SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE
(Autonomous)
Gobichettipalayam, Erode-638455

Regulation 2023 (Autonomous)

Curriculum and Syllabus

Choice Based Credit System (CBCS)

BE- MECHANICAL ENGINEERING

SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE
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Regulation 2023 (UG)
Curriculum and Syllabus
BE-Mechanical Engineering

I. Program Educational Objective (PEO)

PEO1: Successful Career: Effectuating success in careers by exploring with the design, digital and computational analysis of engineering systems, experimentation and testing, smart manufacturing, technical services, and research.

PEO2: Core Competency: Amalgamating effectively with stakeholders to update and improve their core competencies and abilities to ethically compete in the ever-changing multicultural global enterprise.

PEO3: Technological Development: To develop the advanced technology and to nurture innovation and entrepreneurship in order to compete successfully in the global economy.

PEO4: Technical Knowledge: To globally share and apply technical knowledge to create new opportunities that proactively advances our society through team efforts and to solve various challenging technical, environmental and societal problems.

PEO5: Proficiency: To create world class mechanical engineers capable of practice engineering ethically with a solid vision to become great leaders in academia, industries and society.

II. Program Outcomes (POs)

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

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

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

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

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

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

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

III. Program Specific Outcomes (PSOs)

PSO1: Design and Development: Apply the knowledge gained in Mechanical Engineering for design and development and manufacture of engineering systems.

PSO2: Investigate: Apply the knowledge acquired to investigate the problems in Mechanical Engineering with due consideration for environmental and social impacts.

PSO3: Engineering Analysis: Use the engineering analysis and data management tools for effective management of multidisciplinary projects.

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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	12	1	2	3
I	I	Professional English - I	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-
		Matrices and Calculus	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Engineering Physics	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-
		Engineering Chemistry	2.8	1.3	1.6	1	-	1.5	1.8	-		-	-	1.5	-	-	-
		Problem Solving and Python Programming	2	3	3	3	2	-	-	-	-	-	2	2	3	3	3
		தமிழர் மரபு /Heritage of Tamils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Problem Solving and Python Programming Laboratory	2	3	3	3	2	-	-	-	-	-	2	2	3	3	3
		Physics and Chemistry Laboratory	3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-	-
			2.6	1.3	1.6	1	1	1.4	1.8	-	-	-	-	1.3	-	-	-
		English Laboratory	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
	II	Professional English - II	3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-
		Numerical Methods and Statistics	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Materials Science	3	1.3	2	1.3	2.3	1	1.3	-	-	-	-	2	-	-	-
		Basic Electrical and Electronics Engineering	2	1.8	1	-	-	-	-	1	-	-	-	2	-	-	1
		Engineering Graphics	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
		தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
		Basic Electrical and Electronics Engineering Laboratory	3	3	2	1	1	-	-	1.5	2	-	-	-	-	-	1
		Communication Laboratory	2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-	-

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	Credits as per AICTE Model Curriculum
		I	II	III	IV	V	VI	VII	VIII				
1	HSS	4	3					5		12	7.10	12	12
2	BS	12	7	4	2					25	14.79	25	29
3	ES	5	11	9						25	14.79	25	27
4	PC			11	20	9	8	8		56	33.14	56	58
5	PE					9	12			21	12.43	21	9
6	OE						3	9		12	7.10	12	9
7	EEC	1	1	1		1		3	10	17	10.65	16	16
8	MC		√		√	√ / √	√						-
Total Credits / Semester		22	22	25	22	19	23	25	10	168	100	167	160

CATEGORIZATION OF COURSES

i. Humanities and Social Sciences including Management Courses (HSS)
ii. Basic Science Courses (BS)
iii. Engineering Science Courses (ES)
iv. Professional Core Courses (PC)
v. Professional Elective Courses (PE)
vi. Open Elective Courses (OE)
vii. Mandatory Courses (MC)
viii. Employability Enhancement Courses (EEC)
ix. Other Courses (OC)

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

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

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

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

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SEMESTER I

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Induction Program											
1.	23IPA11	Induction Programme	-	-	-	-	-	0	-	-	-
Theory											
2.	23ENT11	Professional English - I	HSS	3	0	0	3	3	40	60	100
3.	23MAT11	Matrices and Calculus	BS	3	1	0	4	4	40	60	100
4.	23PHT11	Engineering Physics	BS	3	0	0	3	3	40	60	100
5.	23CYT11	Engineering Chemistry	BS	3	0	0	3	3	40	60	100
6.	23CST11	Problem Solving and Python Programming	ES	3	0	0	3	3	40	60	100
7.	23TAT11	தமிழர் மரபு / Heritage of Tamils	HSS	1	0	0	1	1	40	60	100
Practicals											
8.	23CSL11	Problem Solving and Python Programming Laboratory	ES	0	0	4	4	2	60	40	100
9.	23PCL11	Physics and Chemistry Laboratory	BS	0	0	4	4	2	60	40	100
10.	23ENL11	English Laboratory	EEC	0	0	2	2	1	60	40	100
			Total	**16**	**1**	**10**	**27**	**22**			

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SEMESTER II

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23ENT21	Professional English - II	HSS	2	0	0	2	2	40	60	100
2.	23MAT21	Numerical Methods and Statistics	BS	3	1	0	4	4	40	60	100
3.	23PHT22	Materials Science	BS	3	0	0	3	3	40	60	100
4.	23EET22	Basic Electrical and Electronics Engineering	ES	3	0	0	3	3	40	60	100
5.	23MET21	Engineering Graphics	ES	2	0	4	6	4	40	60	100
6.	23TAT21	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	HSS	1	0	0	1	1	40	60	100
Practicals											
7.	23MEL21	Engineering Practices Laboratory	ES	0	0	4	4	2	60	40	100
8.	23EEL22	Basic Electrical and Electronics Engineering Laboratory	ES	0	0	4	4	2	60	40	100
9.	23ENL21	Communication Laboratory	EEC	0	0	4	4	2	60	40	100
Mandatory Courses											
10.	23MDC21	Mandatory Course - I Yoga for Human Excellence	MC	0	0	1	1	0	100	-	100
			Total	**14**	**1**	**17**	**32**	**23**			

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SEMESTER III

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23MAT32	Transforms and Partial Differential Equations	BS	3	1	0	4	4	40	60	100
2.	23MET31	Engineering Mechanics	ES	2	1	0	3	3	40	60	100
3.	23MET32	Fluid Mechanics and Machinery	ES	3	1	0	4	4	40	60	100
4.	23MET33	Engineering Thermodynamics	PC	3	0	0	3	3	40	60	100
5.	23MET34	Engineering Materials and Metallurgy	PC	3	0	0	3	3	40	60	100
6.	23MET35	Manufacturing Processes	PC	3	0	0	3	3	40	60	100
7.	23EST31	Entrepreneurship And Startup	EEC	1	0	0	1	1	100	-	100
Practicals											
8.	23MEL31	Computer Aided Machine Drawing	ES	0	0	4	4	2	60	40	100
9.	23MEL32	Manufacturing Process and Machining Laboratory	PC	0	0	4	4	2	60	40	100
			Total	**18**	**2**	**10**	**29**	**25**			

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SEMESTER IV

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23MET41	Theory of Machines	PC	3	0	0	3	3	40	60	100
2.	23MET42	Thermal Engineering	PC	4	0	0	4	4	40	60	100
3.	23MET43	Hydraulics and Pneumatics	PC	3	0	0	3	3	40	60	100
4.	23MET44	Manufacturing Technology	PC	3	0	0	3	3	40	60	100
5.	23MET45	Strength of Materials	PC	3	0	0	3	3	40	60	100
6.	23CYT41	Environmental Sciences and Sustainability	BS	2	0	0	2	2	40	60	100
Practicals											
7.	23MEL41	Material Testing and Fluid Mechanics and Machinery Laboratory	PC	0	0	4	4	2	60	40	100
8.	23MEL42	Thermal Engineering Laboratory	PC	0	0	4	4	2	60	40	100
Mandatory Courses											
9.	23MDC41	Mandatory Course - II Soft and Analytical Skills-I	MC	1	0	0	1	0	-	-	-
			Total	**19**	**0**	**8**	**26**	**22**			

@ 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.

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SEMESTER V

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23MET51	Design of Machine Elements	PC	4	0	0	4	4	40	60	100
2.	23MET52	Metrology and Measurements	PC	3	0	0	3	3	40	60	100
3.		Professional Elective I*	PE	-	-	-	-	3	-	-	100
4.		Professional Elective II*	PE	-	-	-	-	3	-	-	100
5.		Professional Elective III*	PE	-	-	-	-	3	-	-	100
Practicals											
6.	23MEL51	Summer Internship@	EEC	0	0	0	0	1	100	-	100
7.	23MEL52	Metrology and Dynamics Laboratory	PC	0	0	4	4	2	60	40	100
Mandatory Courses											
8.	23MDC51	Mandatory Course - III Soft and Analytical Skills-II	MC	1	0	0	1	0	-	-	-
9.		Mandatory Course-IV&	MC	3	0	0	3	0	100	-	100
10.											
			Total	**20**	**0**	**4**	**24**	**19**			

*** Professional Elective – I to III shall be chosen from the list of Professional Electives (Verticals) offered by same Programme**

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

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

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SEMESTER VI

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23MET61	Heat and Mass Transfer	PC	3	1	0	4	4	40	60	100
2.		Professional Elective IV*	PE	-	-	-	-	3	-	-	100
3.		Professional Elective V*	PE	-	-	-	-	3	-	-	100
4.		Professional Elective VI*	PE	-	-	-	-	3	-	-	100
5.		Professional Elective VII*	PE	-	-	-	-	3	-	-	100
6.		Open Elective – I**	OE	-	-	-	-	3	-	-	100
Practicals											
7.	23MEL61	CAD/CAM Laboratory	PC	0	0	4	4	2	60	40	100
8.	23MEL62	Heat Transfer Laboratory	PC	0	0	4	4	2	60	40	100
Mandatory Courses											
9.		Mandatory Course - V&	MC	3	0	0	3	0	100	-	100
			Total	**21**	**1**	**8**	**30**	**23**			

*** Professional Elective – IV to VII shall be chosen from the list of Professional Electives (Verticals) offered by same Programme**

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

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

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

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SEMESTER VII

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23MET71	Mechatronics and IoT	PC	3	0	0	3	3	40	60	100
2.	23MET72	Computer Integrated Manufacturing	PC	3	0	0	3	3	40	60	100
3.	23UHV71	Human Values and Ethics	HSS	2	0	0	2	2	40	60	100
4.		Elective – Management #	HSS	3	0	0	3	3	40	60	100
5.		Open Elective – II**	OE	-	-	-	-	3	-	-	100
6.		Open Elective – III**	OE	-	-	-	-	3	-	-	100
7.		Open Elective – IV**	OE	-	-	-	-	3	-	-	100
Practicals											
8.	23MEL71	Summer Internship@	EEC	0	0	0	0	1	100	-	100
9.	23MEL72	Design and Fabrication Project	EEC	0	0	4	4	2	40	60	100
10.	23ECL72	Mechatronics and IoT Laboratory	PC	0	0	4	4	2	60	40	100
			Total	**20**	**0**	**4**	**28**	**25**			

 # Elective – Management shall be chosen from the list of Elective management courses.

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

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

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SEMESTER VIII

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Practicals											
1.	23MEL81	Project Work	EEC	0	0	20	20	10	40	60	100
			Total	**0**	**0**	**20**	**20**	**10**			

TOTAL CREDITS: 168

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1	VERTICAL 2	VERTICAL 3	VERTICAL 4	VERTICAL 5	VERTICAL 6	VERTICAL 7	VERTICAL 8	VERTICAL 9	VERTICAL 10
MODERN MOBILITY SYSTEMS	**PRODUCT AND PROCESS DEVELOPMENT**	**ROBOTICS AND AUTOMATION**	**DIGITAL AND GREEN MANUFACTURING**	**PROCESS EQUIPMENT AND PIPING DESIGN**	**CLEAN AND GREEN ENERGY TECHNOLOGIES**	**COMPUTATIONAL ENGINEERING**	**DIVERSIFIED COURSES GROUP 1**	**DIVERSIFIED COURSES GROUP 2**	**DIVERSIFIED COURSES GROUP 3**
Automotive Materials, Components, Design & Testing	Value Engineering	Sensors and Instrumentation	Digital Manufacturing and IoT	Design of Pressure Vessels	Bioenergy Conversion Technologies	Computational Solid Mechanics	Automobile Engineering	Turbo Machines	Advanced Vehicle Engineering
Conventional and Futuristic Vehicle Technology	Additive Manufacturing	Electrical Drives and Actuators	Modern Robotics	Failure Analysis and NDT Techniques	Carbon Footprint estimation and reduction techniques	Computational Fluid Dynamics and Heat transfer	Measurements and Controls	Non-traditional Machining Processes	Advanced Internal Combustion Engineering
Renewable Powered Off Highway Vehicles and Emission Control Technology	CAD/CAM	Embedded Systems and Programming	Lean Manufacturing	Material Handling and solid processing Equipment	Energy Conservation in Industries	Theory on Computation and Visualization	Design Concepts in Engineering	Industrial safety	Casting and Welding Processes
Vehicle Health Monitoring, Maintenance and Safety	Design For X	Robotics	Green Manufacturing Design and Practices	Rotating Machinery Design	Energy Efficient Buildings	Computational Bio- Mechanics	Composite Materials and Mechanics	Thermal Power Engineering	Process Planning and Cost Estimation
CAE and CFD Approach in Future Mobility	Ergonomics in Design	Smart Mobility and Intelligent Vehicles	Environment Sustainability and Impact Assessment	Thermal and Fired Equipment design	Energy Storage Devices	Advanced Statistics and Data Analytics	Electrical Drives and Control	Design of Transmission System	Surface Engineering
Hybrid and Electric Vehicle Technology	New Product Development	Haptics and Immersive Technologies	Energy Saving Machinery and Components	Industrial Layout Design and Safety	Equipment for Pollution Control	CAD and CAE	Power Plant Engineering	Design for Manufacturing	Precision Manufacturing
Thermal Management of Batteries and Fuel Cells	Product Life Cycle Management	Drone Technologies	Green Supply Chain Management	Design Codes and Standards	Renewable Energy Technologies	Machine Learning for Intelligent Systems	Refrigeration and Air Conditioning	Power Generation Equipment Design	Gas Dynamics and Jet Propulsion
-	-	-	-	-	-	-	Dynamics of Ground Vehicles	-	Operational Research

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional 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 2023 (Clause 12).

