://www.ted.com/about/programs-initiatives/ted-talks-education>
- <https://learnenglish.britishcouncil.org/>

CO's & PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	-	-	-	-	-	-	-	3	3	-	3
C02	-	-	-	-	-	-	-	3	3	-	3
C03	-	-	-	-	-	-	1	2	3	-	2
C04	-	-	-	-	-	-	-	2	3	-	2
C05	-	-	-	-	-	-	1	3	3	-	2
AVR							1.00	2.60	3.00		2.40

25ENI11	COMMUNICATIVE ENGLISH-I	L	T	P	C
SDG No. 4,5,8,9,16	(Common to B.E./B.Tech. All Branches)	3	0	2	4

COURSE OBJECTIVES:

- To build a strong foundation in basic grammar and communication skills through structured activities in listening, speaking, reading and writing.
- To develop the ability to express, describe and summarize ideas clearly using appropriate language structures and professional formats.
- To enhance technical communication by practicing structured descriptions, storytelling and data-based writing tasks.
- To enable clear and logical expression through organized speech, note-making and grammar-focused writing.
- To refine expressive and comparative communication skills using advanced vocabulary, professional formats and contextual grammar.

UNIT-I	BUILDING BLOCKS OF COMMUNICATION	6+6
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Grammar : Parts of Speech - Verbs - Word formation - Articles
Listening : Listening to Short Conversations & Descriptions
Speaking : Introducing oneself - Narrating Personal Experience
Reading : Reading Comprehension - Skimming - Scanning - Speed reading
Writing : Formal Letter Writing (Seeking Permission for Industrial Visit & In plant Training) - Instruction Writing

UNIT-II	PROFESSIONAL AND SOCIAL COMMUNICATION	6+6
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Grammar : Conjunction- Preposition- Cause And Effect Expression- Purpose and Means
Listening : Listening for Specific Information (Gap Filling); Listening the Announcement for Data
Speaking : Introducing the Peers- Describing about Person, Place, Things, Food, Culture, etc.
Reading : Reading Newspaper Articles & Technical Blogs
Writing : Professional Email Writing – Checklist

UNIT-III	COMPREHENSION AND PRESENTATION SKILLS	6+6
Grammar	: Types of Sentence - Negatives -Types of Question (Y/N & WH) - Degrees of Comparison.	
Listening	: Listening to TED Talks and Short Technical Reels	
Speaking	: Story Telling & Role Play	
Reading	: Reading comprehension- Reading Print Interview and Answering to the Questions	
Writing	: Paragraph Writing- Data Interpretation & Transcoding (Bar, Pie & Flow Chart)	

UNIT-IV	ENGLISH FOR WORKPLACE READINESS	6+6
Grammar	: Tense (Simple, Continuous, Perfect & Perfect Continuous)	
Listening	: Listening to Inspirational Speech & Professional Interviews	
Speaking	: Extempore Speech- Asking for Information (Direction & General Enquiries)	
Reading	: Reading Engineering/ Technical Essays - Reading Brochures	
Writing	: Note Making & Note Taking - Recommendation Writing	

UNIT-V	ENGLISH FOR FORMAL AND FUNCTIONAL COMMUNICATION	6+6
Grammar	: Modal Auxiliaries - Homophones & Homonyms - Numerical Adjectives - Phrasal Verbs	
Listening	: Listening to Telephonic Conversation- Listening to Product Description	
Speaking	: Master of Ceremony(MoC): Welcome Address & Vote of Thanks	
Reading	: Reading Graphical Materials for Comparison - Reading Advertisement	
Writing	: Report Writing (Accident/ Survey) - Compare and Contrast Essay Writing	

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course,

CO1: Learners will be able to apply basic grammar rules and effectively use LSRW skills for formal and informal communication.

CO2: Learners will be able to construct coherent descriptions and summaries using appropriate connectors, prepositions, and professional vocabulary.

CO3: Learners will be able to describe processes and products clearly in spoken and written formats using suitable sentence structures and data interpretation skills.

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CO4: Learners will be able to classify information, make recommendations, and present structured content through both oral and written communication.

CO5: Learners will be able to express opinions, compare information, and write detailed reports using advanced grammar, graphical references, and formal structures.

TEXT BOOKS:

1. Department of English, AnnaUniversity, "English for Engineers & Technologists" Orient Blackswan Private Ltd, 2020.
2. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, & CO, Department of English, Anna University, "English for Science & Technology" Cambridge University Press, 2021.

REFERENCE BOOKS:

1. Meenakshi Raman & Sangeeta Sharma, "Technical Communication – Principles and Practices", Oxford Univ. Press, New Delhi, 2016.
2. Lakshminarayanan, "A Course Book on Technical English", Scitech Publications (India) Pvt.Ltd. 2012.
3. Aysha Viswamohan, "English For Technical Communication (With CD)", Mcgraw Hill Education, ISBN : 0070264244, 2008.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House, 2016.

E. RESOURCES:

- <https://learnenglish.britishcouncil.org/>

COs-Pos MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	-	2	3	-	3
CO2	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	1	-	-	-	3	3	-	3
CO4	-	-	-	1	-	-	-	3	3	-	3
CO5	-	-	-	-	-	-	-	2	3	-	2
AVR	-	-	-	1.00	-	-	-	2.40	3.00	-	2.60

1- Low, 2- Medium, 3-High, "-" No Correlation

25MAT11 SDG NO.4,8,9,11	MATRICES AND CALCULUS	L	T	P	C
	(Common to B.E./B.Tech. all Branches)	3	0	0	3

COURSE OBJECTIVES:

- To understand the concepts of eigen values, eigenvectors and quadratic forms.
- To develop the skill on the geometric properties of curves using differential calculus.
- To equip students to analyze and optimize the functions of several variables.
- To make the students understand various techniques of integration
- To apply vector calculus and its principles to evaluate vector fields.

UNIT-I **MATRICES** **9**

Eigen values and Eigen vectors of a real matrix – Characteristic equation–Properties of Eigen values and Eigen vectors – Cayley - Hamilton theorem – Reduction of a quadratic form to canonical form by orthogonal transformation–Nature of quadratic forms.

UNIT-II **DIFFERENTIAL CALCULUS** **9**

Curvature – Radius of curvature (Cartesian Co – ordinates only) – Centre of curvature and Circle of curvature – Involute and Evolute (Parabola, Ellipse)

UNIT-III **FUNCTIONS OF SEVERAL VARIABLES** **9**

Euler's theorem for homogenous functions - Jacobians – Taylor's series expansion – Maxima and Minima for functions of two variables – Methods of Lagrangian multipliers.

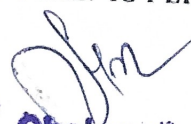
UNIT-IV **INTEGRAL CALCULUS** **9**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Improper integrals.

UNIT-V **VECTOR CALCULUS** **9**

Irrotational and solenoidal vector fields – Green's theorem in plane , Gauss divergence theorem and Stoke's theorem (Cube, Cuboid and Rectangular paralleopiped only).

TOTAL: 45 PERIODS


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COURSE OUTCOMES:

At the end of the course the students will be able to :

- C01: Assimilate the eigen values and eigen vectors in reduction of quadratic form into canonical form.
- C02: Analyze the center of curvature, circle of curvature and develop the evolutes.
- C03: Expand the Taylor series and calculate the extreme value for function of several variables.
- C04: Apply different methods of integration in solving practical problems
- C05: Apply the divergence and curl in vector integral theorems of vector fields.

TEXTBOOKS :

1. James Stewart, "Calculus : Early Transcendental", Cengage Learning, 9th Edition, New Delhi, 2023. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8]
2. Grewal. B. S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2020.

REFERENCE BOOKS :

1. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2022
2. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2021
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2019
4. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2019

E-Resources

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ma03
2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_ma86

CO's - PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	3	3	2	1	-	-	-	2	-	2	3
C02	3	3	2	2	-	-	-	3	-	2	3
C03	3	3	2	2	-	-	-	3	-	2	3
C04	3	3	2	1	-	-	-	2	-	2	3
C05	3	2	2	1	-	-	-	2	-	2	3
AVG	3.00	2.80	2.00	1.40	-	-	-	2.40	-	2.00	3.00

1- Low, 2- Medium , 3-High, "-" No Correlation

25PHI11
SDG No. 3, 4, 9,
11, 12

ENGINEERING PHYSICS
(B.E./B. Tech. - Common to all branches)

L	T	P	C
3	0	2	4

COURSE OBJECTIVES:

- To make the students effectively achieve an understanding of mechanics
- Provide knowledge of elastic property, thermal property of materials and its applications
- Impart knowledge of laser and their applications
- Introduce the essential principles of fiber optics and its applications
- Equipping the students to successfully understand the importance of quantum physics

UNIT-I	MECHANICS	10
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Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – Motion of the CM – Moment of inertia – Theorems of M.I. – M.I of a diatomic molecule – Torque – Rotational energy state of a rigid diatomic molecule – Torsional pendulum – double pendulum.

UNIT-II	PROPERTIES OF MATTER	10
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Elasticity- Hooke's law – stress – strain diagram – Poisson's ratio – Factors affecting elasticity – bending of beams - Bending moment equation – Depression of a cantilever – Young's modulus by uniform bending – I-shaped girders.

UNIT-III	LASER	9
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Lasers: Stimulated absorption – Spontaneous emission – Stimulated emission – Population inversion-Einstein's coefficients derivation and their relations – Pumping methods – Types of lasers – CO₂ laser, Semiconductor lasers (Homojunction & Heterojunction) – Holography - Industrial and Medical Applications of lasers.

UNIT-IV	FIBER OPTICS	8
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Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle – Types of optical fibres (Material, Refractive Index, Mode) – Attenuation, Dispersion, Bending – Fiber optics communication system (qualitative) – Temperature and Displacement sensors – Fiber optic endoscope.

UNIT-V	QUANTUM PHYSICS	8
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Photons and light waves – Electrons and matter waves – The Schrodinger equation (Time dependent and time independent forms) – Particle in a one-dimensional rigid box for Eigen value and Eigen function – tunneling (qualitative) – Electron microscope - Scanning Tunneling microscope .

TOTAL: 45 PERIODS

LIST OF EXERCISE/EXPERIMENTS

1. Determination of rigidity modulus of wire and moment of inertia of regular objects – Torsion pendulum.
2. Determination of Young's modulus by Uniform bending method.
3. Determination of Simple harmonic oscillations of cantilever.
4. Determination of the wavelength of the laser using grating
5. Determination of width of the groove of CD using laser.
6. Determination of numerical aperture and acceptance angle in an optical fiber.
7. Determination particle size of Lycopodium powder using semiconductor laser.
8. Determination of thickness of a material by Air-wedge method.

TOTAL: 30 PERIODS

TOTAL: 45 + 30 = 75 PERIODS

COURSE OUTCOME

At the end of the course the students will be able to

- C01:** Demonstrate the foundational knowledge in Mechanics
- C02:** Interpret the elastic properties of solid materials and their applications
- C03:** Apply the comprehended knowledge about laser and its applications
- C04:** Apply the comprehended knowledge about fibre optic communication system in various engineering applications.
- C05:** Understand the fundamental principles of quantum mechanics.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow, "An Introduction to Mechanics," McGraw Hill Education (Indian Edition), 2021.
2. Arthur Beiser, Shobhit Mahajan, S.Rai Choudhury, "Concepts of Modern Physics," McGraw-Hill (Indian Edition), 2024.

REFERENCE BOOKS:

1. K.Thyagarajan and A.Ghatak, "Lasers: Fundamentals and Applications," Laxmi Publications, (Indian Edition), 2023

2. D.Halliday, R.Resnick and J.Walker, "Principles of Physics," Wiley (Indian Edition), 2021
3. N.Garcia, A.Damask and S.Schwarz, "Physics for Computer Science Students," Springer-Verlag, 2012

PRACTICAL REFERENCES:

1. A.K. Katiyar (Author), C.K. Pandey, Engineering Physics: Theory and Practical Paperback, 2015.

E- Resources:

1. <https://archive.nptel.ac.in/courses/113/106/113106039/>
2. <https://vlab.amrita.edu/?sub=1>
3. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ph52
4. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ph36

CO's- PO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	3	3	2	1	1	-	-	-	-	-	-
C02	3	3	2	1	1	-	-	-	-	-	-
C03	3	2	2	1	2	-	-	-	-	-	-
C04	3	2	2	1	2	-	-	-	-	-	-
C05	3	3	1	1	2	-	-	-	-	-	-
AVG	3.0	2.6	1.8	1.0	1.6	-	-	-	-	-	-

1- Low, 2- Medium , 3-High, "-" No Correlation

Shree Venkateshwara Hi-Tech Engineering College (Autonomous)

25CYI11

ENGINEERING CHEMISTRY

L T P C

SDG No. 4,6,7

(B.E./B.Tech-Common to all branches)

3 0 2 4

COURSE OBJECTIVES:

- To provide foundational knowledge on water quality and water treatment processes.
- To introduce the principles of nanochemistry, methods of synthesizing nanomaterials, and their applications.
- To familiarize students with polymer chemistry, polymerization techniques, and the manufacturing methods of plastics.
- To impart knowledge on fuels and combustion, including manufacturing of fuels, fuel analysis, and alternative energy sources.
- To develop an understanding of electrochemistry and its applications in energy storage devices and electric vehicles.

UNIT-I

WATER AND ITS TREATMENT

9

Water quality parameters – Estimation of hardness by EDTA method - Boiler troubles - Internal treatment and External treatment of boiler feed water – Ion exchange method and zeolite process – Desalination method: Reverse Osmosis.

UNIT-II

NANOCHEMISTRY

9

Basics of Nanochemistry - Size-dependent properties - Types of nanomaterials: nanoparticle, nanowire, nanorod and nanotube - Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, electrochemical deposition - Applications of nanomaterials.

UNIT-III

POLYMER CHEMISTRY

9

Basics of polymer chemistry - Mechanism of polymerization: Addition (Free Radical); condensation and copolymerization - Thermoplastics & thermosetting plastics - Preparation, properties and uses of Nylon 6, 6 and Epoxy resin - Fabrication of plastics - (Compression, Injection & Extrusion moulding).

UNIT-IV

FUELS AND COMBUSTION

9

Classification of fuels - Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method) - Manufacture of synthetic petrol (Bergius process) - Knocking - octane number, cetane number - Power alcohol and biodiesel - Flue gas analysis - ORSAT Method.