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MANDATORY COURSES IV											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MCT51	Introduction to Women and Gender Studies	MC	3	0	0	3	0	100	-	100
2.	23MCT52	Elements of Literature	MC	3	0	0	3	0	100	-	100
3.	23MCT53	Film Appreciation	MC	3	0	0	3	0	100	-	100
4.	23MCT54	Disaster Risk Reduction and Management	MC	3	0	0	3	0	100	-	100

MANDATORY COURSES V											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MCT61	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3	0	100	-	100
2.	23MCT62	History of Science and Technology in India	MC	3	0	0	3	0	100	-	100
3.	23MCT63	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0	100	-	100
4.	23MCT64	State, Nation Building and Politics in India	MC	3	0	0	3	0	100	-	100
5.	23MCT65	Industrial Safety	MC	3	0	0	3	0	100	-	100

ELECTIVE – MANAGEMENT COURSES											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MSE71	Principles of Management	HSS	3	0	0	3	3	40	60	100
2.	23MSE72	Total Quality Management	HSS	3	0	0	3	3	40	60	100
3.	23MSE73	Engineering Economics and Financial Accounting	HSS	3	0	0	3	3	40	60	100
4.	23MSE74	Human Resource Management	HSS	3	0	0	3	3	40	60	100
5.	23MSE75	Knowledge Management	HSS	3	0	0	3	3	40	60	100
6.	23MSE76	Industrial Management	HSS	3	0	0	3	3	40	60	100

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VERTICAL 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.	23MEE11	Automotive Materials, Components, Design and Testing	PE	2	0	2	4	3	50	50	100
2.	23MEE12	Conventional and Futuristic Vehicle Technology	PE	3	0	0	3	3	40	60	100
3.	23MEE13	Renewable Powered Off Highway Vehicles and Emission Control Technology	PE	3	0	0	3	3	40	60	100
4.	23MEE14	Vehicle Health Monitoring, Maintenance and Safety	PE	3	0	0	3	3	40	60	100
5.	23MEE15	CAE and CFD Approach in Future Mobility	PE	2	0	2	4	3	50	50	100
6.	23MEE16	Hybrid and Electric Vehicle Technology	PE	3	0	0	3	3	40	60	100
7.	23MEE17	Thermal Management ofBatteries and Fuel Cells	PE	3	0	0	3	3	40	60	100
VERTICAL 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.	23MEE21	Value Engineering	PE	3	0	0	3	3	40	60	100
2.	23MEE22	Additive Manufacturing	PE	2	0	2	4	3	50	50	100
3.	23MEE23	CAD/CAM	PE	3	0	0	3	3	40	60	100
4.	23MEE24	Design For X	PE	3	0	0	3	3	40	60	100
5.	23MEE25	Ergonomics in Design	PE	3	0	0	3	3	40	60	100
6.	23MEE26	New Product Development	PE	3	0	0	3	3	40	60	100
7.	23MEE27	Product Life Cycle Management	PE	3	0	0	3	3	40	60	100

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VERTICAL 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.	23MEE31	Sensors and Instrumentation	PE	3	0	0	3	3	40	60	100
2.	23MEE32	Electrical Drives and Actuators	PE	3	0	0	3	3	40	60	100
3.	23MEE33	Embedded Systems and Programming	PE	2	0	2	4	3	50	50	100
4.	23MEE34	Robotics	PE	3	0	0	3	3	40	60	100
5.	23MEE35	Smart Mobility and Intelligent Vehicles	PE	3	0	0	3	3	40	60	100
6.	23MEE36	Haptics and Immersive Technologies	PE	3	0	0	3	3	40	60	100
7.	23MEE37	Drone Technologies	PE	3	0	0	3	3	40	60	100

VERTICAL 4: DIGITAL AND GREEN MANUFACTURING											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MEE41	Digital Manufacturing and IoT	PE	2	0	2	4	3	50	50	100
2.	23MEE42	Modern Robotics	PE	2	0	2	4	3	50	50	100
3.	23MEE43	Lean Manufacturing	PE	3	0	0	3	3	40	60	100
4.	23MEE44	Green Manufacturing Design and Practices	PE	3	0	0	3	3	40	60	100
5.	23MEE45	Environment Sustainability and Impact Assessment	PE	3	0	0	3	3	40	60	100
6.	23MEE46	Energy Saving Machinery and Components	PE	3	0	0	3	3	40	60	100
7.	23MEE47	Green Supply Chain Management	PE	3	0	0	3	3	40	60	100

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VERTICAL 5: PROCESS EQUIPMENT AND PIPING DESIGN											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MEE51	Design of Pressure Vessels	PE	3	0	0	3	3	40	60	100
2.	23MEE52	Failure Analysis and NDT Techniques	PE	2	0	2	4	3	50	50	100
3.	23MEE53	Material Handling and Solid Processing Equipment	PE	3	0	0	3	3	40	60	100
4.	23MEE54	Rotating Machinery Design	PE	3	0	0	3	3	40	60	100
5.	23MEE55	Thermal and Fired Equipment Design	PE	3	0	0	3	3	40	60	100
6.	23MEE56	Industrial Layout Design and Safety	PE	2	0	2	4	3	50	50	100
7.	23MEE57	Design Codes and Standards	PE	3	0	0	3	3	40	60	100

VERTICAL 6: CLEAN AND GREEN ENERGY TECHNOLOGIES											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MEE61	Bioenergy Conversion Technologies	PE	3	0	0	3	3	40	60	100
2.	23MEE62	Carbon Footprint Estimation and Reduction Techniques	PE	3	0	0	3	3	40	60	100
3.	23MEE63	Energy Conservation in Industries	PE	3	0	0	3	3	40	60	100
4.	23MEE64	Energy Efficient Buildings	PE	3	0	0	3	3	40	60	100
5.	23MEE65	Energy Storage Devices	PE	3	0	0	3	3	40	60	100
6.	23MEE66	Equipment for Pollution Control	PE	3	0	0	3	3	40	60	100
7.	23MEE67	Renewable Energy Technologies	PE	3	0	0	3	3	40	60	100

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VERTICAL 7: COMPUTATIONAL ENGINEERING											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MEE71	Computational Solid Mechanics	PE	3	0	0	3	3	40	60	100
2.	23MEE72	Computational Fluid Dynamics and Heat transfer	PE	3	0	0	3	3	40	60	100
3.	23MEE73	Theory on Computation and Visualization	PE	3	0	0	3	3	40	60	100
4.	23MEE74	Computational Bio-Mechanics	PE	3	0	0	3	3	40	60	100
5.	23MEE75	Advanced Statistics and Data Analytics	PE	3	0	0	3	3	40	60	100
6.	23MEE76	CAD and CAE	PE	2	0	2	4	3	50	50	100
7.	23MEE77	Machine Learning for Intelligent Systems	PE	3	0	0	3	3	40	60	100
VERTICAL 8: 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.	23MEE81	Automobile Engineering	PE	3	0	0	3	3	40	60	100
2.	23MEE82	Measurements and Controls	PE	3	0	0	3	3	40	60	100
3.	23MEE83	Design Concepts in Engineering	PE	3	0	0	3	3	40	60	100
4.	23MEE84	Composite Materials and Mechanics	PE	3	0	0	3	3	40	60	100
5.	23MEE85	Electrical Drives and Control	PE	3	0	0	3	3	40	60	100
6.	23MEE86	Power Plant Engineering	PE	3	0	0	3	3	40	60	100
7.	23MEE87	Refrigeration and Air Conditioning	PE	3	0	0	3	3	40	60	100
8.	23MEE88	Dynamics of Ground Vehicles	PE	3	0	0	3	3	40	60	100

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VERTICAL 9: 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.	23MEE91	Turbo Machines	PE	3	0	0	3	3	40	60	100
2.	23MEE92	Non-traditional Machining Processes	PE	3	0	0	3	3	40	60	100
3.	23MEE93	Industrial safety	PE	3	0	0	3	3	40	60	100
4.	23MEE94	Thermal Power Engineering	PE	3	0	0	3	3	40	60	100
5.	23MEE95	Design of Transmission System	PE	3	0	0	3	3	40	60	100
6.	23MEE96	Design for Manufacturing	PE	3	0	0	3	3	40	60	100
7.	23MEE97	Power Generation Equipment Design	PE	3	0	0	3	3	40	60	100
VERTICAL 10: DIVERSIFIED COURSES GROUP 3											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MEEX1	Advanced Vehicle Engineering	PE	3	0	0	3	3	40	60	100
2.	23MEEX2	Advanced Internal Combustion Engineering	PE	3	0	0	3	3	40	60	100
3.	23MEEX3	Casting and Welding Processes	PE	3	0	0	3	3	40	60	100
4.	23MEEX4	Process Planning and Cost Estimation	PE	3	0	0	3	3	40	60	100
5.	23MEEX5	Surface Engineering	PE	3	0	0	3	3	40	60	100
6.	23MEEX6	Precision Manufacturing	PE	3	0	0	3	3	40	60	100
7.	23MEEX7	Gas Dynamics and Jet Propulsion	PE	3	0	0	3	3	40	60	100
8.	23MEEX8	Operational Research	PE	3	0	0	3	3	40	60	100

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SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE
(Autonomous)
Gobichettipalayam, Erode -638455

Regulation 2023 (UG)
Curriculum and Syllabus

OPEN ELECTIVES

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
OFFERED BY DEPARTMENT OF CIVIL ENGINEERING											
1.	23CEO11	Civil and Infrastructure Engineering	OE	3	0	0	3	3	40	60	100
2.	23CEO12	Environmental Pollution and waste management	OE	3	0	0	3	3	40	60	100
3.	23CEO13	Environmental Impact Assessment	OE	3	0	0	3	3	40	60	100
4.	23CEO14	Building Services	OE	3	0	0	3	3	40	60	100
5.	23CEO15	Water, Sanitation and Health	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING											
1.	23CSO11	Foundation of AR/VR	OE	2	0	2	4	3	50	50	100
2.	23CSO12	Web Designing	OE	2	0	2	4	3	50	50	100
3.	23CSO13	Block Chain fundamentals	OE	2	0	2	4	3	50	50	100
4.	23CSO14	Knowledge Management	OE	2	0	2	4	3	50	50	100
5.	23CSO15	Cloud Computing Essentials	OE	2	0	2	4	3	50	50	100
OFFERED BY DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING											
1.	23ECO11	Basics of electronics in automation	OE	3	0	0	3	3	40	60	100
2.	23ECO12	Optical engineering	OE	3	0	0	3	3	40	60	100
3.	23ECO13	E-waste management	OE	3	0	0	3	3	40	60	100
4.	23ECO14	Consumer electronics	OE	3	0	0	3	3	40	60	100
5.	23ECO15	Principles of communication engineering	OE	3	0	0	3	3	40	60	100

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S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
OFFERED BY DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING											
1.	23EEO11	Renewable Energy Sources	OE	3	0	0	3	3	40	60	100
2.	23EEO12	Electrical Vehicle	OE	3	0	0	3	3	40	60	100
3.	23EEO13	Energy Auditing and Conservation	OE	3	0	0	3	3	40	60	100
4.	23EEO14	Domestic and Industrial Electrical Installations	OE	3	0	0	3	3	40	60	100
5.	23EEO15	Microcontroller Based System Design	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF MECHANICAL ENGINEERING											
1.	23MEO11	Industrial Instrumentation	OE	3	0	0	3	3	40	60	100
2.	23MEO12	Energy Technology	OE	3	0	0	3	3	40	60	100
3.	23MEO13	Reverse Engineering	OE	3	0	0	3	3	40	60	100
4.	23MEO14	Fire Safety Engineering	OE	3	0	0	3	3	40	60	100
5.	23MEO15	Nano Technology	OE	3	0	0	3	3	40	60	100
6.	23MEO16	Entrepreneurship Development	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT ARTIFICIAL INTELLIGENCE AND DATA SCIENCE											
1.	23AD011	Introduction to Big Data	OE	2	0	2	4	3	50	50	100
2.	23AD012	Principles of Data Science	OE	2	0	2	4	3	50	50	100
3.	23AD013	Data Visualization and its Applications	OE	2	0	2	4	3	50	50	100
4.	23AD014	Data Warehousing and Mining	OE	2	0	2	4	3	50	50	100
5.	23AD015	Principles of Cyber Security	OE	2	0	2	4	3	50	50	100

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S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
OFFERED BY DEPARTMENT INFORMATION TECHNOLOGY											
1.	23IT011	Basics of Java Programming	OE	2	0	2	4	3	50	50	100
2.	23IT012	Ethical Hacking	OE	2	0	2	4	3	50	50	100
3.	23IT013	E-Commerce and Applications	OE	2	0	2	4	3	50	50	100
4.	23IT014	Basics of Android Application Development	OE	2	0	2	4	3	50	50	100
5.	23IT015	Introduction to Web Design	OE	2	0	2	4	3	50	50	100
OFFERED BY DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY											
1.	23PTO11	Nutraceuticals	OE	3	0	0	3	3	40	60	100
2.	23PTO12	IPR for Pharma Industry	OE	3	0	0	3	3	40	60	100
3.	23PTO13	Pharmaceutical Nanotechnology	OE	3	0	0	3	3	40	60	100
4.	23PTO14	Basics of Human Anatomy and physiology	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT BIOMEDICAL ENGINEERING											
1.	23BMO11	Biomedical Instrumentation	OE	3	0	0	3	3	40	60	100
2.	23BMO12	Medical Optics	OE	3	0	0	3	3	40	60	100
3.	23BMO13	Biometric systems and their applications	OE	3	0	0	3	3	40	60	100
4.	23BMO14	Healthcare Management systems	OE	3	0	0	3	3	40	60	100
5.	23BMO15	IOT in Medicine	OE	3	0	0	3	3	40	60	100

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23IPA11	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) Physical Activity:

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts:

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. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later

(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 dont'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.

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

22/09/2023

23ENT11	PROFESSIONAL ENGLISH – I (Common to B.E./B.Tech. all Branches)	L T P C 3 0 0 3

COURSE OBJECTIVES:

- To improve the communicative competence of learners.
- To learn to use basic grammatical structures in suitable contexts.
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text.
- To help learners use language effectively in professional contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs,de initions, essays and user manuals.

UNIT-I **INTRODUCTION TO EFFECTIVE COMMUNICATION AND FUNDAMENTALS OF COMMUNICATION** **10**

Introduction to Effective Communication- Barriers of Communication, Seven C's of Effective Communication, Effective Listening, Effective Speaking, Excellence in Reading, Ways to Develop Language and Communication Skills.

Reading- Reading Brochures (Technical Context), Telephone Messages/ Social Media Messages Relevant to Technical Contexts and Emails.

Writing- Writing Emails / Letters Introducing Oneself.

Grammar- Present Tense (Simple and Progressive); Question Types: Wh/ Yes or No/ and Tags.

Vocabulary- Synonyms; One Word Substitution; Abbreviations & Acronyms (as Used in Technical Contexts)

UNIT-II **NARRATION AND SUMMATION** **9**

Reading - Reading Biographies, Travelogues, Newspaper Reports, Excerpts from Literature, and Travel & Technical Blogs.

Writing - Guided writing, Paragraph Writing, Short Report on an Event (Field Trip etc.)

Grammar - Past Tense (Simple); Subject-Verb Agreement; and Prepositions.

Vocabulary - Word Forms (Pre ixes& Suf ixes); Synonyms and Antonyms; Phrasal Verbs.

UNIT-III **DESCRIPTION OF A PROCESS / PRODUCT** **9**

Reading - Reading Advertisements, Gadget Reviews; User Manuals.

Writing - Writing De initions; Instructions; and Product /Process Description.

Grammar - Imperatives; Adjectives; Degrees of Comparison; Present & Past Perfect Tenses.

Vocabulary- Compound Nouns, Homonyms; and Homophones, Discourse Markers (Connectives & Sequence Words)

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UNIT-IV **CLASSIFICATION AND RECOMMENDATIONS** **9**

Reading - Newspaper Articles; Journal Reports –and Non Verbal Communication (Tables, Pie Charts etc...)
Writing - Note-making / Note-taking (*Study skills to be taught, not tested); Writing Recommendations; Transferring Information from Non Verbal (Chart , Graph etc, to Verbal Mode)
Grammar - Articles; Pronouns - Possessive & Relative Pronouns.
Vocabulary - Collocations; Fixed / Semi Fixed Expressions

UNIT-V **EXPRESSION** **8**

Reading - Reading Editorials; and Opinion Blogs;
Writing - Essay Writing (Descriptive or Narrative).
Grammar- Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs. Function Words.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will able to

CO1:	Use appropriate words in a professional context
CO2:	Gain understanding of basic grammatical structures and use them in right context
CO3:	Read and infer the denotative and connotative meanings of technical text
CO4:	Read and interpret information presented in tables, charts and other graphic forms
CO5:	Write de initions, descriptions, narrations and essays on various topics

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.

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2. Lakshminarayanan, "A Course Book on Technical English", Scitech Publications (India) Pvt.Ltd. 2012.
3. Aysha Viswamohan, "English For Technical Communication (With CD)", Mcgraw HillEducation, 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	PO12
CO1	-	-	-	-	-	-	-	-	2	3	-	3
CO2	-	-	-	-	-	1	-	-	2	3	-	2
CO3	-	-	-	-	-	1	-	-	3	3	-	3
CO4	-	-	-	2	-	-	-	-	3	3	-	3
CO5	-	-	-	-	-	-	-	-	2	3	-	2
AVR	-	-	-	2	-	1	-	-	2	3	-	3

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

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23MAT11	MATRICES AND CALCULUS (Common to B.E./B.Tech. all Branches)	L T P C 3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications
- To familiarize the students with differential calculus
- To familiarize the student with functions of several variables. This is needed in many branches of engineering
- To make the students understand various techniques of integration
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications

UNIT-I **MATRICES** **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

UNIT-II **DIFFERENTIAL CALCULUS** **9+3**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules(sum, product, quotient, chain rules) - Implicit differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT-III **FUNCTIONS OF SEVERAL VARIABLES** **9+3**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT-IV **INTEGRAL CALCULUS** **9+3**

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 - Applications : Hydrostatic force and pressure, moments and centre of mass.

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UNIT-V **MULTIPLE INTEGRALS** **9+3**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications: Moments and centre of mass, moment of inertia.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Use the matrix algebra methods for solving practical problems
CO2: Apply differential calculus tools in solving various application problems.
CO3: Use differential calculus ideas on several variable functions
CO4: Apply different methods of integration in solving practical problems
CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems

TEXT BOOKS :

1. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2019. [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, 44th Edition, 2018

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, 2016
4. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016

CO's – PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	-	-	-	-	2	-	2	3
CO2	3	3	1	1	-	-	-	-	3	-	2	3
CO3	3	3	1	1	-	-	-	-	2	-	2	3
CO4	3	3	1	1	-	-	-	-	2	-	2	3
CO5	3	2	1	1	-	-	-	-	2	-	2	3
AVG	3	3	1	1	-	-	-	-	2	-	2	3

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

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23PHT11	ENGINEERING PHYSICS (Common to B.E./B. Tech. all branches)	L T P C 3 0 0 3

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 iber optics and its applications
- Equipping the students to successfully understand the importance of quantum physics

UNIT-I **MECHANICS** **10**

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of the system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia – theorems of M – M.I of a diatomic molecule – torque – rotational dynamics of rigid bodies – rotational energy state of a rigid diatomic molecule – torsional pendulum – double pendulum

UNIT-II **PROPERTIES OF MATTER AND THERMAL PHYSICS** **10**

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-Modes of heat transfer – thermal conductivity – Newton's law of cooling – Linear heat low – Lee's disc method – conduction through compound media (series and parallel)

UNIT-III **LASER** **9**

Lasers: Stimulated absorption – Spontaneous emission – Stimulated emission – Population inversion-Einstein's coef icients derivation and their relations – Pumping methods – Types of lasers – Nd:YAG, CO_2 laser, Semiconductor lasers (homojunction & heterojunction) – Industrial and Medical Applications of lasers

UNIT-IV **FIBER OPTICS** **8**

Principle and propagation of light in optical ibres – Numerical aperture and Acceptance angle – Types of optical ibres (material, refractive index, mode) – attenuation, dispersion, bending – Fiber optics communication system (qualitative) – Temperature and displacement sensors – iber optic endoscope

UNIT-V **QUANTUM PHYSICS** **8**

Photons and light waves – Electrons and matter waves – Compton effect: theory of scattering –Derivation and experimental veri ication – The Schrodinger equation (Time dependent and

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time independent forms) – particle in a one-dimensional rigid box for eigen value and eigen function – tunneling (qualitative) – scanning tunneling microscope

TOTAL: 45 PERIODS

COURSE OUTCOME:

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

CO1: Understand the importance of mechanics.
CO2: Describe the Elastic property of solid materials and thermal conductivity of solids in industrial applications
CO3: Demonstrate a foundational knowledge in lasers
CO4: The students will get knowledge on iber optics
CO5: Understand the importance of quantum physics

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow, "An Introduction to Mechanics," McGraw Hill Education (IndianEdition), 2017
2. Arthur Beiser, Shobhit Mahajan, S.Rai Choudhury, "Concepts of Modern Physics," McGraw-Hill (Indian Edition), 2017

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

CO's- PO's MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	1	-	-	-	-	-	-	-
CO2	3	3	2	1	1	-	-	-	-	-	-	-
CO3	3	2	2	1	2	-	-	-	-	-	-	1
CO4	3	2	2	1	2	-	-	-	-	-	-	1
CO5	3	3	1	1	2	-	-	-	-	-	-	-
AVG	3	3	2	1	2	-	-	-	-	-	-	1

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

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23CYT11	ENGINEERING CHEMISTRY (Common to B.E./B. Tech. all branches)	L T P C 3 0 0 3

COURSE OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques
- To impart knowledge on the basic principles and preparatory methods of nanomaterials
- To introduce the basic concepts and applications of phase rule and composites
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices

UNIT-I **WATER AND ITS TREATMENT** **9**

Water: Sources and impurities, **Water quality parameters:** turbidity, pH, hardness, alkalinity, TDS, COD and BOD. **Desalination of brackish water**: Reverse Osmosis. **Boiler troubles:** Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. **Treatment of boiler feed water**: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralisation and zeolite process. **Municipal water treatment:** primary treatment and disinfection (UV, Ozonation, break-point chlorination)

UNIT-II **NANOCHEMISTRY** **9**

Basics: Distinction between molecules, nanomaterials and bulk materials; **Size-dependent properties** (optical, electrical, mechanical and magnetic); **Types of nanomaterials**: De inition, properties and uses of – nanoparticle, nanowire and nanotube. **Preparation of nanomaterials:** sol-gel, solvothermal, laser ablation, electrochemical deposition. **Applications** of nanomaterials with examples in medicine, agriculture, energy, electronics and catalysis.

UNIT-III **PHASE RULE AND COMPOSITES** **9**

Phase rule: Introduction, de inition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system – Pattinson's process.

Composites: Introduction: De inition & Need for composites; **Constitution**: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (iber, particulates, lakes and whiskers). **Properties and applications of**: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites.