UNIT-V

ELECTROCHEMISTRY AND STORAGE DEVICES

9

Types of cells – types of electrodes: calomel electrode, glass electrode – Nernst equation – EMF series - Batteries: Primary battery - Dry cell, Secondary battery - lead acid battery and lithium-ion-battery; H₂-O₂ fuel cell; Supercapacitors - Electric vehicles.

TOTAL: 45 HOURS

LIST OF EXPERIEMENTS

1. Determination of types and amount of alkalinity in a water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of chloride content of water sample by Argentometric method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Determination of strength of acids in a mixture of acids using conductivity meter.
6. Conductometric titration of barium chloride against sodium sulphate (precipitation titration).
7. Estimation of iron content of the given solution using potentiometer.
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

TOTAL: 30 HOURS

GRAND TOTAL: 45 + 30 = 75 HOURS

COURSE OUTCOMES:

At the end of the course the students will be able

- C01:** Assess the quality of water from water quality parameter and propose suitable treatment methodologies to treat water.
- C02:** Summarize the basic concepts of nanochemistry in designing the synthesis of nanomaterials for engineering and technology applications.
- C03:** Understand the basic knowledge of polymers to apply the futuristic material needs.
- C04:** Familiar with the concepts of fuels for engineering processes and applications.
- C05:** Apply the concept of electrochemistry in the fabrication of energy storage devices.

TEXT BOOKS:

1. Dr. A. Ravikrishnan, "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Limited, 23rd Edition, 2023.
2. S. S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCE BOOKS:

1. Shashi Chawla, "A Text Book of Engineering Chemistry", Dhanpat Rai & Co (Pvt.) Ltd, New Delhi, 2011.
2. O.G. Palanna, "Engineering Chemistry", McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.

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ONLINE SOURCES:

Unit1:

https://www.youtube.com/watch?v=4SRMmqH2s4&list=PLLy_2iUCG87AZvtaiuD3r4HATrBKhb90P (IIT ROORKEE NPTEL) & <https://www.youtube.com/watch?v=o6iurO2Cwd0> (NPTEL-NOC IITM)

Unit 2:

<https://www.youtube.com/watch?v=0EWCqClSFOA&list=PLyqSpQzTE6M8682dGkNTN8936vSY4CbqZ> (NPTEL-NOC IITM)

Unit 3:

<https://www.youtube.com/watch?v=jSNlmOwpYg&list=PLbMVogVj5nJT0slH3tuas5Blp1DG8ZpMj> (NPTELHRD)

Unit 4:

<https://www.youtube.com/watch?v=1-EliKQ0erA> (AKTU DIGITAL EDUCATION)

Unit 5:

<https://www.youtube.com/watch?v=nh2xbyOaERw> & <https://www.youtube.com/watch?v=iFVVv23ZzGE> (IIT ROORKEE NPTEL)

CO's- PO's MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	3	3	3	3	1	3	-	-	-	-	-
C02	3	2	2	1	3	3	-	-	-	-	2
C03	3	2	2	2	2	2	-	-	-	-	-
C04	3	2	3	2	2	2	-	-	-	-	-
C05	3	2	2	2	2	2	-	-	-	-	-
AVG	3	2	2	2	2	2	-	-	-	-	2

1- Low, 2- Medium , 3-High, "-" No Correlation

25CSI11	PROBLEM SOLVING USING C PROGRAMMING	L	T	P	C
SDG No: 4, 8, 9, 10,17	(Common to: B.E. / B.Tech. all Branches)	3	0	2	4

COURSE OBJECTIVES:

- To learn how to think algorithmically to solve a problem.
- To gain knowledge of fundamental programming concepts in C programming.
- To explore the basic concept of arrays and pointers.
- To learn concept of functions and structures.
- To gain proficiency in file handling techniques.

UNIT-I**COMPUTATIONAL THINKING****9**

Overview of Computational Thinking and Key Techniques – Overview of Software Development Life Cycle – Introduction to Algorithmic Thinking – Elements: Sequence, Selection and Repetition – Representation of Flow Chart – Overview of Flow algorithm Tool – Pseudo- code– Introduction to programming languages

UNIT-II**BASICS OF C PROGRAMMING****9**

Introduction to C - Structure of C Programming - Compiling - Executing and Debugging - Character Set - Tokens - Identifiers - Data Types - Variable - Constants - Evaluating Expression - Type Conversion - Input and Output - Decision control and looping statements

UNIT-III**ARRAYS AND POINTERS****9**

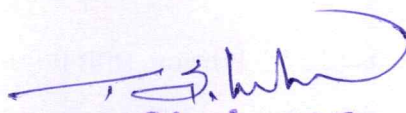
Introduction to Arrays - Declaration and Initialization of Single Dimensional Arrays - Array Operations - Declaration and Initialization of Two-Dimensional Arrays - Multidimensional Arrays - Declaring and Initializing Strings - Reading and Writing Strings - String Operations - Array of Strings. Introduction to Pointers - Pointer operators - Pointer arithmetic - Arrays and pointers - Array of pointers.

UNIT-IV**FUNCTIONS AND STRUCTURES****9**

Function - Types of Function – Elements - Pass by value - Pass by reference – Recursion - Storage Classes. Introduction to structures - Declaring and Defining Structure Variables - Accessing Structure Members - Structure Initialization - Nested structures - Array of structure – typedef - Union

UNIT-V**FILE PROCESSING****9**

Files: Introduction – Using files in C – Read data from files – Writing data to files – Error handling during File operation – Command line arguments.


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TOTAL : 45 PERIODS

PRACTICAL EXERCISES:

1. Implementation of algorithm, flowchart and pseudo code to solve electricity billing.
2. Implementation of algorithm, flowchart and pseudo code to solve retail shop billing.
3. Implementation of if, if-else, nested if and switch statements.
4. Implementation of while, do-while and for loops.
5. Implementation of sorting and searching algorithms.
6. Implementation of one-dimensional array, passing array to functions and array operations.
7. Implementation of programs for implementing various string operations like "copy", "finding length", "compare", "concatenate" with and without built-in library functions.
8. Implementation of pointer operators, call by reference, pointers with array.
9. Implementation of function calls, recursion, call by value.
10. Implementation of structure and nested structure.
11. Implementation of array of structures.
12. Implementation of file operations.
13. Implementation of file to read N character using file functions.

TOTAL: 30 PERIODS

TOTAL: 75 (45+30) PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

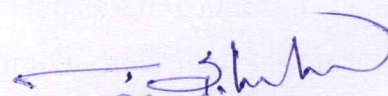
- CO 1 :** Construct algorithmic solutions for a given computational problem.
- CO 2 :** Demonstrate the understanding of fundamental concepts of C programming.
- CO 3 :** Utilize appropriate concepts of arrays and pointers to solve the programming problems effectively.
- CO 4 :** Apply concepts of functions and structures in C programming
- CO 5 :** Implement file I/O operations to store and retrieve data from files.

TEXT BOOKS:

1. GVenkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
2. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2023.
3. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2023.

REFERENCE BOOKS:

1. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2023
2. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C",
SVHEC - R2025


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McGraw-Hill Education, 2024.

3. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2022.

4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2024.

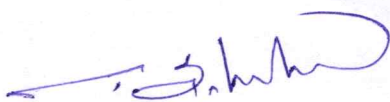
E-RESOURCES:

1. Tutorial point - <https://www.tutorialspoint.com/c-programming/index.htm>
2. Greek for geeks - <https://www.geeksforgeeks.org/c-programming-language/>

CO's – PO's & PSO's MAPPING

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	1	2	-	3	3	1	2	2
CO2	2	3	2	1	2	1	1	2	-	3	2	2	2	2
CO3	3	2	2	1	3	1	1	2	-	3	3	2	2	2
CO4	2	3	3	1	2	2	1	2	-	3	2	2	3	2
CO5	2	2	3	2	1	-	-	2	1	2	2	2	2	2
AVG	2.2	2.4	2.4	1.2	2	1.3	1	2	1	2.8	2.4	1.8	2.2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation


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25TAT11

தமிழர் மரபு

L T P C

SDG No. 3, 4, 8, 11, 16 (B.E./B.Tech- அனைத்து பாடப்பிரிவுகளுக்கும் பொதுவானது)

1 0 0 1

பாடநெறி நோக்கங்கள்:

- தமிழின் இலக்கியங்கள் மற்றும் நவீன இலக்கியங்களைப் புரிந்துகொள்ளுதல்
- தமிழ் கலாச்சார பாரம்பரியத்தைக் கற்றுக்கொள்ளுதல்
- தமிழர்களின் பல்வேறு கலைவடிவங்களைக் கண்டறிதல்
- தமிழர்களின் திணைக்கோட்பாடுகளை விளக்குதல்
- இந்திய சுதந்திர போராட்ட இயக்கங்களுக்கும் இந்திய கலாச்சாரத்திற்குமான தமிழர்களின் பங்களிப்பை உணர்தல்

அலகு - I

மொழி மற்றும் இலக்கியம்

3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் ஆறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமணப் பெளத்த மதங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு - II

மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை

3

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

அலகு - III

நாட்டுப்புறக் கலைகள் மற்றும் வீரவிளையாட்டுகள்

3

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

அலகு - IV

தமிழர்களின் திணைக் கோட்பாடுகள்

3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவு, கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

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அலகு - V

இந்திய தேசிய இயக்கம் மற்றும்

3

இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிற்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

பாடநெறி முடிவுகள்:

இப்பாடத்தைப் படிப்பதின் முடிவில் மாணவர்கள்

- C01: தமிழின் பல்வேறு இலக்கியங்களைப் பற்றிய அறிவைப் பெறுவார்கள்
- C02: தமிழ் கலாச்சார பாரம்பரியத்தின் தனித்தன்மையைக் கற்றுக்கொள்வார்கள்
- C03: தமிழகத்தின் பல்வேறு கலைவடிவங்களைக் கண்டறிவார்கள்
- C04: தமிழர்களின் திணைக்கோட்பாடுகளை அறிந்துகொள்வார்கள்
- C05: தமிழ் சுதந்திரப்போராட்ட வீரர்கள் மற்றும் தமிழ் கலாச்சாரத்தை இந்தியாவின் மற்ற பகுதியுடன் ஒப்பிடும் திறனைப் பெறுவார்கள்

மின் - ஆதாரங்கள்:

1. <https://www.tamilvu.org/>

CO's -PO's விவரணையாக்கம்::

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	-	-	-	-	-	1	1	-	1	-	-
C02	-	-	-	-	-	1	1	-	1	-	-
C03	-	-	-	-	-	1	1	-	1	-	-
C04	-	-	-	-	-	1	1	-	1	-	-
C05	-	-	-	-	-	1	1	-	1	-	-
AVG	-	-	-	-	-	1	1	-	1	-	-



Shree Venkateshwara Hi-Tech Engineering College

25STAT11	HERITAGE OF TAMILS	L T P C
SDG No. 3, 4, 8,11, 16	(B.E./B.Tech-Common to all branches)	1 0 0 1

COURSE OBJECTIVES:

- To understand the Sangam and modern literature of Tamil
- To learn the heritage of Tamil culture
- To recognize the various art forms of Tamils
- To explain the Thinaï concept of Tamils
- To realize the contribution of Tamils to Indian national movement and Indian culture

UNIT-I LANGUAGE AND LITERATURE 3

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

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

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

UNIT-III FOLK AND MARTIAL ARTS 3

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

UNIT-IV THINAI CONCEPTS OF TAMILS 3

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

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

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

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COURSE OUTCOMES:

At the end of the course the student will be able to

- C01:** Gain knowledge about various literatures of Tamil
- C02:** Learn the uniqueness of Tamil cultural heritage
- C03:** Find various art forms of Tamil Nadu
- C04:** Understand the Thinaï concepts in Tamil
- C05:** Distinguish the contribution of Tamils to Indian national movement and Indian culture

E- RESOURCES:

1. <https://www.tamilvu.org/>

CO's -PO's MAPPING:

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011
C01	-	-	-	-	-	1	1	-	1	-	-
C02	-	-	-	-	-	1	1	-	1	-	-
C03	-	-	-	-	-	1	1	-	1	-	-
C04	-	-	-	-	-	1	1	-	1	-	-
C05	-	-	-	-	-	1	1	-	1	-	-
AVG	-	-	-	-	-	1	1	-	1	-	-

25MEL11

SDG No.

4, 9

IDEA LAB

(Common to B.E./B.Tech all branches)

L T P C

0 0 4 2

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Develop hands-on skills in schematic design and PCB layout for custom electronic circuits.
- Enable students to fabricate, assemble, and test PCBs using standard manufacturing practices.
- Impart practical knowledge in embedded system programming using Arduino and Raspberry Pi platforms.
- Provide exposure to workshop tools including welding, lathes, and plumping equipment for physical prototyping.
- Facilitate the design and fabrication of complete working prototypes through integration of embedded hardware and 3D-printed or machined enclosures.

LIST OF EXPERIMENTS:

1. Schematic and PCB layout design of a suitable circuit.
2. Fabrication and testing of the Printed Circuit Board (PCB).
3. Embedded programming using Arduino and/or Raspberry Pi.
4. Familiarity and use of welding equipment.
5. Familiarity and use of lathe operations.
6. Familiarity and use of plumping equipment.
7. 3D Printing practice using Fusion Deposit Modeling (FDM).
8. Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure for innovation and practical learning opportunities.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- C01:** Design and simulate electronic circuits and translate them into PCB layouts using industry-standard tools.
- C02:** Fabricate and test printed circuit boards ensuring reliability and functionality of electronic components.
- C03:** Write and debug embedded programs using Arduino/Raspberry Pi for real-world applications
- C04:** Operate welding, lathe, and plumping tools to build enclosures and mechanical fixtures for prototypes.
- C05:** Integrate embedded systems with 3D-printed/machined parts to develop and present a functional capstone project.

REFERENCE BOOKS:

1. AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), ISBN: 978-9391505332

2. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education. ISBN-13 : 978-1260019193.
3. 3D Printing & Design, Dr. Sabrie Soloman, ISBN: 978-9386173768, Khanna Book Publishing Company, New Delhi.
4. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill. ISBN-13: 978-1259641633
5. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018. ISBN-13: 978-1681884325.