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UNIT-IV **FUELS AND COMBUSTION** **9**

Fuels: Introduction: Classi ication of fuels; **Coal and coke**: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). **Petroleum and Diesel:** Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; **Solid biofuels, Compressed biogas, Power alcohol and biodiesel.**
Combustion of fuels: Introduction: Calori ic value - higher and lower calori ic values, Theoretical calculation of calori ic value; **Flue gas analysis** - ORSAT Method. **CO_2 emission and carbon foot print.**

UNIT-V **ENERGY SOURCES AND STORAGE DEVICES** **9**

Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; **Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries:** Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; **Electric vehicles-working principles; Fuel cells:** H_2-O_2 fuel cell, microbial fuel cell; **Supercapacitors:** Storage principle, types and examples

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able

CO1: To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
CO2: To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3: To apply the knowledge of phase rule and composites for material selection requirements.
CO4: To recommend suitable fuels for engineering processes and applications.
CO5: To recognize different forms of energy resources and apply them for suitable applications in energy sectors

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018
2. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018

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REFERENCE BOOKS:

1. Shashi Chawla, "A Text Book of Engineering Chemistry", Dhanpar Rai & Co (Pvt.) Ltd, New Delhi, 2011
2. O.G. Palanna, "Engineering Chemistry", McGraw Hill Education (India) Private Limited, 2nd Edition, 2017
3. Dr. A.Ravikrishnan, "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Limited, 23rd Edition, 2023

CO's- PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	1	3	3	-	-	-	-	-
CO2	3	2	1	1	2	2	-	-	-	-	-	1
CO3	3	3	1	1	1	1	-	-	-	-	-	-
CO4	3	2	1	1	1	1	-	-	-	-	-	-
CO5	3	2	2	1	2	2	2	-	-	-	-	-
AVG	3	2	2	1	1	2	3	-	-	-	-	1

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

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BoS / S&H

23CST11	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to: B.E. / B.Tech. all Branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To solve problems using computational thinking methods using pseudo code and flowchart
- To understand the fundamentals of algorithmic problem solving basics and strategies
- To define variables data types and error messages
- To learn to solve problems using Python conditionals loops lists tuples and dictionaries to represent complex data
- To understand the functions modules and do input/output with files in Python

UNIT-I **COMPUTATIONAL THINKING** **8**

Introduction - Problem solving and Decomposition - Abstraction - Notations Pseudo code - Flow chart - Programming language

UNIT-II **ALGORITHMIC PROBLEM SOLVING** **8**

Algorithm Implementation - Top down design - Simple strategies for developing algorithms - Iteration - Recursion - Fundamental algorithms - Anticipating and Dealing with Errors

UNIT-III **BASICS BUILDING BLOCKS OF PYTHON** **9**

Variables - Immutable variables - Data types - Operators - Python Reserved Words - Understanding error messages

UNIT-IV **CONTROL STATEMENTS AND STRUCTURED TYPES** **10**

Control Flow - Indenting - if Statement - while Loop - break and continue - for Loop - String - Lists - Tuples - Sets - Dictionaries

UNIT-V **FUNCTIONS, MODULES AND FILES** **10**

Definition - Hiding redundancy - Arguments and return values - Variable Number of Arguments - Scope - Passing Functions to a Function - Mapping Functions in a Dictionary - Lambda function – Recursive Functions - Modules: Standard Modules - OS and SYS modules - User defined Modules - Importing modules – Writing into a File - Reading from a File - File Methods

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1 : Develop algorithmic solutions for simple computational problems to develop and execute simple Python programs.

CO2 : Write the Algorithms for problem solving basics and strategies to solve complex problems

CO3 : Compose simple Python programs using to illustrate variables data types and error messages.

CO4 : Represent compound data using Python conditionals loops lists tuples dictionaries for solving problems

CO5 : Create functions modules read and write data from/to files in Python programs.

TEXT BOOKS:

1. R. G. Dromey "How to Solve it by Computer", Pearson Education., 2015
2. Charles Dierbach "Introduction to Computer Science using Python: A Computational Problem- Solving Focus", Wiley India., 2015

REFERENCE BOOKS:

1. John V. Guttag "Introduction to Computation and Programming using Python", The MIT press. 2021 (3rd Edition).
2. Paul Gries, Jennifer Campbell, Jason Montojo "Practical Programming: An Introduction to Computer Science using Python 3", Pragmatic Programmers., 2013 , Second edition
3. Robert Sedgewick, Kevin Wayne, Robert Dondero "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India., 2016
4. Karl Beecher "Computational Thinking - A beginner's guide to problem solving and Programming", BCS Learning &Development., 2017

E-RESOURCES:

1. http://www.flowgorithm.org/
2. https://www.python.org/
3. https://nptel.ac.in/courses/106104074

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	-	-	-	-	-	2	2	3	3	3
CO2	2	3	3	3	2	-	-	-	-	-	2	-	3	3	3
CO3	2	2	-	2	2	-	-	-	-	-	1	-	3	3	3
CO4	1	2	-	-	1	-	-	-	-	-	1	-	2	3	3
CO5	2	2	-	-	2	-	-	-	-	-	1	2	2	3	3
AVG	**2**	**3**	**3**	**3**	**2**	-	-	-	-	-	**2**	**2**	**3**	**3**	**3**

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

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23TAT11	HERITAGE OF TAMILS (Common to B.E./B. Tech. all branches)	L T P C 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 Thinai 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 Modernliterature 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 In luence of Tamils over the otherparts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

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COURSE OUTCOMES:

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

CO1: Gain knowledge about various literatures of Tamil
CO2: Learn the uniqueness of Tamil cultural heritage
CO3: Find various art forms of Tamil Nadu
CO4: Understand the Thinai concepts in Tamil
CO5: 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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	1	1	-	1	-	-
CO2	-	-	-	-	-	1	1	1	-	1	-	-
CO3	-	-	-	-	-	1	1	1	-	1	-	-
CO4	-	-	-	-	-	1	1	1	-	1	-	-
CO5	-	-	-	-	-	1	1	1	-	1	-	-
AVG	-	-	-	-	-	1	1	1	-	1	-	-

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

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23TAT11 **தமிழர் மரபு** **L T P C**
1 0 0 1

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

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 சமண பௌத்த 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 **நாட்டப்புறக் கலைகள் மற்றும் வீரவிளையாட்டுகள்** **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், 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 அச்சு வரலாறு.

மொத்தம்: 15 பாடவேளைகள்

பாடநெறி முடிவுகள்:

இப்பாடத்தைப் படிப்பதின் முடிவில் மாணவர்கள்

CO1: தமிழின் பல்வேறு இலக்கியங்களைப் பற்றிய அறிவைப் பெறுவார்கள்
CO2: தமிழ் கலாச்சார பாரம்பரியத்தின் தனித்தன்மையைக் கற்றுக்கொள்வார்கள்
CO3: தமிழகத்தின் பல்வேறு கலைவடிவங்களைக் கண்டறிவார்கள்
CO4: தமிழர்களின் திணைக்கோட்பாடுகளை அறிந்துகொள்வார்கள்
CO5: 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	PO12
CO1	-	-	-	-	-	1	1	1	-	1	-	-
CO2	-	-	-	-	-	1	1	1	-	1	-	-
CO3	-	-	-	-	-	1	1	1	-	1	-	-
CO4	-	-	-	-	-	1	1	1	-	1	-	-
CO5	-	-	-	-	-	1	1	1	-	1	-	-
AVG	-	-	-	-	-	1	1	1	-	1	-	-

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

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BoS / S&H

		L	T	P	C
23CSL11	**PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**	0	0	4	2

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

COURSE OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python

LIST OF EXPERIMENTS

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL : 60 PERIODS

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COURSE OUTCOMES:

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

CO1 : Develop algorithmic solutions to simple computational problems

CO2 : Develop and execute simple Python programs.

CO3 : Implement programs in Python using conditionals and loops for solving problems.

CO4 : Deploy functions to decompose a Python program.

CO5 : Process compound data using Python data structures and Utilize Python packages in developing software applications.

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021.
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

E-RESOURCES:

1. http://www.flowgorithm.org/
2. https://www.python.org/
3. https://nptel.ac.in/courses/106104074

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	-	-	2	2	3	3	3
CO2	3	3	3	3	2	-	-	-	-	-	2	-	3	3	
CO3	2	2	-	2	2	-	-	-	-	-	1	-	3	3	3
CO4	1	2	-	-	1	-	-	-	-	-	1	-	2	3	3
CO5	2	2	-	-	2	-	-	-	-	-	1	-	2	3	3
AVG	**2**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**3**	**3**

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

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BoS/CSE& IT

23PCL11	PHYSICS AND CHEMISTRY LABORATORY (Common to B.E./B. Tech. all branches)	L	T	P	C
		0	0	4	2

PHYSICS LABORATORY
(Any Seven Experiments)

COURSE OBJECTIVES:

- Determination of the physical parameters such as young's modulus by Uniform bending method, Non-Uniform bending method, Simple harmonic oscillations of cantilever and rigidity modulus of wire
- To impart knowledge in the determination of the thermal conductivity of a bad conductor by Lee's Disc method and band gap of a semiconductor
- Determination of the wavelength of the laser using grating, numerical aperture and acceptance angle in an optical iber and width of the groove in an compact disc by using laser
- Determination of the velocity of sound and compressibility of liquids by using ultrasonic interferometer
- Knowledge on the frequency of alternating current using electrically vibrating tuning fork by using Melde's apparatus

LIST OF EXPERIMENTS

1. Determination of Young's modulus by Uniform bending method
2. Determination of Young's modulus by non-uniform bending method
3. Simple harmonic oscillations of cantilever
4. Determination of rigidity modulus of wire and moment of inertia of regular objects – Torsion pendulum
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method
6. Determination of band gap of a semiconductor
7. Determination of the wavelength of the laser using grating
8. a) Determination of numerical aperture and acceptance angle in an optical iber
   b) Determination of width of the groove in an compact disc by using laser
9. Determination of the velocity of sound and compressibility of liquids by using ultrasonic interferometer
10. Determination of the frequency of alternating current using electrically vibrating tuning fork -Melde's apparatus

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Experiment and determine the physical characteristics of given solid materials using Young's modulus-Uniform bending method, non-uniform bending method, cantilever method and Torsion Pendulum.

CO2: Experiment and determine the thermal conductivity of a bad conductor using Lee's Disc method and band gap energy of a given semiconducting material using Zener diode.

CO3: Experiment and determine the optical property of light sources, acceptance angle of optical iber and width of the groove in an compact disc using Laser.

CO4: Experiment and determine the velocity of ultrasonic waves using ultrasonic interferometer.

CO5: Experiment and determine the frequency of alternating current using electrically vibrating tuning fork by using Melde's apparatus

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TEXT BOOKS:

1. Dr. P. Mani, Engineering Physics Practicals, Dhanam Publications (2022)

CO's – PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	-	-	-	-	-	-	-	-
CO2	3	3	1	1	-	-	-	-	-	-	-	-
CO3	3	3	1	1	-	-	-	-	-	-	-	-
CO4	3	3	1	1	-	-	-	-	-	-	-	-
CO5	3	3	1	1	-	-	-	-	-	-	-	-
AVG	3	3	1	1	-	-	-	-	-	-	-	-

CHEMISTRY LABORATORY

(Any Seven Experiments)

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as acidity, alkalinity.
- To acquire the knowledge in total hardness and dissolved oxygen and its impacts in industries through experiments
- To understand the impacts of chlorine in water sample through volumetric analysis.
- To induce the students to familiarize with electroanalytical techniques in the determination of impurities in aqueous solutions.
- To determine the amount of metal ions through spectroscopic techniques.

LIST OF EXPERIMENTS

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.
2. Determination of types and amount of alkalinity in a water sample
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Conductometric titration of barium chloride against sodium sulphate (precipitation titration).
9. Estimation of iron content of the given solution using potentiometer.
10. Estimation of sodium /potassium present in water using a lame photometer.

TOTAL: 30 PERIODS

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COURSE OUTCOMES:

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

CO1: Analyse the quality of water samples with respect to their acidity and alkalinity of water samples

CO2: Examine the water quality parameters like total hardness and DO with volumetric analysis.

CO3: Learn the permissible limit of chlorine in the given water sample

CO4: Analyse the impurities in solution by electro analytical techniques quantitatively

CO5: Determine the amount of metal ions through spectroscopic techniques.

CO's – PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	3	3	1	-	-	-	1
CO2	3	2	2	-	-	3	3	1	-	-	-	1
CO3	3	2	1	-	-	3	3	1	-	-	-	1
CO4	3	2	2	-	1	2	1	-	-	-	-	-
CO5	3	2	1	-	1	2	1	-	-	-	-	-
Avg.	3	2	1	-	1	3	2	1	-	-	-	1

TEXT BOOKS:

1. "Vogel's Textbook of Quantitative Chemical Analysis", (8^{th} Edition, 2014)
2. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, "Vogel's Textbookof Quantitative Chemical Analysis", (2009)

Chairman
BoS / S&H

23ENL11	ENGLISH LABORATORY (Common to B.E./B.Tech. all Branches)	L T P C 0 0 2 1

COURSE OBJECTIVES:

- To improve the communicative competence of learners.
- To help learners use language effectively in academic /work contexts.
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities those are relevant to authentic contexts.
- To use language ef iciently in expressing their opinions via various media.

UNIT-I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 6

Listening- Listening for General Information-Speci ic Details- Conversation: Introduction toClassmates - Audio / Video (Formal & Informal); Telephone Conversation; Listening to Voicemail & Messages; Listening and Filling a Form.
Speaking- Making Telephone Calls- Self Introduction; Introducing a Friend; - Politeness Strategies- Making Polite Requests, Making Polite Offers, Replying to Polite Requests and Offers- Understanding Basic Instructions (Filling out a Bank Application for Example).

UNIT-II NARRATION AND SUMMATION 6

Listening - Listening to Podcasts, Anecdotes / Stories / Event Narration; Documentaries and Interviews with Celebrities.
Speaking - Narrating Personal Experiences / Events-Talking about Current and Temporary Situations & Permanent and Regular Situations - Describing Experiences and Feelings- Engaging in Small Talk- Describing Requirements and Abilities.

UNIT-III DESCRIPTION OF A PROCESS / PRODUCT 6

Listening - Listen to Product and Process Descriptions; A Classroom Lecture; and Advertisements about Products.
Speaking - Picture Description- Describing Locations in Workplaces- Giving Instruction to Use the Product- Explaining Uses and Purposes- Presenting a Product- Describing Shapes and Sizes and Weights- Talking about Quantities (Large & Small)- Talking about Precautions.

UNIT-IV CLASSIFICATION AND RECOMMENDATIONS 6

Listening – Listening to Technology, Entertainment and Design (TED) Talks; Listening to Lectures - and Educational Videos.
Speaking – Small Talk; Discussing and Making Plans-Talking about Tasks-Talking about Progress- Talking about Positions and Directions of Movement- Talking about Travel Preparations- Talking about Transportation.

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UNIT-V **EXPRESSION** **6**

Listening - Listening to Debates/ Discussions; Different Viewpoints on an Issue; and Panel Discussions.

Speaking - Making Predictions- Talking about a Given Topic-Giving Opinions- Understandinga Website- Describing Processes.

TOTAL : 30 PERIODS

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 luently 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	PO12
CO1	-	-	-	-	-	-	-	-	3	3	-	3
CO2	-	-	-	-	-	-	-	-	3	3	-	3
CO3	-	-	-	-	-	-	-	1	2	3	-	2
CO4	-	-	-	-	-	-	-	-	2	3	-	2
CO5	-	-	-	-	-	-	-	1	3	3	-	2
AVR	-	-	-	-	-	-	-	1	3	3	-	2

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

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BoS / S&H

23ENT21	PROFESSIONAL ENGLISH – II (Common to B.E./B.Tech. all Branches)	L T P C 2 0 0 2

COURSE OBJECTIVES:

- To engage learners in meaningful language activities to improve their reading and writing skills.
- To learn various reading strategies and apply in comprehending documents in professional context.
- To help learners understand the purpose, audience, contexts of different types of writing.
- To develop analytical thinking skills for problem solving in communicative contexts.
- To demonstrate an understanding of job applications and interviews for internship and placements.

UNIT-I **MAKING COMPARISONS** **6**

Reading - Reading Advertisements, User Manuals, Brochures Emails.

Writing - Professional Emails, Email Etiquette - Compare and Contrast Essay.
Grammar - Mixed Tenses, Prepositional Phrase.

UNIT-II **EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING** **6**

Reading - Reading Longer Technical Texts– Cause and Effect Essays, and Letters / Emails of Complaint.
Writing - Writing Responses to Complaints.
Grammar - Active Passive Voice Transformations, In initive and Gerunds.

UNIT-III **PROBLEM SOLVING** **6**

Reading - Case Studies, Excerpts from Literary Texts, News Reports etc.
Writing - Letter to the Editor, Checklists, Problem Solution Essay / Argumentative Essay.
Grammar - Error Correction; If Conditional Sentences.

UNIT-IV **CLASSIFICATION AND RECOMMENDATIONS** **6**

Reading - Newspaper Articles.
Writing - Recommendations, Transcoding, Accident Report, Survey Report
Grammar - Reported Speech, Modals.
Vocabulary - Conjunctions- Use of Prepositions.

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UNIT-V **EXPRESSION** **6**

Reading - Company Pro iles, Statement of Purpose, (SOP), An Excerpt of Interview with Professionals.
Writing - Job / Internship Application – Cover Letter & Resume.
Grammar - Numerical Adjectives, Relative Clauses.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will able to

CO1:	Compare and contrast products and ideas in technical texts.
CO2:	Identify and report cause and effects in events, industrial processes through technical texts
CO3:	Analyse problems in order to arrive at feasible solutions and communicate them in the written format
CO4:	Present their ideas and opinions in a planned and logical manner
CO5:	Draft effective resumes in the context of job search.

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. Raman, Meenakshi, Sharma & Sangeeta, "Professional English", Oxford University Press, New Delhi, 2019.
2. Dr. V. Chellammal, "Learning to Communicate", Allied Publishers, New Delhi, 2003
3. V.N. Arora and Laxmi Chandra, "Improve Your Writing", Oxford University Press, NewDelhi, 2001.

E. RESOURCES:

- https://learnenglish.britishcouncil.org/

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CO'S-PO'S MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	-	-	-	-	-	1	2	3	-	2
CO2	-	-	-	-	-	-	1	-	3	3	-	3
CO3	-	1	1	-	-	-	-	-	3	3	-	3
CO4	-	-	-	-	-	-	-	-	2	3	-	2
CO5	-	-	-	-	-	-	-	-	2	3	-	2
AVG	-	1	1	-	-	-	1	1	2	3	-	2

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

Chairman
BoS / S&H

23MAT21	NUMERICAL METHODS AND STATISTICS (Common to B.E./B.Tech. all Branches)	L	T	P	C
		3	1	0	4

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 acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of engineering and statistical quality control

UNIT-I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson 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 and Jacobi's method for symmetric matrices.

UNIT-II INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules

UNIT-III NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

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 and Adams - Bash forth predictor corrector methods for solving first order differential equations.

UNIT-IV TESTING OF HYPOTHESIS 9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large andsmall samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes

UNIT-V DESIGN OF EXPERIMENTS 9+3

One way and two way classifications - Completely randomized design – Randomized block design -- Latin square design - 2^2 factorial design.

TOTAL : 60 PERIODS

Chairman
BoS / S&H

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 the concept of testing of hypothesis for small and large samples in real life problems

CO5 : Apply the basic concepts of classifications of design of experiments in the field of agriculture

TEXT BOOKS:

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2023
2. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2019

REFERENCE BOOKS:

1. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020
2. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016
3. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage
4. Learning, New Delhi, 8th Edition, 2014
5 Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, India, 2022

CO's – PO's MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	1	-	-	-	2	-	2	3
CO2	3	3	1	1	1	-	-	-	2	-	2	2
CO3	3	3	1	1	1	-	-	-	2	-	2	3
CO4	3	3	1	1	1	-	-	-	2	-	2	3
CO5	3	2	1	1	1	-	-	-	2	-	3	3
AVG	3	3	1	1	1	-	-	-	2	-	2	3

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

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BoS / S&H

23PHT22	MATERIALS SCIENCE (for B.E. MECH and 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**

Principles of heat transfer, steady state of heat low, conduction through compound media- series and parallel-conductivity of rubber tube and powder materials - heat transfer through fenestrations, thermal insulation and its bene its - heat gain and heat loss estimation - factors affecting the thermal performance of buildings - central heating.

UNIT-II **VENTILATION AND REFRIGERATION** **9**

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

UNIT-III **ACOUSTICS** **9**

Introduction-Classi ication of sound – Characteristics of sound - decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coef icient and its determination –factors affecting acoustics of buildings and their remedies.

UNIT-IV **OPTICAL PROPERTIES OF MATERIALS** **9**

Classi ication of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode – OLED

UNIT-V **NEW ENGINEERING MATERIALS** **9**

Ceramics – types and applications – Composites: classi ication, role of matrix and reinforcement – processing of ibre reinforced plastics and ibre reinforced metals –

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BoS / S&H

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

CO's – PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	1	1	-	-	-	-	-	1
CO2	3	1	2	-	2	1	-	-	-	-	-	1
CO3	3	2	2	1	2	2	1	-	-	-	-	1
CO4	3	1	1	-	2	2	-	-	-	-	-	1
CO5	3	-	2	-	2	2	2	-	-	-	-	1
AVG	3	2	2	1	2	2	2	-	-	-	-	1

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

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		L	T	P	C
23EET22	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (For B.E./B.Tech- CIVIL, CSE, MECH, AI&DS, BME, IT, Pharm.Tech branches)**	3	0	0	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 10

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 1ϕ Transformer, Three phase alternator, Three phase induction motor and Synchronous motor.

UNIT-IV ANALOG ELECTRONICS 8

Resistor, Inductor and Capacitor in electronic circuits, PN Junction diodes, Rectifier, Zener diode-Characteristics-Applications, Construction and characteristics of bipolar junction transistor-Biasing, JFET, MOSFET, IGBT, SCR, Amplifier –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

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COURSE OUTCOME

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	PO12	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	3	2	2	-	-	-	-	-	1	-	-	3	3	2

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

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BoS / EEE

23MET21	ENGINEERING GRAPHICS (Common to: B.E./B.Tech. all Branches)	L	T	P	C
		2	0	4	4

Course Objectives:

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

- Drawing engineering curves.
- Drawing projection of points, lines and plane surface.
- Drawingprojection of solids and freehand sketching.
- Drawing of sectioned solids and development of surfaces
- Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

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

UNIT-I PLANE CURVES **5+12**

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 — Drawing of tangents and normal to the above curves.

UNIT-II PROJECTION OF POINTS, LINES AND PLANE SURFACE **6+12**

Principal Planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT-III PROJECTION OF SOLIDS AND FREEHAND SKETCHING **6+12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Orthographic projection- Freehand sketching of multiple views from pictorial views of objects.

UNIT-IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **7+12**

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 — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

UNIT-V ISOMETRIC AND PERSPECTIVE PROJECTIONS **6+12**

Principles of isometric projection — isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL : 90 PERIODS

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COURSE OUTCOMES:

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

CO1: Construct the conic curves, involutes and cycloid

CO2: Solve practical problems involving projection of lines, Planes.

CO3: DrawProjection of solids and can draw freehand sketch.

CO4: Draw projection of sectioned solids and development of surfaces

CO5: Draw theisometric and perspective 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. BasantAgarwal 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	PO12	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

Chairman
BoS / Mech

23TAT21	TAMILS AND TECHNOLOGY (Common to B.E./B. Tech. all branches)	L T P C 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 ishery knowledge of Tamils
- To learn about scienti ic Tamil and its usage in online platforms

UNIT-I **WEAVING AND CERAMIC TECHNOLOGY** **3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graf iti on Potteries.

UNIT-II **DESIGN AND CONSTRUCTION TECHNOLOGY** **3**

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

UNIT-III **MANUFACTURING TECHNOLOGY** **3**

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

UNIT-IV **AGRICULTURE AND IRRIGATION TECHNOLOGY** **3**

Dam, Tank, ponds, Sluice, Signi icance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Speci ic Society

UNIT-V **SCIENTIFIC TAMIL & TAMIL COMPUTING** **3**

Development of Scienti ic 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

Chairman
BoS / S&H

COURSE OUTCOMES:

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

CO1: Relate the weaving ceramic technology of Tamils
CO2: Understand the knowledge of Tamils in design and construction technology
CO3: Recognize the manufacturing technology knowledge of Tamils
CO4: Criticize the agriculture and ishery knowledge of Tamils
CO5: Apply scienti ic Tamil in Various online platforms

E- RESOURCES:

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

CO's –PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	1	1	1	1	1	-	1
CO2	2	-	-	-	-	2	2	2	2	2	-	2
CO3	2	-	-	-	-	2	2	2	2	2	-	2
CO4	1	-	-	-	-	1	1	1	1	1	-	1
CO5	2	-	-	-	-	2	2	2	2	2	-	2
AVG	2	-	-	-	-	2	2	2	2	2	-	2

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23TAT21 **தமிழரும் தொழில்நுட்பமும்** **L T P C**
1 0 0 1

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

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 கட்டிடத் தொழில்நுட்பம்** **3**

சங்க காலத்தில் நெசவுத்தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்சங்க 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 - மாமல்லபுரச் 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 காட்டும் 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

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அலகு - IV **வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம்** **3**

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் 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 - கணித்தமிழ் 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

CO1: நெசவு மற்றும் பானைத்தொழில்நுட்பத்தை பற்றிப் புரிந்துகொள்வார்கள்
CO2: வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பத்தில் தமிழர்களின் அறிவைப் பெறுவார்கள்
CO3: தமிழர்களின் உற்பத்தி தொழில்நுட்பத்தை கண்டறிவார்கள்
CO4: தமிழர்களின் வேளாண்மை மற்றும் கடல்சார் அறிவைக் குறித்து விவாதிப்பார்கள்.
CO5: 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	PO12
CO1	1	-	-	-	-	1	1	1	1	1	-	1
CO2	2	-	-	-	-	2	2	2	2	2	-	2
CO3	2	-	-	-	-	2	2	2	2	2	-	2
CO4	1	-	-	-	-	1	1	1	1	1	-	1
CO5	2	-	-	-	-	2	2	2	2	2	-	2
AVG	2	-	-	-	-	2	2	2	2	2	-	2

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23EEL22	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L	T	P	C
		0	0	4	2

(for B.E./B.Tech- CIVIL, MECH, Pharm.Tech branches)

COURSE OBJECTIVES:

- To train the students in conducting load tests on electrical machines.
- To gain practical experience in characterizing electronic devices.
- To train the students to use DSO for measurements.