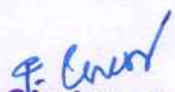
E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc25_ee163/preview
2. https://onlinecourses-archive.nptel.ac.in/noc18_cs05/course
3. <https://www.autodesk.com/learn/ondemand/collection/fusion-360>

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	-	2	-	-	-	-	1	-
CO2	3	2	3	2	2	-	-	-	-	1	-
CO3	3	3	3	2	3	-	-	-	-	2	-
CO4	2	1	2	-	2	-	-	-	-	1	-
CO5	3	3	3	2	3	-	-	-	2	3	2
Avg	3	2	3	2	2	-	-	-	2	2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation


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Shree Venkateshwara Hi-Tech Engineering College (Autonomous)

25MDC11
SDG No. 3,4,5,10,16

YOGA FOR HUMAN EXCELLENCE
(Common to B.E./B.Tech. all Branches)

L	T	P	C
0	0	1	0

UNIT-I	SIMPLIFIED PHYSICAL EXERCISES	3
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Physical exercises: Hand exercises – Leg exercises. Breathing exercises: Eye exercises – Kapalabathi. Makarasana. Body massages: Acupressure – Relaxation.

UNIT-II	KAYA KALPA	3
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Kaya Kalpa Exercise – Aswini Mudra – Moola Bandha – Ojas Breath (Kayakalpa Exercise should be learnt directly from the World Community Service Centre.)

UNIT-III	MEDITATION	3
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Agna. Santhi : Clearence. Thuriya. Thuriyattheetham meditation

UNIT-IV	HUMAN RESOURCES DEVELOPMENT	3
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Roles and responsibilities of a human being (Due the Duty, 4 Ashramas) - Desire Alignment (Aasai seeramaithal) - Discipline (olukkam formula) - Diet/Food control (Organ Clock) - Five duties, Five limitations (Ivaghai kadamaighal, Indhil Alavu murai) - Bene its of Blessings (comparing to Law of attraction)- Individual peace leads to world peace.

UNIT-V	YOGASANAS	3
---------------	------------------	----------

Suriya Namaskar, Padmasana, Vajrasana, Sukasana, Trikonasana , Saral matsyasana, Gomugasana, Mandukasana, Arthamatsyendrasana, Ushtrasana, Siddhasana, Shavasana

TOTAL : 15 PERIODS

TEXT BOOKS:

1. Yoga Practices – I: VISION, Vethathiri Publications.
2. Yogasana – Vethathiri Publications

REFERENCE BOOKS:

1. Simplified Physical Exercises – Vethathiri Publications.
2. Sound Health Through Yoga – Dr. K. Chandrasekaran.

25ENI21
SDG No. 4,5,8,9,16

COMMUNICATIVE ENGLISH – II
(Common to B.E./B.Tech. All Branches)

L	T	P	C
2	0	2	3

COURSE OBJECTIVES:

- To develop the learners' fundamental communication skills by introducing basic grammar, everyday conversations, and descriptive writing.
- To enable learners to understand and apply advanced grammar structures, enhance their listening skills for process comprehension, improve presentation abilities, read technical documents, and write formal complaint and editorial letters.
- To equip learners with essential communication skills for interviews, group discussions, debates, and professional correspondence.
- To develop learners' skills in reported speech, descriptive speaking, review listening, fluent reading, and formal correspondence.
- To prepare learners for job interviews, professional speaking, resume writing, and job-related communication.

UNIT-I INTRODUCTION TO EFFECTIVE COMMUNICATION 6+3

- Grammar** : Prefix/ Suffix- Active and Passive Voice- Model Passive
- Listening** : Listening to Short literary Texts - Listening to a Presentation and Completing Gap Filling Exercise
- Speaking** : Talking about Daily Routine, Hobbies, Favorites, Family, etc.
- Reading** : Describing a Product through Comparing & Contrasting it with other Products
- Writing** : Writing a short biography on Achievers based on given hints.

UNIT-II PROCESS COMMUNICATION AND TECHNICAL WRITING 6+3

- Grammar** : Subject - Verb Agreement -Infinitives - Gerunds
- Listening** : Listening to Process Description and Drawing a Flow Chart
- Speaking** : General and Technical Presentation.
- Reading** : Reading Technical Manuals.
- Writing** : Writing Complaint Letter to Companies - Letter to the Editor.

UNIT-III

**ADVANCED COMMUNICATION FOR PROFESSIONAL
SUCCESS**

6+3

- Grammar** : If Clause -One Word Substitution
- Listening** : Listening to Interview Techniques and Etiquettes
- Speaking** : Participating in Group Discussion - Developing Persuasive Skills and Argument Construction (Debate)
- Reading** : Reading of Articles (Editorials)
- Writing** : Compose Emails for Internship Request, Placement Enquires and Industrial Visits

UNIT-IV

DESCRIPTIVE AND INTERACTIVE COMMUNICATION

6+3

- Grammar** : Reported Speech - Compound Words
- Listening** : Listening to Book and Movie Review
- Speaking** : Describing Working Mechanism
- Reading** : Reading for Improving Fluency and Intonation.
- Writing** : Writing letter of Invitation, Acceptance and Declination

UNIT-V

CAREER-ORIENTED COMMUNICATION SKILLS

6+3

- Grammar** : Content vs. Function Words – Fixed & Semi Fixed Expression - Relative Phrase
- Listening** : Listening to job Interviews and Answering to the Exercise
- Speaking** : Offline and Online Interviews.
- Reading** : Matching the Heading to the Paragraph.
- Writing** : Job Application & Internship Application with Resume.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will able to

CO 1: Apply basic grammar, communicate daily situations, comprehend listening tasks, compare products and write short biographies.

CO 2: Correct grammar, present processes effectively, interpret technical texts and draft form:

letters.

CO 3: Use conditional sentences, participate confidently in debates and discussions, follow interview protocols, analyze editorials and compose professional emails.

CO 4: Use reported speech, describe processes, listen and respond to reviews, read with fluency and draft formal invitation letters.

CO 5: Apply grammar structures, face interviews confidently, match texts with headings, and draft job applications with resumes.

TEXT BOOKS:

1. Department of English, Anna University, "English for Engineers & Technologists" Orient Blackswan Private Ltd, 2020.
2. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, & CO, Department of English, Anna University, "English for Science & Technology" Cambridge University Press, 2021.

REFERENCE BOOKS:

1. Meenakshi Raman & Sangeeta Sharma, "Technical Communication–Principles and Practices", Oxford Univ. Press, New Delhi, 2016.
2. Lakshminarayanan, "A Course Book on Technical English", Scitech Publications (India) Pvt.Ltd. 2012.
3. Aysha Viswamohan, "English For Technical Communication (With CD)", Mcgraw Hill Education, ISBN : 0070264244, 2008.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House, 2016.

E. RESOURCES:

- <https://learnenglish.britishcouncil.org/>

CO's-PO's MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	-	3	3	-	3
CO2	-	-	-	-	-	-	-	3	3	-	3
CO3	-	-	-	-	-	-	-	3	3	-	2
CO4	-	-	-	-	-	-	-	3	3	-	2
CO5	-	-	-	-	-	-	-	3	3	-	2
AVR	-	-	-	-	-	-	-	3.00	3.00	-	2.40

1- Low, 2- Medium, 3-High, "-" No Correlation

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25MAT21	NUMERICAL METHODS AND DIFFERENTIAL EQUATIONS	L	T	P	C
SDG NO.4,8,9,11	(Common to B.E./B.Tech. all Branches)	3	0	0	3

COURSE OBJECTIVES:

- To introduce the basic concepts of solving algebraic and transcendental equations
- To introduce the numerical techniques of interpolation in various intervals and differentiation and integration in engineering and technology
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations
- To familiarize students how to solve the higher-order linear differential equations.
- To enable students to understand the definition and properties of the Laplace transform apply it to solve differential and integral equations and analyze the behavior of systems in the frequency domain .

UNIT-I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9

NewtonRaphson method- Solution of linear system of equations - Gauss elimination method - Pivoting-Gauss Jordan method - Iterative methods of Gauss Jacobi and Gauss Seidel - Eigen values of a matrix by Power method.

UNIT-II INTERPOLATION, NUMERICAL DIFFERENTIATION AND 9
NUMERICAL INTEGRATION

Lagrange's and Newton's divided difference interpolations - Newton's forward and backward difference interpolation - Numerical single integrations using Trapezoidal and Simpson's 1/3 rules

UNIT-III NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL 9
EQUATIONS

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's predictor corrector methods for solving first order differential equations.

UNIT-IV ORDINARY DIFFERENTIAL EQUATIONS 9

Linear higher order differential equations with constant coefficients - Method of variation of parameters - Cauchy's and Legendre's linear differential equations

UNIT-V LAPLACE TRANSFORMS 9

Laplace transform: Sufficient conditions - Transform of elementary functions - Basic Properties - Transform of periodic functions. Inverse Laplace transform: Standard results - statement of Convolution theorem and its applications - Solution of linear second order ODE with constant coefficients using Laplace transformation techniques.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

At the end of the Course the students will be able to

- CO1 :** Apply the numerical techniques of interpolation in various intervals and differentiation and integration for engineering problems
- CO2 :** Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations
- CO3 :** Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications
- CO4 :** Apply various techniques in solving differential equations..
- CO5 :** Understand Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2019
2. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016

REFERENCE BOOKS:

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2015.
2. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016
3. T.K.V Iyengar, B.krishna Gandhi, S.Ranganatham, M.V.S.S.N Prasad, " Laplace Transforms, Numerical Methods and complex variables", S.Chand, 10th march 2025.

E-Resources

1. <https://www.scribd.com/document/854329544/Iterative-Methods>
2. https://www.youtube.com/watch?v=yPNSIhE_FZM

CO's – PO's MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	1	-	-	2	-	2	3
CO2	3	3	2	1	1	-	-	2	-	2	2
CO3	3	3	2	1	1	-	-	2	-	2	3
CO4	3	3	2	1	1	-	-	2	-	2	3
CO5	3	2	2	1	1	-	-	2	-	3	3
AVG	3.00	2.80	2.00	1.00	1.00	-	-	2.00	-	2.20	2.80

1. Low, 2- Medium , 3-High, "-" No Correlation

SVHEC-R2025


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BoS / S&H

25PHT22
SDG No. 3, 7, 9,
11, 12, 13

MATERIALS SCIENCE
(Common to B.E. MECH, CIVIL)

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To introduce the basics of heat transfer through different materials, thermal performance of building and various thermal applications
- To impart knowledge on the ventilation and air conditioning of buildings
- To introduce the concepts of sound
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To discuss the basics of new engineering materials

UNIT-I	THERMAL APPLICATIONS	9
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Principles of heat transfer, steady state of heat flow, conduction through compound media-series and parallel-conductivity of rubber tube and powder materials - heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings - central heating.

UNIT-II	VENTILATION AND REFRIGERATION	9
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Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A.C.Systems.

UNIT-III	ACOUSTICS	9
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Introduction-Classification of sound - Characteristics of sound - decibel- Weber-Fechner law - Sabine's formula- derivation using growth and decay method - Absorption Coefficient and its determination -factors affecting acoustics of buildings and their remedies.

UNIT-IV	OPTICAL PROPERTIES OF MATERIALS	9
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Classification of optical materials - carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode - solar cell - LED - Organic LED - Laser diodes

UNIT-V

NEW ENGINEERING MATERIALS

9

Ceramics – types and applications – Composites: classification, role of matrix and reinforcement – processing of fibre reinforced plastics and fibre reinforced metals – Metallic glasses: Properties, preparation and applications – Shape memory alloys: Characteristics and applications – Carbon nanotubes: Properties and applications

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Acquire knowledge about heat transfer through different materials, thermal performance of building and thermal insulation
- CO2:** Gain knowledge on the ventilation and air conditioning of buildings
- CO3:** Understand the concepts of sound and its measurements
- CO4:** Understand the optical properties of materials and working principles of various optical devices
- CO5:** Familiarize with ceramics, composites, metallic glasses, shape memory alloys, and their important applications

TEXT BOOKS:

1. Marko Pinteric, "Building Physics", Springer 2021
2. Jasprit Singh, "Semiconductor Optoelectronics: Physics and Technology", Mc-Graw Hill India (2019)
3. M.F.Ashby, P.J.Ferreira and D.L.Schodek. "Nanomaterials, Nanotechnologies and Design: an Introduction for Engineers", 2011

REFERENCE BOOKS:

1. Hugo Hens, "Applied Building Physics", Wiley, 2016
2. K.G.Budinski and M.K.Budinski. "Engineering Materials: Properties and Selection", Pearson Education, 2016
3. Pallab Bhattacharya, "Semiconductor Optoelectronic Devices", Pearson, 2017
4. Dr.P.Mani, "Physics for Civil Engineering", Dhanam Publications, 2022

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E- Resources:

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_me194
2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_me124
3. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_me132
4. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ph56

CO's – PO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	3	2	2	-	1	1	-	-	-	-	1
C02	3	1	2	-	2	1	-	-	-	-	1
C03	3	2	2	1	2	2	-	-	-	-	1
C04	3	1	1	-	2	2	-	-	-	-	1
C05	3	-	2	-	2	2	-	-	-	-	1
AVG	3.0	1.5	1.8	1.0	1.8	1.6	-	-	-	-	1.0

1- Low, 2- Medium , 3-High, "-" No Correlation

25EEI22 SDG NO:4,7,8,9	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (For B.E./B.Tech- CIVIL, CSE, MECH, AI&DS, AI&ML, IT, Cyber Security, Pharm.Tech branches)	L	T	P	C
		2	0	2	3
COURSE OBJECTIVES: ➤ To learn the basic concepts of electric circuits and analysis. ➤ To analyze the magnetic circuits and domestic wiring. ➤ To understand the basics of working principles and application of electrical machines. ➤ To impart knowledge about analog devices and their characteristics. ➤ To educate on the fundamental concepts of digital electronics.					
UNIT-I	ELECTRIC CIRCUITS				10
Basic components of electric circuits, Charge, Current, Voltage and Power, Voltage and current sources, Ohm's law, Kirchhoff's laws, Series and parallel connected independent sources, Resistors in series and parallel, Voltage division and current division rule, Mesh current and node voltage methods of analysis-DC Circuits.					
UNIT-II	MAGNETIC CIRCUITS AND ELECTRICAL INSTALLATIONS				10
Magnetic circuits-definitions-MMF, flux, reluctance, Magnetic field intensity, Flux density, Fringing, Self and Mutual inductances-simple problems. Domestic wiring, Wires and Cables - types, Earthing, Protective devices, Switch fuse unit, Safety precautions and First Aid.					
UNIT-III	ELECTRICAL MACHINES				9
Construction and working principle- DC generators, EMF equation, Types and applications. Working principle of DC motors, Types and applications. Construction, Working principle and applications of 1 ϕ Transformer, Three phase alternator, Three phase induction motor.					
UNIT-IV	ANALOG ELECTRONICS				9
Resistor, Inductor and Capacitor in electronic circuits, PN Junction diodes, Rectifier, Zener diode-Characteristics-Applications, Construction and characteristics of bipolar junction transistor (CC,CE & CB)-Applications.					
UNIT-V	DIGITAL ELECTRONICS				7
Review of number systems, Binary codes, Error detection and correction codes, Combinational logic Circuits, Representation of logic functions-SOP and POS forms, K-map representations, Minimization using K maps - Simple Problems.					
TOTAL: 45 PERIODS					

LAB COMPONENT:

15 PERIODS

1. Verification of ohms and Kirchhoff's Laws.
2. Load test on Single phase Transformer.
3. Load Test on 1Ø Induction Motor.
4. Characteristics of PN and Zener Diodes.
5. Characteristics of BJT.
6. Study of Logic Gates.