LIST OF EXPERIMENTS

1. Verification of ohms and Kirchhoff's Laws.
2. Speed control of DC Shunt Motor.
3. Load test on Self Excited DC Shunt Generator.
4. Load test on Single phase Transformer.
5. Load Test on 1Ø Induction Motor.
6. Characteristics of PN and Zener Diodes.
7. Characteristics of BJT and MOSFET.
8. Characteristics of SCR.
9. Half wave and Full Wave rectifiers.
10. Implementation of Binary Adder and Subtractor.
11. Study of Logic Gates.
12. Study of DSO.

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

CO1	Verify the Ohm's and Kirchhoff's Laws.
CO2	Analyze experimentally the load characteristics of electrical machines.
CO3	Analyze the characteristics of basic electrical devices.
CO4	Use DSO to measure the various parameters.
CO5	Analyze the characteristics of basic electronic devices.

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REFERENCE BOOKS:

1. SVHEC- Basic Electrical and Electronics Engineering Laboratory Manual.

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	-	-	-	2	-	-	-	3	3	-
CO2	3	3	2	1	1	-	-	-	2	-	-	-	3	3	-
CO3	3	3	2	1	1	-	-	-	2	-	-	-	3	1	-
CO4	3	3	2	1	1	-	-	-	2	-	-	-	3	1	-
CO5	3	3	2	1	1	-	-	-	2	-	-	-	3	1	-
AVG	3	3	2	1	1	-	-	-	2	-	-	-	3	2	-

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

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BoS / EEE

23ENL21	COMMUNICATION LABORATORY (Common to B.E./B.Tech. all Branches)	L T P C 0 0 4 2

COURSE OBJECTIVES:

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To analyse concepts and problems and make effective presentations explaining them clearly and precisely.
- To be able to communicate effectively through formal and informal writing.
- To be able to use appropriate language structures to write emails, reports and essays
- To give instructions and recommendations that are clear and relevant to the context

UNIT-I **MAKING COMPARISONS** **12**

Speaking - Role Play Exercises Based on Workplace Contexts- Talking about Competition- Discussing Progress toward Goals- Talking about Experiences- Talking about Events in Life-Discussing Past Events.
Writing - Writing Emails (Formal & Semi-Formal)

UNIT-II **EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING** **12**

Speaking - Discussing News Stories – Talking about Frequency- Talking about Travel Problems-Discussing Travel Procedures- Talking about Travel Problems- Making Arrangements-Describing Arrangements- Arrangements Discussing Plans and Decisions-Discussing Purposes and Reasons- Understanding Common Technology Terms.
Writing -Writing Different Types of Emails.

UNIT-III **PROBLEM SOLVING** **12**

Speaking - Discussing Predictions- Describing the Climate- Discussing Forecasts and Scenarios- Talking about Purchasing- Discussing Advantages and Disadvantages- Making Comparisons- Discussing Likes and Dislikes- Discussing Feelings about Experiences-Discussing Imaginary Scenarios.
Writing - Short Essays and Reports- Formal/Semi-Formal letters.

UNIT-IV **CLASSIFICATION AND RECOMMENDATIONS** **12**

Speaking - Discussing the Natural Environment- Describing Systems- Describing Position and Movement Explaining Rules (Example- Discussing Rental Arrangements)-Understanding Technical Instructions.

Writing - Writing Instructions -Writing a Short Article.

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UNIT-V **EXPRESSION** **12**

Reading - Describing Things Relatively-Describing Clothing-Discussing Safety Issues (Making Recommendations) Talking about Electrical Devices-Describing Controlling Actions.

Writing - Job Application (Cover Letter + Curriculum Vitae) – Writing Recommendations.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will able to

CO1: Speak effectively in group discussions held in a formal/semi formal contexts
CO2: Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions
CO3: Create emails, letters and effective job applications with resume.
CO4: Write critical reports to convey data and information with clarity and precision
CO5: Deliver suitable instructions and recommendations for safe execution of tasks

E-RESOURCES:

- https://www.englishclub.com/speaking/
- https://learnenglish.britishcouncil.org/

CO's-PO's MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	3	3	-	3
CO2	-	-	2	-	-	-	-	-	3	3	-	3
CO3	-	-	-	-	-	-	-	-	3	3	-	2
CO4	-	-	-	-	-	-	-	-	3	3	-	3
CO5	-	-	1	-	-	-	-	1	3	3	-	2
AVG	-	-	2	-	-	-	-	1	3	3	-	3

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

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23MDC21	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**

Physical exercises: Hand exercises – Leg exercises. Breathing exercises: Eye exercises – Kapalabathi. Makarasana. Body massages: Acupressure – Relaxation.

UNIT-II **KAYA KALPA** **3**

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**

Agna. Santhi : Clearence. Thuriya. Thuriyatheetham meditation

UNIT-IV **HUMAN RESOURCES DEVELOPMENT** **3**

Eradication of worries – Bene its of Blessings – Greatness of Friendship – Neutralization of anger - Individual peace and world peace

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

Suriya Namaskar, Padmasana, Vajrasana, Sukasana, Chakrasana (side posture), Viruchasana, Bhujangasana, Yoga mudra, Ustrasana, Maha Mudra, Vakkarasana.

TOTAL : 15 PERIODS

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Simpli ied Physical Exercises – Vethathiri Publications.
2. Sound health through yoga – Dr. K. Chandrasekaran.

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23MAT32 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (for B.E. CIVIL, MECH & BME)

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations
- To acquaint the student with Fourier, transform techniques used in wide variety of situations
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop 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 - First order partial differential equations reducible to standard types- Lagrange's linear equation

UNIT-II FOURIER SERIES 9+3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series
and cosine series – Root mean square value – 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 TRANSFORMS 9+3

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

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

Z-transforms - Elementary properties – Convergence of Z-transforms - – 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:

CO1: Understand how to solve the given standard partial differential equations.

CO2: Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

CO3: Appreciate the physical significance of Fourier series techniques in solving one dimensional heat flow problems and one-dimensional wave equations

CO4: 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

CO5: 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",44thEdition, 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", 5thEdition, 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	PO12
CO1	3	3	1	1	-	-	-	-	2	-	-	3
CO2	3	3	1	1	-	-	-	-	2	-	-	3
CO3	3	3	1	1	-	-	-	-	2	-	-	3
CO4	3	3	1	1	-	-	-	-	2	-	-	3
CO5	3	3	1	1	-	-	-	-	2	-	-	3
Avg	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**3**

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

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BoS / S&H

23MET31 **ENGINEERING MECHANICS** **L T P C**
2 1 0 3

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 the 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**

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 EQULIBRIUM OF RIGID BODIES **9**

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 - Equilibrium of Rigid bodies in three dimensions.

UNIT-III PROPERTIES OF SURFACES AND SOLIDS **9**

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**

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**

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.

TOTAL : 45 PERIODS

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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:

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, "Vector Mechanics for Engineers: Statics and Dynamics", McGraw Higher Education., 12thEdition, 2019.
2. Kumaravelan R. and Yugananth P., "Engineering Mechanics", 2nd Edition, Scitech Publications, 2015.
3. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

REFERENCE BOOKS:

1. Hibbeller, R.C., "Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics", 13th edition,Prentice Hall, 2013.
2. Timoshenko S, Young D H, Rao J V and SukumarPati, "Engineering Mechanics", 5thEdition, McGraw HillHigher Education, 2013.
3. Kottiswaran N., "Engineering Mechanics Statics and Dynamics", 10th Edition, Sri Balaji Publications Pvt.Ltd., 2013.

E-RESOURCES:

1. https://nptel.ac.in/courses/112106180
2. 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	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	-	-	-	-	-	-	2	3	1	-
CO2	3	2	2	1	1	-	-	-	-	-	-	2	3	1	-
CO3	3	2	3	1	1	-	-	-	-	-	-	2	3	1	-
CO4	3	2	3	1	1	-	-	-	-	-	-	2	3	1	-
CO5	3	2	3	1	1	-	-	-	-	-	-	2	3	1	-
Avg	**3**	**2**	**2.6**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**1**	**-**

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

Chairman 24/01/2024
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23MET32 **FLUID MECHANICS AND MACHINERY** **L T P C**
3 0 0 3

Course Objectives:

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

- To introduce the students about properties of the fluids, behavior of fluids under static conditions.
- To impart basic knowledge of the flow through pipes and boundary layer concept.
- To understand the importance of dimensional analysis and model studies.
- To understand the importance of various types of flow in turbines.
- To understand the importance of various types of flow in pumps.

UNIT-I FLUID PROPERTIES AND FLOW CHARACTERISTICS **9**

Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Flow characteristics – Rate of flow, concept of control volume - continuity equation, energy equation and momentum equation- Applications.

UNIT-II FLOW THROUGH PIPES AND BOUNDARY LAYER **9**

Laminar flow through circular conduits - friction factor - Major Loses - Darcy Weisbach equation and chezys formula - minor losses- Moody diagram - Pipes in series and parallel - Boundary layer concepts - Types of boundary layer thickness.

UNIT-III DIMENSIONAL ANALYSIS AND MODEL STUDIES **9**

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

UNIT-IV TURBINES **9**

Theory of rotodynamic machines - Classification of turbines – Working principles –Pelton wheel - Modern Francis turbine - Kaplan turbine - Velocity Triangle - Work done - Efficiencies – Draft tube - Specific speed - Performance curves for turbines - Governing of turbines.

UNIT-V PUMPS **9**

Classification of pumps - Centrifugal pumps - Working principle - Heads and efficiencies– Velocity triangles - Work done by the impeller - Performance curves - Reciprocating pump working principle - Indicator diagram and its variations – Pumps in parallel and series - Rotary pumps Classifications.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the properties and behavior of fluid in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics

CO2: Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel. Also, to understand the concept of boundary layer and its thickness on the flat solid surface.

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CO3: Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies

CO4: Explain the working principles of various turbines and design the various types of turbines.

CO5: Explain the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Fox W.R. and McDonald A.T., Introduction to Fluid Mechanics John-Wiley and Sons, Singapore, 2011.
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., 2014.
4. S K Som; GautamBiswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2012.
5. Streeter, V. L. and Wylie E. B., Fluid Mechanics, McGraw Hill Publishing Co., 2010.

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	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	2	3	3	3
CO2	3	3	3	2	-	-	-	-	-	-	-	2	3	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	2	3	3	3
CO4	3	3	3	2	-	-	-	-	-	-	-	2	3	3	3
CO5	3	3	3	2	-	-	-	-	-	-	-	2	3	3	3
Avg	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**	**3**

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

Chairman
BoS / Mech

23MET33	ENGINEERING THERMODYNAMICS	L	T	P	C
		3	0	0	3

Course Objectives:

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

1. Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems.
2. Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations.
3. Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart
4. Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations.
5. Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.

UNIT-I BASICS, ZEROTH AND FIRST LAW 9

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 – steady and unsteady flow processes.

UNIT-II SECOND LAW AND ENTROPY 9

Heat Engine – Refrigerator - Heat pump. Statements of second law and their equivalence & corollaries. Carnot cycle - Reversed Carnot cycle - 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

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

UNIT-IV PROPERTIES OF PURE SUBSTANCES 9

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.

UNIT-V GAS MIXTURES AND THERMODYNAMIC RELATIONS 9

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 : 45 PERIODS

27/01/2024
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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	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	1	-	-	2	-	1	2	3	2	3
CO2	3	3	2	1	-	1	-	-	2	-	1	2	3	2	3
CO3	3	3	2	1	-	1	-	-	2	-	1	2	3	2	3
CO4	3	3	2	1	-	1	-	-	2	-	1	2	3	2	3
CO5	3	3	2	1	-	1	-	-	2	-	1	2	3	2	3
AVG	**3**	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**2**	**-**	**1**	**2**	**3**	**2**	**3**

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

Chairman 23/5/2024
BoS / Mech

23MET34 ENGINEERING MATERIALS AND METALLURGY

L	T	P	C
3	0	0	3

Course Objectives:

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

- To learn the constructing the 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 engineering 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 – phase diagrams, Isomorphous,eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – Iron carbide equilibrium diagram.Classification of steel and cast-Iron microstructure, properties and application.