COURSE OUTCOMES

At the end of this course the students will be able to:

- CO1** Explain circuit's behavior using circuit laws and analyze the mesh analysis and nodal analysis.
- CO2** Analyze the Magnetic circuits, earthing and wiring.
- CO3** Understand the working principle and applications of electrical machines.
- CO4** Aanalyze the characteristics of analog electronic devices.
- CO5** Explain the basic concepts of digital electronics.

TEXT BOOKS:

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020.
2. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019.
3. James A Svoboda, Richard C. Dorf, Dorf's Introduction to Electric Circuits, Wiley, 2018.
4. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

REFERENCE BOOKS:

1. Muhammad H.Rashid, "Spice for Circuits and electronics", 4th Edition., Cengage India, 2019.
2. Thomas L. Floyd, 'Electronic Devices', 10th Edition, Pearson Education, 2018.
3. John Bird, "Electrical Circuit theory and technology", Routledge; 2017.
4. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

E-RESOURCES:

1. NPTEL-Online Courses and Video lectures: <https://nptel.ac.in/>

CO's - PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	1	-	3	2	1
CO2	3	3	2	2	-	-	-	-	-	1	-	3	3	2
CO3	3	3	3	3	-	-	-	-	-	1	-	3	3	3
CO4	3	3	3	3	-	-	-	-	-	1	-	3	3	3
CO5	3	3	3	2	-	-	-	-	-	1	-	3	3	3
AVG	3	2.8	2.4	2.2	-	-	-	-	-	1	-	3	2.8	2.4

1 - low, 2 - medium, 3 - high, '-' - no correlation


Chairman
BoS / EEE

25CSI21
SDG No: 4, 8, 9, 10,17

PYTHON PROGRAMMING
 (Common to: B.E. / B.Tech. all Branches)

L	T	P	C
3	0	2	4

COURSE OBJECTIVES:

- To understand the basics of python data types and operators
- To learn to solve problems using Python conditionals and loops.
- To define Python , lists, tuples, dictionaries to represent complex data .
- To define python function and use function calls to solve problems.
- To develop python program using modules and files.

UNIT-I

PYTHON FUNDAMENTALS

9

Python Interpreter and Interactive Mode --Variables - Immutable variables - Data types - Tokens - Keywords - Operators - Python Reserved Words Statements - Indentation - Understanding error messages

UNIT-II

STRING AND CONTROL FLOW

9

Strings - Single-quote, double quote and multi-line strings - String Operations (Concatenation, Repetition, Indexing, Slicing, Splitting and Joining) Control Flow - If/Else Statements - for, while statements - Range () function - break and continue statement.

UNIT-III

LIST, TUPLES, DICTIONARIES

9

Lists - list operations - list slices - list methods - list loop - Tuples - assignment - tuple operations - Dictionaries - Operations and Methods in Dictionary - Looping and Dictionaries.

UNIT-IV

FUNCTIONS

9

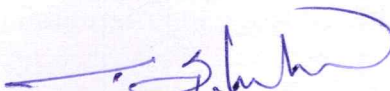
Functions- Elements of User Defined Functions - Fruitful Functions - Parameters and Arguments - Lambda Functions or Anonymous Functions - Scope - Function Composition

UNIT-V

MODULES AND FILES

9

Modules: Standard Modules - OS and SYS modules - User defined Modules - Importing modules - Writing into a File - Reading from a File - File Methods


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TOTAL : 45 PERIODS

PRACTICAL EXERCISES:

List of Experiments

1. Python programming using simple Input/Output statements and data types.
2. Implement a python program using Operators.
3. Implementing programs using Strings.
4. Develop a python program using String operations.
5. Scientific problems using Decision making statements.
6. Develop a python program using Looping statements.
7. Create real-time applications using Lists
8. Applications using Tuples.
9. Develop real-time applications using Dictionaries.
10. Program using user defined functions.
11. Develop a python program using Lambda function.
12. Computations using NumPy functions.
13. Develop applications using File handling techniques.
14. Implement programs using written modules and Python Standard Libraries.

TOTAL : 30 PERIODS

TOTAL : 75(45+30) PERIODS

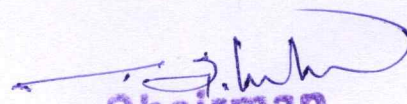
COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1 :** Understand and use the Python interpreter and IDE for writing, running, and debugging code using data types and operators.
- CO2 :** Write simple Python programs using conditionals and loops for solving problems.
- CO3 :** Decompose a Python program using Python lists, tuples, dictionaries etc.
- CO4 :** Decompose a Python program into functions.
- CO5 :** Read and write data from/to files in Python programs and perform mathematical and scientific calculations using the math modules.

TEXT BOOKS:

- 1.R. G. Dromey "How to Solve it by Computer", Pearson Education., 2024.
- 2.Robert Sedgewick "Introduction to Programming in Python", Pearson Education., 2024.


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REFERENCE BOOKS:

1. John V. Guttag "Introduction to Computation and Programming using Python", The MIT press., 2016.
2. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.

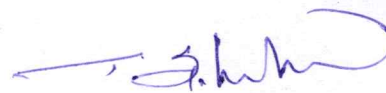
E-RESOURCES:

1. <https://www.python.org/>

CO's - PO's & PSO's MAPPING

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	2	2	2	2	2	2	3	3	3
CO2	2	3	3	3	2	2	2	2	2	2	2	3	3	3
CO3	2	2	3	2	2	2	2	2	2	1	2	3	3	3
CO4	1	2	3	3	1	2	2	2	2	1	2	2	3	3
CO5	2	2	3	3	2	2	2	2	2	1	2	2	3	3
AVG	1.8	2.4	3	2.8	1.8	2	2	2	2	1.4	2	2.6	3	3

1 - low, 2 - medium, 3 - high, '-' - no correlation


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25MEI21	ENGINEERING GRAPHICS	L	T	P	C
SDG No.	(Common to B.E. - Civil, CSE, Mech, BME, CSE(CS),	3	0	2	4
4, 9, 11	CSE(AIML) & B.Tech. - BT, IT, PT, AIDS)				

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Construct standard plane curves and geometrical shapes used in engineering applications
- Draw and interpret projections of points, lines, and plane surfaces using first angle projection method
- Visualize and draw projections of basic solids and model them using CAD software
- Perform sectioning of solids and development of lateral surfaces for practical engineering applications using manual and CAD method
- Convert pictorial and isometric views into orthographic projections through freehand sketching and CAD practice

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications and education - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT-I PLANE CURVES

9

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method

Construction of cycloid — Construction of involutes of square and circle.

UNIT-II PROJECTION OF POINTS, LINES AND PLANE SURFACE

9

Principal Planes - First angle projection - Projection of points - Projection of straight lines inclined to both the principal planes by rotating line method.

Projection of planes inclined to both the principal planes by rotating object method.

UNIT-III PROJECTION OF SOLIDS

9+10

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

Practical: Projection of prisms, pyramids, cylinder and cone using CAD software for innovation in engineering design.

UNIT-IV PROJECTION OF SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

9+10

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other.

Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

Practical: Projection of sectioning of above solids and Development of lateral surfaces of simple and sectioned solids using CAD software.

UNIT-V ORTHOGRAPHIC PROJECTION

9+10

Orthographic projection- Freehand sketching of multiple views from pictorial views of objects used in urban planning and engineering applications.

Practical: Orthographic projections from given isometric and pictorial views of simple objects using CAD software to enhance learning opportunities.

TOTAL : 75 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Create standard plane curves and geometrical shapes used in engineering applications
CO2: Produce and interpret projections of points, lines, and plane surfaces using the first angle projection method
CO3: Generate projections and CAD models of basic engineering solids
CO4: Execute sectional views and surface developments of solids using appropriate manual and CAD techniques
CO5: Analyze pictorial and isometric views to generate complete and accurate orthographic projections

TEXT BOOKS:

1. K Venugopal, Engineering Drawing and Graphics, Sixth edition, New Age International, 2013.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

REFERENCE BOOKS:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edit ion, 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.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.

E-RESOURCES:

1. <https://archive.nptel.ac.in/courses/112/102/112102304/>
2. https://onlinecourses.nptel.ac.in/noc20_me79/preview
3. <https://www.youtube.com/watch?v=ANEvQyt3PnU>

CO's - PO's & PSO's MAPPING

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

1 - low, 2 - medium, 3 - high, '-' - no correlation

25TAT21
SDG No. 2, 4, 6, 9, 11

தமிழரும் தொழில்நுட்பமும்
(B.E./B.Tech- அனைத்து பாடப்பிரிவுகளுக்கும்
பொதுவானது)

L T P C
1 0 0 1

பாடநெறி நோக்கங்கள்:

- நெசவு மற்றும் பானைத்தொழில்நுட்பத்தைப் புரிந்து கொள்ளுதல்
- சேர, சோழ, பல்லவ மற்றும் நாயக்கர்களின் வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பத்தை ஒப்பிடுதல்
- தமிழர்களின் பல்வேறு உற்பத்தி தொழில்நுட்பத்தைப் பற்றிய அறிவைப் பெறுதல்
- தமிழர்களின் வேளாண்மை மற்றும் கடல்சார் அறிவைப் பெற்றுக்கொள்ளுதல்
- அறிவியல் தமிழையும் அதன் இணையப்பயன்பாட்டையும் கற்றல்

அலகு - I நெசவு மற்றும் பானைத் தொழில்நுட்பம் 3
சங்க காலத்தில் நெசவுத்தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு - II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப்பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரம் சிற்பங்களும் கோவில்களும் - சோழர் காலத்து பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை

அலகு - III உற்பத்தித் தொழில்நுட்பம் 3
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

அலகு - IV

வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம்

3

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குழுவித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்

அலகு - V

அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்

3

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

மொத்தம்: 15 பாடவேளைகள்

பாடநெறி முடிவுகள் :

இப்பாடத்தைப் படிப்பதின் முடிவில் மாணவர்கள்

- C01: நெசவு மற்றும் பாணைத்தொழில்நுட்பத்தை பற்றிப் புரிந்துகொள்வார்கள்
C02: வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பத்தில் தமிழர்களின் அறிவைப் பெறுவார்கள்
C03: தமிழர்களின் உற்பத்தி தொழில்நுட்பத்தை கண்டறிவார்கள்
C04: தமிழர்களின் வேளாண்மை மற்றும் கடல்சார் அறிவைக் குறித்து விவாதிப்பார்கள்.
C05: பல்வேறு இணையப் பயன்பாடுகளில் அறிவியல் தமிழைப் பயன்படுத்திப்பார்ப்பார்கள்

மின் -ஆதாரங்கள்:

1. <https://www.tamilvu.org/>
2. <https://sorkuvai.com/>

CO's -PO's விவரணையாக்கம்:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	1	-	-	-	-	1	1	1	1	-	1
C02	2	-	-	-	-	2	2	2	2	-	2
C03	2	-	-	-	-	2	2	2	2	-	2
C04	1	-	-	-	-	1	1	1	1	-	1
C05	2	-	-	-	-	2	2	2	2	-	2
AVG	2	-	-	-	-	2	2	2	2	-	2

SVHEC-R 2025

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25TAT21	TAMILS AND TECHNOLOGY	L	T	P	C
SDG No. 2, 4, 6, 9, 11	(Common to B.E./B. Tech. all branches)	1	0	0	1

COURSE OBJECTIVES:

- To understand about weaving and ceramic technology of Tamils
- To compare the design and constructive technology of Cheras, Cholas, Pallavas and Nayakkars
- To gain knowledge in various manufacturing technology of Tamils
- To analyse the agriculture and fishery knowledge of Tamils
- To learn about scientific Tamil and its usage in online platforms

UNIT-I	WEAVING AND CERAMIC TECHNOLOGY	3
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Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT-II	DESIGN AND CONSTRUCTION TECHNOLOGY	3
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Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT-III	MANUFACTURING TECHNOLOGY	3
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Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT-IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3
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Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompur of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries - Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society

UNIT-V	SCIENTIFIC TAMIL & TAMIL COMPUTING	3
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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 PERIODS

SVHEC-R 2025


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COURSE OUTCOMES:

At the end of the course the student will be able to

- C01:** Relate the weaving ceramic technology of Tamils
C02: Understand the knowledge of Tamils in design and construction technology
C03: Recognize the manufacturing technology knowledge of Tamils
C04: Criticize the agriculture and fishery knowledge of Tamils
C05: Apply scientific Tamil in Various online platforms

E- RESOURCES:

1. <https://www.tamilvu.org/>
2. <https://sorkuvai.com/>

CO's -PO's MAPPING:

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011
C01	1	-	-	-	-	1	1	1	1	-	1
C02	2	-	-	-	-	2	2	2	2	-	2
C03	2	-	-	-	-	2	2	2	2	-	2
C04	1	-	-	-	-	1	1	1	1	-	1
C05	2	-	-	-	-	2	2	2	2	-	2
AVG	2	-	-	-	-	2	2	2	2	-	2

25MEL21

SDG No.

4, 7, 9, 12

VISION CREATION LAB

(Common to B.E MECH and CIVIL)

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- Identify the problem statement of the customers.
- Understand the needs of the customers.
- Draw upon, interpret, and weight all the findings.
- Generate as many different ideas as possible and visualize them.
- Develop a prototype of ideas and test them.

LIST OF ACTIVITIES

Design Thinking is human-centered problem-solving tool which emphasize on empathy, collaboration, co-creation and stakeholder feedback to unlock creativity and innovation, to devices feasible and viable, idea/solutions.

Note: Each activity must use one or two design thinking tools from each phases for assessment.

S.No	Activities	Sugesstion tools	Name of the tools
1	Introduction Overview of design thinking, Design thinking phases and tools.(6 hours)	Text book	1. Problem statements 2. Design Principles 3. Question 5x Why 4. Stakeholder Map
2	Understanding phase Learning about the users, their needs, problems, and experiences. (10 hours)	Dt 1 - 08	5. 5Wh questions 6. Interview for Empathy 7. Extreme & Lead User 8. Emotional Response Cards
3	Observe phase Observe the behavior, problems, and needs without interference (10 hours)	Dt 09 - 14	9. Empathy Map 10. Persona & User Profile 11. Analysis-Question-BUILDER 12. Customer Journey Map
4	Define phase Involves analyzing user research data and organize research findings. (10 hours)	Dt 15 - 19	13. AEIOU 14. Peers Observing Peers 15. HMW-question 16. Storytelling 17. Context Mapping
5	Ideate phase Generate ideas through the phase and review the idea. (10 hours)	Dt 20 - 23	18. Define Success 19. Critical Items Diagram 20. Brainstorming 21. 2x2 Matrix
6	Prototype & Test Phase Importance of prototype and testing in design thinking -create simple and scale down version of prototype (10 hours)	Dt 24 - 30	22. 6-3-5-Methode 23. Analogien & Benchmarking 24. Exploration Map 25. Prototype to Test 26. Service Blueprint 27. MVP
7	Report Submission (4 hours)		28. Testing Sheet 29. Feedback-Capture-Grid 30. Experience Testing

Case studies:

Students are required to acquire knowledge of Design Thinking tools and apply these concepts using case studies such as

Renewable Energy Based Automation System, Advanced Hybrid Manufacturing System, Temperature Based Smart Control System, AI-Based Industrial Monitoring System, Energy Recovery and Efficiency System, Digital Support System for Agriculture, Sustainable Electric Mobility System and other applications promoting sustainable practices..

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Getting customer insights and appropriate problem statement.

CO2 : Observe the customer pains and gains to have better understanding.

CO3 : Develop a point of view from the various insights gathered and write a problem Statement.

CO4 : Ideate and develop innovative solution to the customer problem.

CO5 : Create a prototype as a solution base and test the same.

TEXT BOOKS:

1. The Design Thinking Playbook, Michael Lewrick, Patrick Link, Larry Leifer, Wiley, 2018.
2. Thinking: A Comprehensive Textbook, Shalini Rahul Tiwari (Author), Rohit Rajendra Swarup (Author), First Edition, Wiley, 2024.

REFERENCE BOOKS:

1. Design Thinking for dummies, Chrisian Muller- Roterberg, Willey, 2020.
2. Design Thinking: A Hands-on Approach, Chandramouli Subramanian, Thiagarajan Paramasivan, Sankaran Venkataramani, Atlantic, 2025.

E-RESOURCES

1. DT-Tools- <https://en.dt-toolbook.com/tools-eng>
2. https://onlinecourses.swayam2.ac.in/aic23_ge17/unit?unit=9&lesson=13
3. <https://archive.nptel.ac.in/courses/110/106/110106124/>

CO's - PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	1	2	1	2	2	1	3	2	2
CO2	3	2	2	3	3	2	2	1	3	2	1	3	2	2
CO3	3	3	2	3	3	2	2	3	3	2	1	3	2	2
CO4	3	3	3	3	3	2	3	3	2	2	2	3	2	2
CO5	3	3	3	3	3	2	2	3	2	2	1	3	2	2
AVG	3	2.6	2.4	3	3	2	2.2	2.2	2.4	2	1.2	3	2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

g. Raveer
Chairman
BoS / Mech

Shree Venkateshwara Hi-Tech Engineering College (Autonomous)

25MAT32 SDG NO.4,8,9,17	TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS (for B.E. CIVIL, MECH, BME & B.TECH BIO-TECH, PT)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To introduce the basic concepts of PDEs for solving standard partial differential equations.
- To introduce Fourier series analysis, which is central to many engineering applications apart from its use in solving boundary value problems.
- To acquaint students with Fourier series techniques used in solving heat flow problems in various situations
- To acquaint students with Fourier transform techniques used in wide variety of situations
- To introduce effective mathematical tools for solving partial differential equations that model several physical processes and for developing Z-transform techniques for discrete- time systems.

UNIT-I **PARTIAL DIFFERENTIAL EQUATIONS** **9+3**

Formation of partial differential equations – Solutions of standard types of first order partial differential equations - Lagrange's linear equation

UNIT-II **FOURIER SERIES** **9+3**

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

UNIT-III **APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS** **9+3**

Classification of PDE – Method of separation of variables - Fourier series solutions of one-dimensional wave equation – One dimensional equation of heat conduction

UNIT-IV **FOURIER TRANSFORM** **9+3**

Statement of Fourier integral theorem– Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions

UNIT-V **Z - TRANSFORMS AND DIFFERENCE EQUATIONS** **9+3**

Z-transforms - Elementary properties – Initial and final value theorems - Inverse Z-transform using partial fraction and convolution theorem - Formation of difference equations – Solution of difference equations using Z – transforms

TOTAL : 60 PERIODS


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COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

- C01:** Understand how to solve the given standard partial differential equations.
- C02:** Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- C03:** Appreciate the physical significance of Fourier series techniques in solving one dimensional heat flow problems and one-dimensional wave equations
- C04:** Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering
- C05:** Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2023.
2. Kreyszig E, "Advanced Engineering Mathematics", 10th Edition, John Wiley, New Delhi, India, 2023.

REFERENCE BOOKS:

1. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 10th Edition, Laxmi Publications Pvt. Ltd, 2021.
2. James. Glyn., "Advanced Modern Engineering Mathematics", 5th Edition, Pearson Education, New Delhi, 2018.
3. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.
4. Wylie. R.C. and Barrett. L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc24_ma37/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma20/preview

CO's - PO's MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	3	3	1	1	-	-	-	2	-	-	3
C02	3	3	1	1	-	-	-	2	-	-	3
C03	3	3	1	1	-	-	-	2	-	-	3
C04	3	3	1	1	-	-	-	2	-	-	3
C05	3	3	1	1	-	-	-	2	-	-	3
Avg	3	3	1	1	-	-	-	2	-	-	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

25MET31
SDG No.
9, 11

ENGINEERING MECHANICS

L	T	P	C
3	1	0	4

Course Objectives:

The main learning objective of this course is to prepare the students to:

- To Learn the use scalar and vector analytical techniques for analyzing forces in statically determinate structures
- To introduce the equilibrium of rigid bodies, vector methods and free body diagram
- To study and understand the distributed forces, surface, loading on beam and intensity.
- To learn the principles of friction, forces and to determine and apply the concepts of frictional forces at the contact surfaces of various engineering systems.
- To develop basic dynamics concepts – force, momentum, work and energy

UNIT-I BASICS AND STATICS OF PARTICLES 9+3

Introduction – Units and Dimensions – Laws of Mechanics – Statics of Particles - Forces in a Plane, Resultant of Forces, Resolution of A Force into Components, Rectangular Components of a Force, unit vectors. Equilibrium of a particle- newton's first law of motion, Space and Free-Body Diagrams, forces in space, equilibrium of a particle in space.

UNIT-II EQUILIBRIUM OF RIGID BODIES 9+3

Free body diagram – Types of supports –Action and reaction forces –Stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force - Equilibrium of Rigid bodies in two dimensions – Analysis of trusses using method of joints for resilient infrastructure - Equilibrium of Rigid bodies in three dimensions.

UNIT-III PROPERTIES OF SURFACES AND SOLIDS 9+3

Determination of Areas and Volumes – First moment of area and Centroid of sections – T section- I section- Angle section Hollow section from primary simpler sections – Second moment of plane areas – Parallel axis theorem and Perpendicular axis theorem – T section - I section- Angle section- Hollow section – Polar moment of Inertia – Product of Inertia- Principal Moment of Inertia of plane area- Mass moment of inertia

UNIT-IV FRICTION 9+3

The laws of dry friction, coefficients of friction, angles of friction, wedge friction, wheel friction, rolling resistance, ladder friction.

UNIT-V DYNAMICS OF PARTICLES 9+3

Kinematics - rectilinear motion and curvilinear motion of particles. Kinetics- newton's second law of motion -equations of motions, Dynamic equilibrium, energy and momentum methods - work of a force, Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact of bodies for innovation in engineering design.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1: Illustrate the vector and scalar representation of forces and moments
- CO2: Analyse the rigid body in equilibrium
- CO3: Evaluate the properties of distributed forces
- CO4: Determine the friction and the effects by the laws of friction
- CO5: Calculate dynamic forces exerted in rigid body

TEXT BOOKS:

- Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, "Vector Mechanics for Engineers: Statics and Dynamics", McGraw Higher Education., 13thEdition, 2025.
- Kumaravelan R. and Yugananth P., "Engineering Mechanics", 2nd Edition, Scitech Publications, 2015.
- Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

REFERENCE BOOKS:

- D.Mohan Raj, S. Karuppusamy, C. Venkatesh, Dr. M. Arun "Engineering Mechanics, 1st edition,Quill Tech Publications, 2024
- Hibbeller, R.C., "Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics", 13th edition,Prentice Hall, 2013.
- Timoshenko S, Young D H, Rao J V and SukumarPati, "Engineering Mechanics", 5thEdition, McGraw HillHigher Education, 2013.
- Kottiswaran N., "Engineering Mechanics Statics and Dynamics", 10th Edition, Sri Balaji Publications Pvt.Ltd., 2013.

E-RESOURCES:

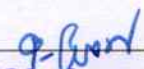
- <https://nptel.ac.in/courses/112106180>
- <https://www.youtube.com/watch?v=nGfVTNfNwnk>

CO's - PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	-	-	-	-	-	-	3	2	-
CO2	3	2	2	1	1	-	-	-	-	-	-	2	2	2
CO3	3	2	3	1	1	-	-	-	-	-	-	3	2	3
CO4	3	2	3	1	1	-	-	-	-	-	-	3	3	3
CO5	3	2	3	1	1	-	-	-	-	-	-	3	3	3
Avg	3	2	2.6	1	1	-	-	-	-	-	-	2.8	2.4	2.8

1 - low, 2 - medium, 3 - high, '-' - no correlation

SVHEC-R2025


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BoS / Mech

25MET32
SDG No. 7,9,12

ENGINEERING THERMODYNAMICS

L T P C
3 1 0 4

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Apply Zeroth and First Law to closed and open systems
- Analyse thermal devices using Second Law and entropy
- Evaluate steam properties using steam tables and Mollier chart
- Compute properties of ideal and real gases
- Calculate properties of gas mixtures and property changes

UNIT-I BASICS, ZEROTH AND FIRST LAW 9+3

Review of Basics – Thermodynamic systems, Properties and processes Thermodynamic Equilibrium - Displacement work - P-V diagram. Thermal equilibrium - Zeroth law – Concept of temperature and Temperature Scales. First law – application to closed and open systems –Energy steady and unsteady flow processes.

UNIT-II SECOND LAW AND ENTROPY 9+3

Heat Engine – Refrigerator - Heat pump. Statements of second law and their equivalence & corollaries. Carnot cycle - Reversed Carnot cycle – Efficiency Performance - Clausius inequality. Concept of entropy - T-s diagram - Tds Equations - Entropy change for a pure substance.

UNIT-III AVAILABILITY AND APPLICATIONS OF II LAW 9+3

Ideal gases undergoing different processes - principle of increase in entropy. Applications of II Law. High-and low-grade energy- Conservation. Availability and Irreversibility for open and closed system processes - I and II law Efficiency

UNIT-IV PROPERTIES OF PURE SUBSTANCES 9+3

Steam - formation and its thermodynamic properties - p-v, p-T, T-v, T-s, h-s diagrams. PVT surface. Determination of dryness fraction. Calculation of work done and heat transfer in non-flow and flow processes using Steam Table and Mollier Chart-Industry.

UNIT-V GAS MIXTURES AND THERMODYNAMIC RELATIONS 9+3

Properties of Ideal gas, real gas - comparison. Equations of state for ideal and real gases. vander Waal's relation - Reduced properties - Compressibility factor - Principle of Corresponding states - Generalized Compressibility Chart. Maxwell relations - Tds Equations - heat capacities relations - Energy equation, Joule- Thomson experiment - Clausius-Clapeyron equation.

Total Hours: 60

COURSE OUTCOME

At the end of the course the students would be able to

- CO1** Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems.
- CO2** Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations.
- CO3** Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart

- CO4** Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations.
- CO5** Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.

TEXT BOOKS:

1. Nag .P.K., "Engineering Thermodynamics", 6th Edition, Tata McGraw Hill (2017), New Delhi.
2. Natarajan, E., "Engineering Thermodynamics: Fundamentals and Applications", 2nd Edition (2014), Anuragam Publications, Chennai.
3. Cengel, Y and M. Boles, Thermodynamics - An Engineering Approach, Tata McGraw Hill, 9th Edition, 2019.

REFERENCE BOOKS:

1. Chattopadhyay, P, "Engineering Thermodynamics", 2nd Edition Oxford University Press, 2016.
2. Rathakrishnan, E., "Fundamentals of Engineering Thermodynamics", 2nd Edition, Prentice Hall of India Pvt. Ltd, 2006.
3. Claus Borgnakke and Richard E. Sonntag, "Fundamentals of Thermodynamics", 10th Edition, Wiley Eastern, 2019.
4. Venkatesh. A, "Basic Engineering Thermodynamics", Universities Press (India) Limited, 2007.

E-RESOURCES:

1. <https://archive.nptel.ac.in/courses/112/106/112106310/>
2. <https://ocw.mit.edu/courses/5-60-thermodynamics-kinetics-spring-2008/pages/lecture-notes/>
3. <http://ndl.iitkgp.ac.in/document/Mk82ZERlbkovZWhUNGV2T3oxamN0UT09>

CO & PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	-	2	-	-	-	-	-	1	2	1	-
CO2	3	3	-	2	2	1	-	-	-	-	1	2	2	-
CO3	3	3	2	2	2	2	-	-	-	-	2	3	3	1
CO4	3	2	-	2	3	-	-	-	-	-	1	2	2	2
CO5	3	3	2	2	2	-	-	-	-	-	2	2	3	2
AVG	3.0	2.8	2.0	2.0	2.2	1.5	-	-	-	-	1.4	2.2	2.2	1.7

1 - low, 2 - medium, 3 - high, '-' - no correlation

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Chairman
BoS / Mech

25MET33

ENGINEERING MATERIALS AND METALLURGY

L T P C

SDG No.