UNIT-II HEAT TREATMENT 9

Definition – Full annealing, stress relief, recrystallisation and spheroidising –normalizing, hardening andtempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram– continuous cooling Transformation (CCT) diagram – Austempering, Martempering – Hardenability,Jominy end quench test -case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame andInduction 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 –super alloys – shape memory alloys- Properties and Applications.

UNIT-IV NON-METALLIC MATERIALS 9

Polymers – types of polymers, commodity and engineering polymers – Properties and applications ofPE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PAI, PPO, PPS, PEEK, PTFE, Thermoset polymers –Urea and Phenol formaldehydes –Nylon, Engineering Ceramics – Properties and applications of Al_2O_3,SiC, Si_3N_4, PSZ and SIALON –Composites- Matrix and reinforcement Materials-applications of Composites - Nano composites.

UNIT-V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS 9

Mechanisms of plastic deformation, slip and twinning – Types of fracture – fracture mechanics-Griffith'stheory- Testing of materials under tension, compression and shear loads – Hardness tests (Brinell,Vickers and Rockwell), Micro and nano-hardness tests, Impact test lzod and charpy, fatigue and creepfailure mechanisms.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1: Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.

CO2: Explain isothermal transformation, continuous cooling diagrams and different heattreatment processes.

CO3: Clarify the effect of alloying elements on ferrous and non-ferrous metals

CO4: Summarize the properties and applications of non-metallic materials

CO5: Explain the testing of mechanical properties.

TEXT BOOKS:

1. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of IndiaPrivate Limited, 9th edition ,2018.
2. Sydney H.Avner, "Introduction to Physical Metallurgy", McGraw Hill Book Company, 1994

REFERENCE BOOKS:

1. A. Alavudeen, N. Venkateshwaran, and J. T.WinowlinJappes, A Textbook of Engineering Materialsand Metallurgy, Laxmi Publications, 2006
2. Amandeep Singh Wadhwa, andHarvinder Singh Dhaliwal, A Textbook of Engineering Material andMetallurgy, 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
5. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, 2nd edition Re print2019.

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	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	2	-	-	-	-	-	-	-	2	2	1	2
CO2	3	1	3	1	-	2	-	1	-	-	-	2	2	1	2
CO3	3	1	3	-	-	-	-	-	-	-	-	2	2	1	2
CO4	3	1	3	-	-	-	2	-	-	-	-	2	2	1	2
CO5	3	1	3	2	2	-	-	-	-	-	-	2	2	1	2
Avg	**3**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**2**	**2**	**1**	**2**

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

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23MET35	MANUFACTURING PROCESSES	L	T	P	C
		3	0	0	3

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 sandProperties and testing – Cores –Types and applications – Molding machines – Types and applications–Melting furnaces – Principle of special casting processes- Shell, investment – Ceramic mould – Pressure diecasting – low pressure, gravity- Tilt pouring, high pressure die casting- Centrifugal Casting – CO2 casting –Defects in Sand casting process-remedies.

UNIT-II METAL JOINING PROCESSES **9**

Fusion welding processes – Oxy fuel welding – Filler and Flux materials--Arc welding, Electrodes, Coatingand specifications – Gas Tungsten arc welding –Gas metal arc welding - Submerged arc welding – Electroslag welding– Plasma arc welding –- Resistance welding Processes -Electron beam welding –Laser beamWelding Friction welding – Friction stir welding – Diffusion welding – Thermit Welding, Weld defects –inspection &remedies – Brazing - soldering – Adhesive bonding.

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 ofRolling – Flat strip rolling – shape rolling operations – Defects in rolled parts – Principle of rod and wiredrawing – Tube drawing – Principles of Extrusion – Types – Hot and Cold extrusion. Introduction to shapingoperations.

UNIT-IV SHEET METAL PROCESSES **9**

Sheet metal characteristics – Typical shearing, bending and drawing operations – Stretch forming operations– Formability of sheet metal – Test methods –special forming processes - Working principle and applications– Hydro forming – Rubber pad forming – Metal spinning – Introduction of Explosive forming, magnetic pulseforming, peen forming, Super plastic forming – Micro forming – Incremental forming.

UNIT-V MANUFACTURE OF PLASTIC COMPONENTS **9**

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

TOTAL : 45 PERIODS

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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, 2013.
2. P.N.Rao Manufacturing Technology Volume 1 McGrawhill Education 5th edition,2018.
3. HajraChouldhary S.K and HajraChoudhury. AK., Elements of workshop Technology, volume I and II, Media promoters and Publishers Private Limited, Mumbai, 1997.

REFERENCE BOOKS:

1. Roy. A. Lindberg, Processes and materials of manufacture, PHI / Pearson education, 2006.
2. S. GowriP.Hariharan, A.SureshBabu, Manufacturing Technology I, Pearson Education, 2008.
3. Sharma, P.C., A Text book of production Technology, S.Chand and Co. Ltd., 2004.

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	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	-	2	3	1	1	-	-	1	3	1	-
CO2	3	-	2	-	-	2	3	1	1	-	-	1	3	1	-
CO3	3	-	2	-	-	2	3	1	1	-	-	1	3	1	-
CO4	3	-	2	-	-	2	3	1	1	-	-	1	3	1	-
CO5	3	-	2	-	2	2	3	1	1	-	-	1	3	1	-
Avg	**3**	**-**	**2**	**-**	**2**	**2**	**3**	**1**	**1**	**-**	**-**	**1**	**3**	**1**	**-**

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

Chairman
BoS / Mech

23EST31	ENTREPRENEURSHIP AND STARTUP	L	T	P	C
		1	0	0	1

Course Objectives:

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

- To develop a knowledge on basic concepts of entrepreneurship.
- To know about business opportunities and project evaluation criteria.
- To explore the concept of startups, government schemes and other financial institutions support

UNIT-I ENTREPRENEURSHIP CONCEPTS **5**

Entrepreneurship-Meaning-Origin-Functions-Factors Affecting Entrepreneurial Growth- - Role of Entrepreneurship in Economic Development- Skills required for an Entrepreneur - Barriers to Entrepreneurship - Stages in Entrepreneurial Process.

UNIT-II PROJECT FORMULATION AND IDENTIFICATION **5**

Identification of business opportunities -Project formulation- Project Classification and Identification - Project Objectives - Technical Analysis, Financial Analysis – Environmental Appraisal of Project - EDP Phases - Project Report Preparation.

UNIT-III START UP OPPORTUNITIES AND FINANCE **5**

The New Industrial Revolution- Business Start-up - Rise of the startup Economy- Government Initiatives - Government schemes and incentives - Institutional service to entrepreneur - Sources of Finance.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

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

CO1: Enhanced the knowledge of entrepreneurship qualities and skills to startup a business.

CO2: Understand the project classification and prepare a feasibility report.

CO3: Provide vision for the own Start-up and its importance for economic development.

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CO, PO & PSO MAPPING

CO/ PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	1	-	-	-	-	-	-	-	3	2	2
CO2	2	3	1	3	-	-	-	-	-	-	-	-	2	1	2
CO3	1	-	3	2	2	-	-	-	-	-	-	-	1	3	2
Avg	2	2	2	1.6	1	-	-	-	-	-	-	-	2	2	2

TEXT BOOKS:

1. Gupta C.B and Srinivasan N.P- Entrepreneurial development-Sultan Chand and Sons- Latest edtion.
2. Khanka S.S.-Entrepreneurial Development-S.Chand & Co,RamNagar, New Delhi, Latest edtion.

REFERENCE BOOKS:

1. Vasant Desai-Project Management and Entrepreneurship-Himalaya Publishing House, 2023.
2. P.Narayana Reddy – Entrepreneurship Text and Cases- Cengage learning.2022.
3. Prasanna Chandra- Projects planning, analysis, selection, implementation and review Tata McGraw-Hill Publishing Co, Latest edtion.
4. Donald F.Kuratko -Entrepreneurship theory, process & practice-9th Edition-Cengage Learning, 2022.

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23MEL31 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. - 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.

PART-II 2D DRAFTING 48

Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed Drawing.

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

Total: 20% of classes for theory classes and 80% of classes for practice

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

CO1	Prepare comprehensive drawing layouts for modeled assemblies, including accurate Bills of Materials (BoM).
CO2	Demonstrate the ability to create precise orthogonal views for machine components using 3D modeling.
CO3	Develop skills in preparing standard drawing layouts for various modeled parts, ensuring clarity and adherence to industry standards.
CO4	Showcase proficiency in integrating BoM within assembly drawings for effective documentation and communication.
CO5	Apply learned techniques to generate standardized drawing layouts that meet industry requirements for modeled parts.

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TEXT BOOKS:

1. Gopalakrishna K.R., "Machine Drawing", 17th Edition, Subhas Stores Books Corner, Bangalore,2003.
2. N. D . Bhatt and V.M. Panchal, "Machine Drawing", 51st Edition, Charator Publishers,2022.
3. GoutamPohit and GoutamGhosh, "Machine Drawing with AutoCAD", 1st Edition,Pearson Education, 2004

REFERENCE BOOKS:

1. Jun narkar, N.D., "Machine Drawing", 1st Edition, Pearson Education, 2004
2. N. Siddeshwar, P. Kanniah, V.V.S. Sastri," Machine Drawing" , published by Tata McGrawHill,2006
3. S. Trymbaka Murthy, "A Text Book of Computer Aided Machine Drawing", CBS Publishers, New Delhi, 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's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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

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23MEL32	MANUFACTURING PROCESS AND MACHINING LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives:

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

- Selecting appropriate tools, equipment's and machines to complete a given job.
- Performing various welding process using GMAW
- Fabricating gears using gear making machines.
- Performing various machining process such as rolling, drawing, turning, shaping, drilling, milling
- Analyzing the defects in the cast and machined components.

LIST OF EXPERIMENTS

1. Fabricating simple structural shapes using Gas Metal Arc Welding machine.
2. Preparing green sand moulds with cast patterns.
3. Taper Turning and Eccentric Turning on circular parts using lathe machine.
4. Knurling, external and internal thread cutting on circular parts using lathe machine.
5. Shaping – Square and Hexagonal Heads on circular parts using shaper machine.
6. Drilling and Reaming using vertical drilling machine.
7. Milling contours on plates using vertical milling machine.
8. Cutting spur and helical gear using milling machine.
9. Grinding components using cylindrical and centerless grinding machine.
10. Grinding components using surface grinding machine.
11. Cutting force calculation using dynamometer in milling machine
12. Cutting force calculation using dynamometer in lathe machine

Total Hours 60

COURSE OUTCOME

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

CO1: Demonstrate the safety precautions exercised in the mechanical workshop

CO2: Join two metals using GMAW

CO3: Make the gears using gear making machines

CO4: Make the work piece as per given shape and size using machining process such as rolling, drawing, turning, shaping, drilling and milling.

CO5: Become and Analyze the defects in the cast and machined components

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CO's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	1	-	2	-	-	1	2	1	-
CO2	3	-	-	-	-	-	1	-	2	-	-	1	2	1	-
CO3	3	-	-	-	-	-	1	-	2	-	-	1	2	1	-
CO4	3	-	-	-	-	-	1	-	2	-	-	1	2	1	-
CO5	3	-	-	-	-	-	1	-	2	-	-	1	2	1	-
Avg	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**-**	**-**	**1**	**2**	**1**	**-**

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

Reference:

1. Manual prepared by the faculty of Mechanical Engineering Department, SVHEC.

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23MET41	THEORY OF MACHINES	L	T	P	C
		3	0	0	3

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 thedisplacement, 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 andanalyzing 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**

Mechanisms – Terminology and definitions – kinematics inversions of 4 bar and slide crank chain – kinematics analysis in simple mechanisms – velocity and acceleration polygons– Analytical methods – computer approach – cams – classifications – displacement diagrams - layout of plate cam profiles – derivatives offollowers motion – circular arc and tangent cams.

UNIT-II GEARS AND GEAR TRAINS **9**

Spur gear – law of toothed gearing – involute gearing – Interchangeable gears – Gear tooth action interference and undercutting – nonstandard teeth – gear trains – parallel axis gears trains – epicyclic gear trains – automotive transmission gear trains.

UNIT-III FRICTION IN MACHINE ELEMENTS **9**

Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt and rope drives – Friction aspects in brakes– Friction in vehicle propulsion and braking.

UNIT-IV FORCE ANALYSIS **9**

Applied and Constrained Forces – Free body diagrams – static Equilibrium conditions – Two, Three and four members – Static Force analysis in simple machine members – Dynamic Force Analysis – Inertia Forces and Inertia Torque – D'Alembert's principle – superposition principle – dynamic Force Analysis in simple machine members.