3 0 0 3

8,9,12

Course Objectives:

The main learning objective of this course is to prepare the students to:

- To learn the Infrastructure of phase diagram and using of iron-iron carbide phase diagram for microstructure formation.
- To learn selecting and applying various heat treatment processes and its microstructure formation.
- To illustrate the different types of ferrous and non-ferrous alloys and their uses in engineering field.
- To illustrate the different polymer, ceramics and composites and their uses in Industrial field.
- To learn the various testing procedures and failure mechanism in engineering field.

UNIT-I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS

9

Constitution of alloys – Solid solutions, substitutional and interstitial – Infrastructure of Phase diagrams.

Iron – Iron carbide equilibrium diagram - Eutectic, Eutectoid, Peritectic, and Peritectoid reactions.

UNIT-II HEAT TREATMENT

9

Definition – Full annealing, stress relief, recrystallisation and spheroidising –normalizing, hardening and tempering of steel- Innovations in heat treatment processes.

Hardenability, Jominy end quench test -case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening.

UNIT-III FERROUS AND NON-FERROUS METALS

9

Effect of alloying additions on steel (Mn, Si, Cr, Mo, Ni, V, Ti & W) – stainless and tool steels – HSLA -Maraging steels – Grey, white, malleable, spheroidal – alloy cast irons.

Copper and its alloys – Brass, Bronze and Cupronickel – Aluminium and its alloys; Al-Cu – precipitation strengthening treatment – shape memory alloys- Properties and Industrial Applications.

UNIT-IV NON-METALLIC MATERIALS

9

Economic growth of Polymers – types of polymers, commodity and engineering polymers – Consumption and Production of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PAI, PPO, PEEK, PTFE, Thermoset polymers-Properties and advanced industrial applications.

Engineering Ceramics – Properties and applications of Al_2O_3 , SiC, Si_3N_4 , PSZ and SIALON – Composites- Matrix and reinforcement Materials-applications of Composites.

UNIT-V MECHANICAL METALLURGY

9

Mechanisms of plastic deformation, slip and twinning – Types of fracture – fracture mechanics- Griffith's theory.

Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), Impact test Izod and charpy, fatigue and creep failure mechanisms for Sustainable Material Selection.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Explain the Infrastructure of alloys, phase diagram and Iron-Iron carbon diagram..
- CO2:** Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes and its innovations.
- CO3:** Clarify the effect of alloying elements on ferrous and non-ferrous metals in industrial applications.
- CO4:** Summarize the properties and applications of non-metallic materials.
- CO5:** Explain the testing of mechanical properties and failure analysis for sustainable material selection.

TEXT BOOKS:

1. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 9th edition , 2018.
2. Sydney H.Avner, "Introduction to Physical Metallurgy", McGraw Hill Book Company, 2008.
3. Dr.V.Jayakumar, " Engineering Metallurgy", Lakshmi Publications, Twelfth edition, 2024.

REFERENCE BOOKS:

1. A. Alavudeen, N. Venkateshwaran, and J. T.Winowlinjappes, A Textbook of Engineering Materials and Metallurgy, Laxmi Publications, 2006.
2. Amandeep Singh Wadhwa, andHarvinder Singh Dhaliwal, A Textbook of Engineering Material and Metallurgy, University Sciences Press, 2008
3. G.S. Upadhyay and AnishUpadhyay, "Materials Science and Engineering", Viva Books Pvt.Ltd, New Delhi, 2020.
4. Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt.Ltd. 6th edition, 2019

E-RESOURCES:

1. <https://archive.nptel.ac.in/courses/113/102/113102080/>
2. <https://archive.nptel.ac.in/courses/112/104/112104203/>
3. <https://archive.nptel.ac.in/courses/113/105/113105099/>
4. <https://www.youtube.com/watch?v=uAKjmubJsJk>

CO's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	-	1	-	-	-	-	1	2	3	2	1
CO2	3	2	2	1	1	-	-	-	-	1	2	3	2	1
CO3	3	2	2	1	1	1	1	-	-	1	2	3	2	1
CO4	2	2	2	1	1	2	2	-	-	1	2	2	2	1
CO5	3	3	1	2	2	-	1	-	-	1	2	3	3	2
Avg	2.8	2.2	1.6	1.0	1.2	0.6	0.4	-	-	1.0	2.0	2.8	2.2	1.2

1 - low, 2 - medium, 3 - high, '-' - no correlation

25MET34

MANUFACTURING PROCESSES - I

L T P C

SDG No.

3 0 0 3

8, 9, 12

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Illustrate the working principles of various metal casting processes
- Learn and Apply the working principles of various metal joining processes
- Analyse the working principles of bulk deformation of metals
- Learn the working principles of sheet metal forming process
- Study and Practice the working principles of plastics molding

UNIT-I METAL CASTING PROCESSES

9

Sand Casting – Sand Mould – Type of patterns - Pattern Materials – Pattern allowances – Molding sand Properties and testing for Resource Efficiency – Cores – Types and applications – Molding machines – Types and applications for Sustainable Manufacturing – Melting furnaces – Principle of special casting processes for Sustainable Infrastructure.

Shell, investment – Ceramic mould – Pressure die casting – low pressure, gravity- high pressure die casting- Centrifugal Casting – CO2 casting – Defects in Sand casting process- remedies for Responsible Production and Industrial Growth.

UNIT-II METAL JOINING PROCESSES

9

Fusion welding processes – Oxy fuel welding – Filler and Flux materials--Arc welding, Electrodes, Coating and specifications – Gas Tungsten arc welding –Gas metal arc welding – Submerged arc welding – Electro slag welding–

Plasma arc welding –Processes -Electron beam welding –Laser beam Welding Friction welding – Friction stir welding – Diffusion welding – Thermit Welding, Weld defects – inspection & remedies

UNIT-III BULK DEFORMATION PROCESSES

9

Hot working and cold working of metals – Forging processes – Open, impression and closed die forging –cold forging- Characteristics of the processes – Typical forging operations

Rolling of metals – Types of Rolling – Flat strip rolling – shape rolling operations – Defects in rolled parts – Principle of rod and wire drawing – Tube drawing.

UNIT-IV SHEET METAL PROCESSES

9

Sheet metal characteristics – Typical shearing, bending and drawing operations for Resource Efficiency – Test methods – special forming processes - Working principle and applications for Sustainable Manufacturing.

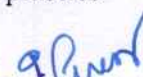
Hydro forming – Rubber pad forming – Metal spinning – Introduction of Explosive forming, magnetic pulse forming, peen forming, Super plastic forming – Micro forming – Incremental forming for Industrial Innovation and Advanced Manufacturing.

UNIT-V MANUFACTURE OF PLASTIC COMPONENTS

9

Types and characteristics of plastics – Molding of thermoplastics & Thermosetting polymers- working principles and typical applications – injection molding – Plunger and screw machines – Compression molding, Transfer Molding -Typical industrial applications – introduction to blow molding – Extrusion – Thermoforming – Bonding of Thermoplastics- duff moulding.

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TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Explain the principle of different metal casting processes
- CO2:** Describe the various metal joining processes.
- CO3:** Illustrate the different bulk deformation processes
- CO4:** Apply the various sheet metal forming process.
- CO5:** Apply suitable molding technique for manufacturing of plastics components

TEXT BOOKS:

1. Kalpakjian. S, "Manufacturing Engineering and Technology", Pearson Education India, 4th Edition, 2019.
2. P.N.Rao Manufacturing Technology Volume 1 Mc Grawhill Education 5th edition, 2018.
3. Hajra Choudhary S.K and Hajra Choudhury. AK., Elements of workshop Technology, volume I, Media promoters and Publishers Private Limited, Mumbai, 2025.

REFERENCE BOOKS:

1. Roy. A. Lindberg, Processes and materials of manufacture, PHI / Pearson education, 2021.
2. S. Gowri P.Hariharan, A.Suresh Babu, Manufacturing Technology I, Pearson Education, 2018.
3. Sharma, P.C., A Text book of production Technology, S.Chand and Co. Ltd., 2012.

E-RESOURCES:

1. <https://archive.nptel.ac.in/courses/112/107/112107145/#>
2. <https://archive.nptel.ac.in/courses/112/107/112107219/>
3. https://onlinecourses.nptel.ac.in/noc20_me67

CO's – PO's & PSO's MAPPING

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

1 - low, 2 - medium, 3 - high, '-' - no correlation

25ME131

FLUID MECHANICS AND MACHINERY

L T P C

SDG No.

3 0 2 4

6,7,9,11,12,13

Course Objectives:

The main learning objective of this course is to prepare the students :

- To understand the fundamental properties of fluids and analyze pressure measurement systems, buoyancy, and hydrostatic forces.
- To study fluid kinematics and dynamics principles and apply continuity and Bernoulli equations to fluid flow measurements.
- To analyze laminar and turbulent flow through pipes and evaluate frictional losses in pipe networks.
- To apply dimensional analysis techniques and similitude principles for model studies and engineering applications.
- To understand the construction, operation, performance characteristics, and testing of hydraulic turbines and pumps.

UNIT-I FLUID PROPERTIES AND PRESSURE MEASUREMENTS

9

Definitions - Fluid Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension, capillarity, vapour pressure, cavitation -

Pressure measurement-manometry, buoyancy, stability of floating bodies, forces on submerged bodies.

UNIT-II FLUID KINEMATICS AND DYNAMICS

9

Types of fluid flow application of continuity equation, Continuity equations in Cartesian coordinates.

Euler's equation of motion along streamline, Bernoulli's equation, and its applications- Orifice meter, Venturimeter, Roto meter, Pitot tube.

UNIT-III FLOW THROUGH PIPES

9

Laminar flow through circular pipes - Hagen Poiseuille equation - Boundary layer concept- Turbulent flow through circular pipes.

Darcy Weisbach equation -friction factor - Moody diagram - Energy losses, pipes in series and parallel.

UNIT-IV DIMENSIONAL ANALYSIS

9

Need for dimensional analysis methods of dimensional analysis Buckingham's II-theorem, Dimensionless parameters.

Application of dimensionless parameters. Models and Similitude - Model laws.

UNIT-V HYDRAULIC TURBINES AND PUMPS

9

Hydraulic turbines-classification and working principle. Pelton wheel turbine -Francis turbine-Kaplan turbine.

Centrifugal pumps-working principle work done by the impeller performance curves Reciprocating pump- working principle.

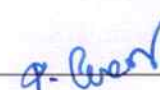
TOTAL : 45 PERIODS

LIST OF EXPERIMENTS: (30 PERIODS)

1. Determination of the Coefficient of Discharge of a Venturimeter.
2. Measurement of Flow Rate Using a Rotameter.
3. Determination of Friction Factor for Flow Through Pipes.
4. Performance Test on a Centrifugal Pump and Drawing of Characteristic Curves.
5. Performance Test on a Reciprocating Pump and Drawing of Characteristic Curves.
6. Performance Test on a Pelton Wheel Turbine and Drawing of Characteristic Curves.

TOTAL : 75 PERIODS.

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COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1: Explain fluid properties and determine pressure, buoyancy, stability, and hydrostatic forces acting on submerged and floating bodies
- CO2: Apply continuity, Euler's, and Bernoulli's equations to analyze fluid flow and evaluate the performance of flow measuring devices.
- CO3: Analyze laminar and turbulent pipe flows and estimate frictional and energy losses in pipe systems.
- CO4: Apply Buckingham's π -theorem, dimensional analysis, and similitude concepts to develop dimensionless parameters and model laws.
- CO5: Evaluate the performance characteristics and efficiencies of hydraulic turbines and pumps through theoretical and experimental analysis.

TEXT BOOKS:

1. Bansal R.K. "Fluid Mechanics and Hydraulic Machines", 9th revised Edition, 2023, Laxmi Publications,
2. Modi P.N. and Seth, S.M. Hydraulics and Fluid Mechanics, 22nd edition, 2019, Standard Book House, New Delhi,.
3. Kumar K. L., Engineering Fluid Mechanics, 2016, Eurasia Publishing House(p) Ltd. New Delhi.

REFERENCE BOOKS:

1. Fox W.R. and McDonald A.T., Introduction to Fluid Mechanics John-Wiley and Sons, Singapore, 2021.
2. Pani B S, Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.
3. Cengel Y A and Cimbala J M, Fluid Mechanics, McGraw Hill Education Pvt. Ltd., 2018.
4. S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2021.
5. Streeter, V. L. and Wylie E. B., Fluid Mechanics, McGraw Hill Publishing Co., 2017.

E-RESOURCES:

1. <https://nptel.ac.in/courses/112104118>
2. <https://egyankosh.ac.in/handle/123456789/31951>
3. <https://archive.nptel.ac.in/courses/112/105/112105206>

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	1	-	-	-	-	-	-	3	2	-
CO2	3	3	2	2	2	-	-	-	-	-	-	3	3	-
CO3	3	3	2	2	2	-	-	-	-	-	-	3	3	-
CO4	2	3	2	3	2	-	-	-	-	-	-	2	3	1
CO5	3	3	2	3	3	-	-	-	-	-	-	3	3	2
Avg	2.8	2.8	2	2.5	2	-	-	-	-	-	-	2.8	2.8	1.5

1 - low, 2 - medium, 3 - high, '-' - no correlation

25MEL31
SDG No. 4,8,9

COMPUTER AIDED MACHINE DRAWING LABORATORY

L	T	P	C
0	0	4	2

Course Objectives:

At the end of the course the students would be able to

1. Acquire proficiency in 2D drafting and 3D modeling software, emphasizing practical skills.
2. Apply standard drawing practices, focusing on fits and tolerances in engineering design.
3. Create assembly drawings through both manual techniques and standard CAD packages.
4. Prepare standardized drawing layouts for modeled parts and assemblies.
5. Utilize CAD tools for precise documentation and effective communication in the design process.

PART-I DRAWING STANDARDS & FITS AND TOLERANCES

12

Code of practice for Engineering Drawing, BIS specifications – Welding symbols, riveted joints, keys, fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keys etc. supporting industrial standardization - Limits, Fits – Tolerancing of individual dimensions IS919- Specification of Fits – Preparation of production drawings and reading of part and assembly drawings, basic principles of Geometric Dimensioning & Tolerancing for quality engineering practices.

PART-II 2D DRAFTING

48

Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed Drawing using modern drafting practices for technical skill development.

1. Bearings – Bush Bearing,
2. Couplings – Flange, Oldham's, Muff, Gear couplings.
3. Joints – Universal, Knuckle, Gib & Cotter, Strap, Sleeve & Cotter joints.
4. Engine parts – Piston, Connecting Rod, Crosshead (vertical and horizontal), Stuffing box, multi-plate clutch.
5. Machine Components – Screw Jack, Machine Vice, Lathe Tail Stock and Plummer Block.

Total: 20% of classes for theory and 80% of classes for practice to strengthen technical competency and professional skills.

Note: 25% of assembly drawings must be done manually and remaining 75% of assembly drawings must be done by using any CAD software. The above tasks can be performed manually and using standard commercial 2D CAD software.

TOTAL : 60 PERIODS

COURSE OUTCOME

At the end of the course the students would be able to

- C01** Prepare standard drawing layouts for machine components and assemblies using engineering drawing conventions.
- C02** Generate precise orthographic and sectional views of machine components using CAD software.
- C03** Develop production and assembly drawings incorporating dimensions, fits, tolerances, and GD&T principles.
- C04** Prepare assembly drawings with Bills of Materials (BoM) for effective engineering documentation.
- C05** Apply CAD drafting techniques to create industry-standard drawings of mechanical components and assemblies.

TEXT BOOKS:

1. Gopalakrishna K.R., "Machine Drawing", 23th Edition, Subhas Stores Books Corner, Bangalore, 2017.
2. N. D . Bhatt and V.M. Panchal, "Machine Drawing", 51st Edition, Charator Publishers, 2022.
3. Goutam Pohit and Goutam Ghosh, "Machine Drawing with AutoCAD", 1st Edition reprinting, Pearson Education, 2014.

REFERENCE BOOKS:

1. Jun narkar, N.D., "Machine Drawing", 1st Edition reprint, Pearson Education, 2014.
2. N. Siddeshwar, P. Kanniah, V.V.S. Sastri, "Machine Drawing", published by Tata McGrawHill, 2017.
3. S. Trymbaka Murthy, "A Text Book of Computer Aided Machine Drawing", CBS Publishers, New Delhi, 2016.

E-RESOURCES:

1. https://nptel.ac.in/courses/112103019?utm_source=chatgpt.com
2. https://www.youtube.com/watch?v=e03iGD_eq4g
3. <https://www.youtube.com/watch?v=yMKPxo8NtT8>

CO's – PO's& PSO's MAPPING

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

1 - low, 2 - medium, 3 - high, '-' - no correlation

P. Chari
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BoS / Mech

25MET41

SDG No.

7,8,9,12

HYDRAULICS AND PNEUMATICS

L	T	P	C
3	0	0	3

Course Objectives:

The main learning objective of this course is to prepare the students to:

- To provide the knowledge on the working principles of fluid power systems
- To study the fluids and components used in modern industrial fluid power system.
- To develop the design, construction and operation of fluid power circuits.
- To learn the working principles of pneumatic power system and its components.
- To provide the knowledge of trouble shooting methods in fluid power systems.

UNIT-I FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS 9

Introduction to Fluid power – Advantages and Applications – Fluid power systems – Types of fluids - Properties of fluids and selection in industrial automation– Basics of Hydraulics – Pascal's Law – Principles of flow.

Sources of Hydraulic power: Pumping Theory- Pump Classification – Construction, Working, Design, Advantages, Disadvantages, Performance, Pump selection and maintenance.

UNIT-II HYDRAULIC ACTUATORS AND CONTROL COMPONENTS 9

Hydraulic Actuators: Cylinders – Types and construction, Energy-Efficient Applications, Hydraulic Cushioning for Energy Conservation– Rotary Actuators.

Control Components: Direction Control, Flow control and pressure control valves – Types, Construction and Operation– Accessories: Reservoirs– Filters –types and selection for Sustainable Hydraulic Fluid Management- Applications – Fluid Power ANSI Symbols.

UNIT-III HYDRAULIC CIRCUITS AND SYSTEMS 9

Accumulators, Intensifiers, Hydraulic circuits enhanced Industrial Productivity – Regenerative, Pump Unloading, Pressure Intensifier, Air-over oil, Sequence, Fail-Safe, Speed Control.

Hydrostatic transmission, Electro hydraulic circuits – Mechanical hydraulic servo systems- Applications for Sustainable Manufacturing and Industrial Growth.

UNIT-IV PNEUMATIC AND ELECTRO PNEUMATIC SYSTEMS 9

Properties of air –Air preparation and distribution – Filters, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust Valves, Pneumatic actuators for advanced manufacturing applications-Design of Smart Pneumatic Circuits.

Cascade method –Electro Pneumatic System for Industrial Automation– Ladder diagram – Timer circuits - Introduction to fluidics in Modern Industrial Infrastructure.

UNIT-V TROUBLE SHOOTING AND APPLICATIONS 9

Installation, Selection, Efficient Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Conditioning, Recycling and Sustainable Management of Hydraulic Fluids.

Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding and Press and Forklift applications– Low-cost Automation –Hydraulic and Pneumatic Power Packs.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1: Apply the working principles of fluid power systems and hydraulic pumps for energy-efficient fluid power applications.
- CO2: Apply the working principles of hydraulic actuators and control components to enhance safe, productive, in industrial operations.
- CO3: Design and develop innovative hydraulic circuits and systems for advanced industrial automation and sustainable infrastructure.
- CO4: Apply the working principles of pneumatic circuits and power system and its components.
- CO5: Identify various failures and troubles shooting methods in fluid power systems.

TEXT BOOKS:

1. Anthony Esposito, "Fluid Power with Applications", Prentice Hall, 2009.
2. James A. Sullivan, "Fluid Power Theory and Applications", Fourth Edition, Prentice Hall, 1997
3. Prof.J.Dixon Jim Joseph, Prof.K.M. Arunraja, "Hydraulics and Pneumatics" ARS Publications, First edition 2020.

REFERENCE BOOKS:

1. Jagadeesha. T., "Pneumatics Concepts, Design and Applications ", Universities Press, 2015.
2. Joshi.P., "Pneumatic Control", Wiley India, 2018.
3. Majumdar, S.R., "Oil Hydraulics Systems – Principles and Maintenance", TataMcGraw Hill, 2011.
4. Shanmugasundaram.K., "Hydraulic and Pneumatic Controls". Chand & Co, 2006.
5. Srinivasan.R., "Hydraulic and Pneumatic Controls", Vijay Nicole Imprints, 3rd edition, 2019

E-RESOURCES:

1. <https://archive.nptel.ac.in/courses/112/106/112106300/>
2. <https://archive.nptel.ac.in/courses/112/105/112105046/>
3. <https://www.youtube.com/watch?v=akZjDHD6JC4>

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	1	2	-	-	-	-	-	1	3	2	1
CO2	3	2	1	1	2	-	-	-	-	-	1	3	2	1
CO3	3	3	3	2	2	-	-	1	1	1	1	2	2	1
CO4	3	2	1	1	2	-	-	-	-	-	1	2	3	1
CO5	2	3	2	3	2	-	-	2	2	-	1	3	3	1
Avg	2.8	2.4	1.4	1.6	2.0	-	-	0.6	0.6	0.2	1.0	2.6	2.4	1.0

1 - low, 2 - medium, 3 - high, '-' - no correlation

25MEI41	KINEMATICS AND DYNAMICS OF MACHINES	L	T	P	C
SDG No.		3	0	2	4
7, 9					

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Study the basic components of mechanisms, analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism and design cam mechanisms for specified output motions.
- Study the basic concepts of toothed gearing and kinematics of gear trains.
- Analyzing the effects of friction in machine elements.
- Analyzing the force-motion relationship in components subjected to external forces and analyzing of standard mechanisms.
- Analyzing the undesirable effects of unbalances resulting from prescribed motions in mechanism and the effect of dynamics of undesirable vibrations.

UNIT-I KINEMATICS OF MECHANISMS 9

Basic terminology - Degree of freedom - Inversion of Four bar and slider crank mechanism - Velocity and acceleration analysis of mechanisms.

Introduction of cam and follower mechanism - Classification - Construction of cam profile - Uniform Velocity - Uniform Acceleration and Retardation - SHM and Cycloidal Curves.

UNIT-II GEARS AND GEAR TRAINS 9

Theory of Gearing - Gear Nomenclature - Law of gearing - Tooth Forms - Minimum Number Teeth - Length of Arc of Contact - Contact Ratio - interference and undercutting.

Gear Trains - Classification - Speed calculation - parallel axis and epicyclic gear trains.

UNIT-III FRICTION DRIVES 9

Surface contacts - Sliding and Rolling friction - Friction drives - Friction in screw threads - pivot and collar friction.

Friction clutches - single, multiplate and cone clutch - Belt and rope drives- power calculation for improved energy efficiency.

UNIT-IV FORCE ANALYSIS AND BALANCING 9

Applied and Constrained Forces - Static and Dynamic Force analysis of mechanism - Dynamics of reciprocating Engines - Inertia Forces and Inertia Torque for industrialisation systems.

Static and Dynamic balancing - Balancing of rotating masses and reciprocating masses.

UNIT-V VIBRATION 9

Free vibrations - Equations of motion - natural Frequency - Types of damping - Damped Vibration - Torsional vibration - critical speed of simple shaft - Forced vibration - harmonic Forcing - Vibration isolation (Gyroscopic principles).

TOTAL : 45 PERIODS

PRACTICAL EXERCISES : 30 PERIODS

1. Study of mechanisms - identification of links, joints - DOF - Inversions.
2. Dynamic analysis of cam mechanism.

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3. Kinematics of gears and gear trains.
4. Torsional vibration (undamped) of single rotor shaft system.
5. Experiment on motorized gyroscope.
6. Experiment on Universal governors (Watt, Porter, Proell)
7. Determination of critical speed of shafts.

TOTAL : 75 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Discuss the basics of mechanism.
- CO2:** Solve problems on gears and gear trains.
- CO3:** Examine friction in machine elements.
- CO4:** Calculate static and dynamic forces of mechanisms.
- CO5:** Calculate the balancing masses and their locations of reciprocating and rotating masses. Computing the frequency of free vibration, forced vibration and damping coefficient.

TEXT BOOKS:

1. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", Oxford University Press, 2017.
2. Ramamurthi. V, "Mechanics of Machines", Narosa Publishing House, 3rd edition 2019.
3. R.S.Khurmi, J.K.Gupta, "Theory of Machines", Eurasia Publishing House, S. Chand Pvt Limited, 2013.

REFERENCE BOOKS:

1. Rao,J.S. and Dukkupati.R.V. "Mechanism and Machine Theory", New Age International Pvt. Ltd., 2nd edition, 2014.
2. Rattan, S.S, "Theory of Machines", McGraw-Hill Education Pvt. Ltd., 5th edition 2019.
3. Robert L. Norton, Kinematics and Dynamics of Machinery, Tata McGraw-Hill, 2013.

E-RESOURCES:

1. <https://archive.nptel.ac.in/courses/112/104/112104121/>
2. <https://archive.nptel.ac.in/courses/112/106/112106270/>
3. <https://www.youtube.com/watch?v=WmzA03LdTTE>

CO's – PO's & PSO's MAPPING

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

1 - low, 2 - medium, 3 - high, '-' - no correlation

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25MEI42

THERMAL ENGINEERING

L T P C

SDG No.

3 0 2 4

7, 9, 13

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Understand the principles of thermodynamics, thermodynamic cycles, and analyze the performance of steam power plants, gas turbines, and IC engines.
- Analyze the flow of steam through nozzles and evaluate the performance characteristics of steam turbines and gas turbines under various operating conditions.
- Study the construction, working principles, combustion process, and auxiliary systems of SI and CI engines along with emission control concepts.
- Evaluate the performance parameters of IC engines, compressors, refrigeration systems, and conduct heat balance and performance tests.
- Develop practical skills in conducting experiments related to valve timing, engine testing, refrigeration systems, steam generators, turbines, and fuel property measurements.

UNIT-I THERMODYNAMIC CYCLES

9

Air Standard Cycles – Carnot, Otto, Diesel, Dual, Brayton – Cycle Analysis, Performance and Comparison, Basic Rankine Cycle, modified, reheat and regenerative cycles

UNIT-II STEAM NOZZLES AND INJECTOR

9

Types and Shapes of nozzles Flow of steam through nozzles, Critical pressure ratio, Variation of mass flow rate with pressure ratio. Effect of friction. Metastable flow.

UNIT-III STEAM AND GAS TURBINES

9

Types, Impulse and reaction principles, Velocity diagrams, Work done and efficiency – optimal operating conditions. Multi-staging, compounding and governing. Gas turbine cycle analysis – open and closed cycle. Performance and its improvement - Regenerative, Intercooled, Reheated cycles and their combination for enhanced energy efficiency.

UNIT-IV INTERNAL COMBUSTION ENGINES – FEATURES AND COMBUSTION

9

IC engine – Classification, working, components and their functions. Ideal and actual : Valve and port timing diagrams, p-v diagrams- two stroke & four stroke, and SI & CI engines – comparison. Geometric, operating, and performance comparison of SI and CI engines. Desirable properties and qualities of fuels. Air-fuel ratio calculation – lean and rich mixtures. Combustion in SI & CI Engines – Knocking – phenomena and control with emphasis on reducing greenhouse gas emissions.

UNIT-V INTERNAL COMBUSTION ENGINE PERFORMANCE AND AUXILIARY SYSTEMS

9

Performance and Emission Testing, Performance parameters and calculations. Morse and Heat Balance tests. Multipoint Fuel Injection system and Common rail direct injection systems. Ignition systems – Magneto, Battery and Electronic. Lubrication and Cooling systems. Concepts of Supercharging and Turbocharging –Emission Norms climate change mitigation and energy efficiency.

TOTAL : 45 PERIODS

PRACTICAL EXERCISES : 30 PERIODS

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1. Valve Timing and Port Timing diagrams.
2. Performance Test on four – stroke Diesel Engine.
3. Heat Balance Test on 4 – stroke Diesel Engine.
4. Retardation Test on a Diesel Engine.
5. Determination of Flash Point and Fire Point of various fuels / lubricants
6. Performance test on a two stage Reciprocating Air compressor
7. Determination of COP of a Refrigeration system
8. Study of Steam Generators and Turbines.