UNIT-V BALANCING AND VIBRATION **9**

Static and Dynamic balancing – Balancing of revolving and reciprocating masses – Balancing machines – free vibrations – Equations of motion – natural Frequency – Damped Vibration – bending critical speed of simple shaft – Torsional vibration – Forced vibration – harmonic Forcing – Vibration isolation. (Gyroscopic principles)

TOTAL : 45 PERIODS

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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 PvtLimited, 2013.

REFERENCE BOOKS:

1. Rao.J.S. and Dukkipati.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=WmzAO3LdTTE

CO's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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

Chairman
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23MET42	THERMAL ENGINEERING	L	T	P	C
		4	0	0	4

Course Objectives:

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

- To learn the concepts and laws of thermodynamics to predict the operation of thermodynamic cycles and performance of Internal Combustion(IC) engines and Gas Turbines
- To analyzing the performance of steam nozzle, calculate critical pressure ratio
- To Evaluating the performance of steam turbines through velocity triangles, understand the need for governing and compounding of turbines
- To analyzing the working of IC engines and various auxiliary systems present in IC engines.
- To evaluating the various performance parameters of IC engines.

UNIT-I THERMODYNAMIC CYCLES **12**

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

UNIT-II STEAM NOZZLES AND INJECTOR **12**

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 **12**

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

UNIT-IV INTERNAL COMBUSTION ENGINES – FEATURES AND COMBUSTION **12**

IC engine – Classification, working, components and their functions. Ideal and actual : Valve and port timingdiagrams, 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.

UNIT-V INTERNAL COMBUSTION ENGINE PERFORMANCE AND AUXILIARY SYSTEMS **12**

Performance and Emission Testing, Performance parameters and calculations. Morse and Heat Balancetests. 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

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Apply thermodynamic concepts to different air standard cycles and solve problems..

CO2: To solve problems in steam nozzle and calculate critical pressure ratio

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CO3: Explain the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems.

CO4: Explain the functioning and features of IC engine, components and auxiliaries..

CO5: Calculate the various performance parameters of IC engines.

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

E-RESOURCES:

1. https://www.youtube.com/watch?v=2LPQX4F-GoA&list=PLwdnzlV3ogoWV-_n1YItO933MxgPXfEiM
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	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	3	-	-	-	3	-	-	-	3	-	-
CO2	2	3	3	-	2	-	-	-	2	-	-	-	3	-	-
CO3	2	3	3	-	3	-	-	-	3	-	-	-	3	-	-
CO4	2	3	3	-	2	-	-	-	2	-	-	-	3	-	-
CO5	2	2	2	-	3	-	-	-	3	-	-	-	3	-	-
Avg	**2.4**	**2.8**	**2.8**	**-**	**2.6**	**-**	**-**	**-**	**2.6**	**-**	**-**	**-**	**3**	**-**	**-**

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

Chairman 20/11/2024
BoS / Mech

23MET43	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 PRINICIPLES AND HYDRAULIC PUMPS 9

Introduction to Fluid power – Advantages and Applications – Fluid power systems – Types of fluids -Properties of fluids and selection – Basics of Hydraulics – Pascal's Law – Principles of flow - Friction loss –Work, Power and Torque- Problems, Sources of Hydraulic power: Pumping Theory-– Pump Classification –Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criteria of pumps –Fixed and Variable displacement pumps .

UNIT-II HYDRAULIC ACTUATORS AND CONTROL COMPONENTS 9

Hydraulic Actuators: Cylinders – Types and construction, Application, Hydraulic cushioning – RotaryActuators-Hydraulic motors - Control Components: Direction Control, Flow control and pressure control valves– Types, Construction and Operation – Accessories: Reservoirs, Pressure Switches – Filters –types andselection- Applications – Fluid Power ANSI Symbols.

UNIT-III HYDRAULIC CIRCUITS AND SYSTEMS 9

Accumulators, Intensifiers, Industrial hydraulic circuits – Regenerative, Pump Unloading, Double-Pump,Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-Safe, Speed Control,Deceleration circuits, Sizing of hydraulic systems, Hydrostatic transmission, Electro hydraulic circuits, –Servoand Proportional valves – Applications- Mechanical, hydraulic servo systems.

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, Design of Pneumatic circuit – classification- single cylinder andmulti cylinder circuits-Cascade method –Integration of fringe circuits, Electro Pneumatic System – Elements– Ladder diagram – timer circuits-Problems, Introduction to fluidics and pneumatic logic circuits.

UNIT-V TROUBLE SHOOTING AND APPLICATIONS 9

Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems,Conditioning of hydraulic fluids Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding,Press and Forklift applications- mobile hydraulics; Design of Pneumatic circuits for metal working, handling,clamping counter and timer circuits. – Low-cost Automation – Hydraulic and Pneumatic power packs, IOT inHydraulics and pneumatics.

TOTAL : 45 PERIODS

Chairman
BoS / Mech

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.

CO2: Apply the working principles of hydraulic actuators and control components.

CO3: Design and develop hydraulic circuits and systems.

CO4: Apply the working principles of pneumatic circuits and power system and its components.

CO5: Identify various 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

REFERENCE BOOKS:

1. Jagadeesha. T., "Pneumatics Concepts, Design and Applications ", Universities Press, 2015.
2. Joshi.P., Pneumatic Control", Wiley India, 2008.
3. Majumdar, S.R., "Oil Hydraulics Systems – Principles and Maintenance",TataMcGraw Hill, 2001.
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	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	-	-	-	-	-	-	-	1	2	1	1
CO2	2	1	1	1	-	-	-	-	-	-	-	1	2	1	1
CO3	2	1	1	1	-	-	-	-	-	-	-	1	2	1	1
CO4	2	1	1	1	-	-	-	-	-	-	-	1	2	1	1
CO5	2	1	1	1	-	-	-	-	-	-	-	1	2	1	1
Avg	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**	**1**

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

Chairman
BoS / Mech

23MET44 **MANUFACTURING TECHNOLOGY**

L	T	P	C
3	0	0	3

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.
- Study the basic concepts of CNC of machine tools and constructional features of CNC.
- Learn the basics of CNC programming concepts to develop the part programme for Machinecentre and turning centre.

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, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability.

UNIT-II TURNING MACHINES **9**

Centre lathe, constructional features, specification, operations – taper turning methods, thread cuttingmethods, special attachments, surface roughness in turning, machining time and power estimation. Speciallathes - Capstan and turret lathes- tool layout – automatic lathes: semi-automatic – single spindle: Swisstype, automatic screw type – multi spindle.

UNIT-III RECIPROCATING MACHINE TOOLS **9**

Reciprocating machine tools: shaper, planer, slotter: Types and operations- Hole making: Drilling, reaming,boring, tapping, type of milling operations-attachments- types of milling cutters– machining time calculation- 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, centrelessgrinding, internal grinding - micro finishing methods.

UNIT-IV CNC MACHINES **9**

Computer Numerical Control (CNC) machine tools, constructional details, 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, Setting up a CNC machine for machining.

TOTAL : 45 PERIODS

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BoS / Mech

COURSE OUTCOMES:

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

CO1: Apply the mechanism of metal removal process and to identify the factors involved in improvingmachinability

CO2: Describe the constructional and operational features of centre lathe and other special purposelathes.

CO3: Constructional and operational features of reciprocating machine tools

CO4: Apply the constructional features and working principles of CNC machine tools.

CO5: Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNCmachine tools to manufacture 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, 2018.
3. Rao. P.N "Manufacturing Technology," Metal Cutting and Machine Tools, Tata McGraw- Hill, New Delhi, 2009.

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	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	1	3	-	-	3	-	2	3	3	2
CO2	3	3	3	1	1	1	3	-	-	3	-	2	3	2	2
CO3	3	3	3	1	1	1	3	-	-	3	-	2	3	2	2
CO4	3	3	3	1	1	1	3	-	-	3	-	2	3	2	2
CO5	3	3	3	1	1	1	3	-	-	3	-	2	3	2	3
Avg	**3**	**3**	**3**	**1**	**1**	**1**	**3**	**-**	**-**	**3**	**-**	**2**	**3**	**2**	**2**

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

Chairman
BoS / Mech

23MET45	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3

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 - Volumertric strains – Stresses on inclined planes – Principal stresses and principal planes – Mohr's circle of stress.

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 and over hanging beams. Theory of simple bending – Bending stress distribution – Load carrying capacity – Proportioning of sections – Flitched beams – Shear stress distribution.

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 to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – springs in series and parallel.

UNIT-IV DEFLECTION OF BEAMS 9

Elastic curve – Governing differential equation - Double integration method - Macaulay's method – Area moment method - Conjugate beam method for computation of slope and deflection of determinant beams.

UNIT-V THIN CYLINDERS, SPHERES AND THICK CYLINDERS 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 - Lame's theory.

TOTAL : 45 PERIODS

Chairman
BoS / Mech

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, 7th edition, 2018.
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", Khanna Publishers, New Delhi 2014.

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/112107146
2. https://archive.nptel.ac.in/courses/112/107/112107147/

CO's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	1	-	2	3
CO2	2	3	3	3	-	-	-	-	-	-	-	1	2	-	3
CO3	3	3	3	3	-	2	2	-	-	-	-	1	2	-	3
CO4	2	3	3	2	-	2	2	-	-	-	-	1	-	2	3
CO5	2	3	3	3	-	2	2	-	-	-	-	1	2	-	3
Avg	**2.4**	**2.8**	**2.8**	**2.8**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**	**3**

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

Chairman 22/01/2024
BoS / Mech

23CYT41	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY (Common to: B.E./B.Tech. all Branches)	L 2	T 0	P 0	C 2

Course Objectives:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and sustainable practices
- To imbibe awareness on manmade activities and population issues

UNIT-I ENVIRONMENT AND BIODIVERSITY 6

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity – values of biodiversity, India as a mega-diversity nation – threats to biodiversity – conservation of biodiversity. Activity: Documentation of ecosystems/Biodiversity within Campus.

UNIT-II ENVIRONMENTAL POLUTION 6

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts. Activity: Documentation of pollution issues in Erode district.

UNIT-III RENEWABLE SOURCES OF ENERGY 6

Energy management and conservation - New Energy Sources: Need and different types of new energy sources. Concept, origin and applications of - Hydrogen energy, Ocean energy, Tidal energy and geothermal energy conversion. Activity: Documentation of available renewable resources in Erode district.

UNIT-IV SUSTAINABILITY AND MANAGEMENT 6

Development, GDP, Sustainability- concept, needs and challenges - Sustainable Development Goals - Concept of Carbon Credit, Carbon Footprint. Circular economy, ISO 14000 Series, Material Life Cycle Assessment, Environmental Impact Assessment. Green Engineering. Activity: Documentation of sustainable goals of Tamilnadu.

UNIT-V HUMAN POPULATION AND DISASTER MANAGEMENT 6

Population growth, Population explosion— Family Welfare Program – Environment and human health. Human rights – HIV/AIDS – Women and Child Welfare – Role of Information Technology in environment and human health – Disaster management: Floods, earthquake, cyclone and landslides. Activity: Documentation of women development schemes in Tamilnadu.

TOTAL :30 PERIODS

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BoS / S&H

COURSE OUTCOMES:

At the end of the course the students will be able to	
CO1:	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
CO2:	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
CO3:	To identify and apply the understanding of renewable and non-renewable resources
CO4:	To recognize the different goals of sustainable development and sustainability practices and apply them for future development.
CO5:	To aware the population issues and to handle the disaster issues

TEXT BOOKS:

1. Dr. A.Ravikrishnan "Environmental Sciences and Sustainability", 2nd Edition, Sri Krishna Hitech Publishing Company Pvt. Ltd, 2022.

2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2010.

3. Gilbert M.Masters& Wendell P Ela, 'Introduction to Environmental Engineering and Science', 3rdedition, Prentice – Hall of India Pvt. Ltd, New Delhi, 2008.

REFERENCE BOOKS:

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2009.

2. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2022.

3. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2023.

E- SOURCES:

Unit 1:https://www.youtube.com/watch?v=Ar04qG1P8Es (IIT ROORKEE NPTEL)&https://www.youtube.com/watch?v=SHxAOoxhKTA (IIT KANPUR NPTEL)
Unit 2:https://www.youtube.com/watch?v=I7Z34WU257U (IIT ROORKEE NPTEL)
Unit 3:https://www.youtube.com/watch?v=1kUE0BZtTRc (NATIONAL GEOGRAPHIC)
Unit 4:https://www.youtube.com/watch?v=Crd3CFq5B4s (IITM NPTEL)
Unit 5:https://www.youtube.com/watch?v=sMqtwbKc8EA (FINANCIAL TIMES)

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CO's& PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	2	3	-	-	-	-	2
CO2	3	2	-	-	-	3	3	-	-	-	-	2
CO3	3	-	1	-	-	2	2	-	-	-	-	2
CO4	3	2	1	1	-	2	2	-	-	-	-	2
CO5	3	2	1	-	-	2	2	-	-	-	-