TOTAL : 75 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Apply thermodynamic principles to analyze air standard cycles, Rankine cycles, gas turbine cycles, and compare their performances.
- CO2:** Analyze steam flow through nozzles and evaluate the performance, governing, and compounding of steam and gas turbines.
- CO3:** Explain the working, combustion phenomena, fuel requirements, and auxiliary systems of SI and CI engines.
- CO4:** Determine the performance parameters, efficiency, heat balance, and emission characteristics of IC engines, compressors, and refrigeration systems through theoretical and experimental methods.
- CO5:** Perform laboratory experiments related to thermal engineering systems, interpret test results, and prepare technical observations and performance analyses.

TEXT BOOKS:

1. Mahesh. M. Rathore, "Thermal Engineering", 1st Edition, Tata McGraw Hill, 2010.
2. Ganesan.V, " Internal Combustion Engines" 4th Edition, Tata McGraw Hill, 2012.

REFERENCE BOOKS:

1. Ballaney. P, "Thermal Engineering", 25th Edition, Khanna Publishers, 2017.
2. Gupta H.N, "Fundamentals of Internal Combustion Engines", 2nd Edition Prentice Hall of India, 2013..
3. Mathur M.L and Mehta F.S., "Thermal Science and Engineering", 3rd Edition, Jain Brothers Pvt. Ltd, 2017
4. Manual prepared by the faculty of Mechanical Department, SVHEC.

E-RESOURCES:

1. https://www.youtube.com/watch?v=2LPQX4F-GoA&list=PLwdnzlV3ogoWV-_n1YltO933MxgPXfEiM
2. https://onlinecourses.nptel.ac.in/noc23_me31

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	-	-	3	-	-	-	3	2	-
CO2	2	3	3	1	2	-	-	2	-	-	-	3	2	-
CO3	2	3	3	1	3	-	-	3	-	-	-	3	2	-
CO4	2	3	3	1	2	-	-	2	-	-	-	3	2	-
CO5	2	2	2	1	3	-	-	3	-	-	-	3	2	-
Avg	2.4	2.8	2.8	1	2.6	-	-	2.6	-	-	-	3	2	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

SVHEC-R2025

g. Chari
Chairman
BoS / Mech

25MEI43
SDG No. 4,9,11

STRENGTH OF MATERIALS

L	T	P	C
3	0	2	4

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Understand the concepts of stress, strain, principal stresses and principal planes
- Study the concept of shearing force and bending moment due to external loads in determinate beams and their effect on stresses
- Determine stresses and deformation in circular shafts and helical spring due to torsion.
- Compute slopes and deflections in determinate beams by various methods.
- Study the stresses and deformations induced in thin and thick shells

UNIT-I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids – Tension, Compression and Shear Stresses - Deformation of simple and compound bars – Thermal stresses – Elastic constants - Volumetric strains – Stresses on inclined planes – Principal stresses and principal planes for engineering analysis.

UNIT-II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM 9

Beams – Types - Transverse loading on beams – Shear force and Bending moment in beams – Cantilever, Simply supported beams. Theory of simple bending – Bending stress distribution – Shear stress distribution in structural components.

UNIT-III TORSION 9

Theory of Torsion – Stresses and Deformations in Solid and Hollow Circular Shafts – Combined bending moment and torsion of shafts - Power transmitted through shaft – Closed and Open Coiled helical springs for industrial applications.

UNIT-IV DEFLECTION OF BEAMS 9

Elastic curve – Governing differential equation - Macaulay's method – Conjugate beam method for computation of slope and deflection of determinant beams for safe and sustainable infrastructure.

UNIT-V SUSTAINABLE CYLINDRICAL AND SPHERICAL STRUCTURES 9

Stresses in thin cylindrical shell due to internal pressure - circumferential and longitudinal stresses - Deformation in thin cylinders – Spherical shells subjected to internal pressure – Deformation in spherical shells – Thick cylinders - Lamé's theory.

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS: (30 PERIODS)

Objective: The experiments are designed to evaluate the mechanical behavior of engineering materials and structural elements for sustainable infrastructure, industrial applications, and quality engineering practices.

1. Tension Test on Mild Steel Rod
2. Shear Test on Mild Steel Specimen (Single/Double Shear)
3. Compression Test on Helical Spring
4. Torsion Test on Mild Steel Shaft
5. Brinell Hardness Test on Metallic Specimens
6. Deflection Test on Simply Supported Beam

TOTAL: 75 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1: Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
- CO2: Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
- CO3: Apply basic equation of torsion in designing of shafts and helical springs.
- CO4: Calculate slope and deflection in beams using different methods.
- CO5: Analysis of stresses and deformations induced in thin and thick shells.

TEXT BOOKS:

1. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 8th edition, 2025.
2. Rattan S.S., "Strength of Materials", Tata McGraw Hill Education Pvt .Ltd., New Delhi, 2017.
3. Vazirani. V.N, Ratwani. M.M, Duggal .S.K "Analysis of Structures: Analysis, Design and Detailing of Structures-Vol.1", 18th Edition, Khanna Publishers, New Delhi 2015.

REFERENCE BOOKS:

1. Singh. D.K., "Strength of Materials", Ane Books Pvt Ltd., New Delhi, 2021.
2. Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2015.
3. Beer. F.P. & Johnston. E.R. "Mechanics of Materials", Tata McGraw Hill, 8th Edition, New Delhi 2019

E-RESOURCES:

1. <https://nptel.ac.in/courses/112105125>
2. <https://www.engineeringtoolbox.com/>
3. https://upload.wikimedia.org/wikipedia/commons/5/53/The_strength_of_materials%3B_a_text-book_for_engineers_and_architects_%28IA_strengthofmateri00andr%29.pdf

CO's - PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	1	-	2	3
CO2	2	3	3	3	-	-	-	-	-	-	1	2	-	3
CO3	3	3	3	3	-	2	-	-	-	-	1	2	-	3
CO4	2	3	3	2	-	2	-	-	-	-	1	-	2	3
CO5	2	3	3	3	-	2	-	-	-	-	1	2	-	3
Avg	2.4	2.8	2.8	2.8	-	2	-	-	-	-	1	2	2	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

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25MEI44
SDG No.
4,8,9

MANUFACTURING PROCESSES - II

L	T	P	C
3	0	2	4

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Study the concepts and basic mechanics of metal cutting and the factors affecting machinability.
- Learn working principles of basic and advanced turning machines.
- Understand the basics of machine tools with reciprocating and rotating motions and abrasive finishing processes.
- Understand the basic concepts, constructional features and control systems of CNC machine tools.
- Develop CNC part programs for turning centres and machining centres..

UNIT-I MECHANICS OF METAL CUTTING

9

Mechanics of chip formation, forces in machining, Types of chip, cutting tools – single point cutting tool nomenclature, orthogonal and oblique metal cutting, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Productivity Machinability.

UNIT-II TURNING MACHINES

9

Centre lathe, constructional features, specification, operations – taper turning methods, thread cutting methods, special attachments. Special lathes - Capstan and turret lathes- tool layout – automatic lathes: semi-automatic – single spindle: Swiss type, automatic screw type – Industry multi spindle.

UNIT-III RECIPROCATING MACHINE TOOLS

9

Reciprocating machine tools: shaper, planer, type of milling operations-attachments- types of milling cutters– Gear cutting, gear hobbing and gear shaping – gear finishing methods Abrasive processes: grinding wheel – specifications and selection, types of grinding process – cylindrical grinding, surface grinding, centreless grinding, internal grinding.

UNIT-IV CNC MACHINES

9

Computer Numerical Control (CNC) machine tools, constructional details, Innovation special features – Drives, Recirculating ball screws, tool changers; CNC Control systems – Open/closed, point-to-point/continuous -Turning and machining centres – Work holding methods in Turning and machining centres, Coolant systems, Safety features.

UNIT-V PROGRAMMING OF CNC MACHINE TOOLS

9

Coordinates, axis and motion, Absolute vs Incremental, Interpolators, Polar coordinates, Program planning, G and M codes, Manual part programming for CNC machining centers and Turning centers – Fixed cycles, Loops and subroutines, Educating Setting up a CNC machine for machining.

TOTAL : 45 PERIODS

PRACTICAL EXERCISES : 30 PERIODS

1. Turning /Knurling / external (or) internal thread cutting on circular parts using lathe machine.
2. Cutting force calculation using dynamometer in lathe machine.

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Chairman
BoS / Mech

3. Study of Capstan and Turret Lathe.
4. Shaping – Square Head on circular parts using shaper machine.
5. Study of Construction, Working and Gear Generation by Gear Hobbing Machine
6. Milling contours on plates using vertical / Horizontal milling machine.
7. Grinding components using cylindrical / surface grinding machine.
8. CNC Part Programming and Tool Path Simulation using CAM Software
9. Perform CNC Machining operation on the given Workpiece

TOTAL : 75 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Explain the mechanism of metal cutting and identify factors affecting machinability.
- CO2:** Describe the constructional and operational features of centre lathe and other special purpose lathes.
- CO3:** Explain the constructional and operational features of reciprocating machine tools, milling machines and grinding machines.
- CO4:** Explain the constructional features and working principles of CNC machine tools.
- CO5:** Develop and execute CNC part programs using G and M codes for manufacturing a given component.

TEXT BOOKS:

1. Kalpakjian, S, "Manufacturing Engineering and Technology", Pearson Education India, 7th Edition, 2018..
2. Michael Fitzpatrick, Machining and CNC Technology, McGraw-Hill Education; 4th edition, 2024.
3. Rao. P.N "Manufacturing Technology," Metal Cutting and Machine Tools, Tata McGraw- Hill, New Delhi, 2018.

REFERENCE BOOKS:

1. Roy. A. Lindberg, Processes and materials of manufacture, PHI / Pearson education, 2006.
2. A. B. Chattopadhyay, Machining and Machine Tools, Wiley, 2nd edition, 2017.
3. Peter Smid, CNC Programming Handbook, Industrial Press Inc., Third edition 2007.

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_me04
2. https://onlinecourses.nptel.ac.in/noc19_me46

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	3	3	3	1	1	1	-	-	3	-	2	3	3	2
C02	3	3	3	1	1	1	-	-	3	-	2	3	2	2
C03	3	3	3	1	1	1	-	-	3	-	2	3	2	2
C04	3	3	3	1	1	1	-	-	3	-	2	3	2	2
C05	3	3	3	1	1	1	-	-	3	-	2	3	2	3
Avg	3	3	3	1	1	1	-	-	3	-	2	3	2.2	2.2

1 - low, 2 - medium, 3 - high, '-' - no correlation

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g. B. Srinivas
Chairman
BoS / Mech

25MDC45

SDG No.

3, 8, 9

INDUSTRIAL SAFETY

L	T	P	C
3	0	0	0

Course Objectives:

The main learning objective of this course is to prepare the students to:

- Understand the Introduction and basic Terminologies safety.
- Enable the students to learn about the Important Statutory Regulations and standards.
- Enable students to Conduct and participate the various Safety activities in the Industry.
- Have knowledge about Workplace Exposures and Hazards.
- Assess the various Hazards and consequences through various Risk Assessment Techniques.

UNIT-I SAFETY TERMINOLOGIES

9

Hazard-Types of Hazard- Risk-Hierarchy of Hazards Control Measures-Lead indicators- lag Indicators-Flammability- Toxicity Time-weighted Average (TWA) - Threshold Limit Value (TLV) - Short Term Exposure Limit (STEL)- Immediately dangerous to life or health (IDLH)- acute and chronic Effects- Routes of Chemical Entry-Personnel Protective Equipment- Health and Safety Policy-Material Safety Data Sheet MSDS

UNIT-II STANDARDS AND REGULATIONS

9

Indian Factories Act-1948- Health- Safety- Hazardous materials and Welfare- ISO 45001:2018 occupational health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998- Hazard Identification and Risk Analysis- code of practice IS 15656:2006

UNIT-III SAFETY ACTIVITIES

9

Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment

UNIT-IV WORKPLACE HEALTH AND SAFETY

9

Noise hazard- Particulate matter- musculoskeletal disorder improper sitting poster and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane Safety- Toxic gas Release affecting worker health and safe work environments.

UNIT-V HAZARD IDENTIFICATION TECHNIQUES

9

Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability- Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment- Checklist Analysis- Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- CO1:** Understand the basic concept of safety.
- CO2:** Obtain knowledge of Statutory Regulations and standards.
- CO3:** Know about the safety Activities of the Working Place.
- CO4:** Analyze on the impact of Occupational Exposures and their Remedies
- CO5:** Obtain knowledge of Risk Assessment Techniques.

TEXT BOOKS:

1. L. M. Deshmukh Industrial Safety Management: Hazard Identification and Risk Control, McGraw-Hill Education, 2005.
2. R.K. Jain and Prof. Sunil S. Rao, Industrial Safety, Health and Environment Management Systems, Khanna Publishers, 4th Edition, 2006.

REFERENCE BOOKS:

1. Frank P. Lees, Lees' Loss Prevention in the Process Industries: Hazard Identification, Assessment and Control, Butterworth-Heinemann (Elsevier), UK, 4th Edition, 2012.
2. John Ridley and John Channing, Safety at Work, Routledge, 9th Edition, 2022.
3. Dan Petersen, Techniques of Safety Management: A Systems Approach, McGraw-Hill, 2003.
4. Alan Waring, Safety Management Systems, Chapman & Hall, England, 1996.
5. American Society of Safety Professionals (ASSP) ANSI/ASSP Z10 - Occupational Health and Safety Management Systems, Latest Edition, 2019.

E-RESOURCES:

1. ISO 45001:2018 occupational health and safety (OH&S) International Organization for Standardization <https://www.iso.org/standard/63787.html>
2. Indian Standard code of practice on occupational safety and health audit <https://law.resource.org/pub/in/bis/S02/is.14489.1998.pdf>
3. Indian Standard code of practice on Hazard Identification and Risk Analysis IS 15656:2006 <https://law.resource.org/pub/in/bis/S02/is.15656.2006.pdf>

CO's - PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	-	1	3	2	3	-	1	3	3	-	-
CO2	2	3	-	-	1	3	3	3	-	1	3	3	-	-
CO3	2	2	-	-	1	2	2	3	-	1	2	3	-	-
CO4	3	3	-	-	2	3	2	3	-	1	3	3	-	-
CO5	3	2	-	-	2	3	2	3	-	2	3	3	-	-
Avg	2.6	2.6	-	-	1.4	2.8	2.8	3	-	1.2	2.8	3	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation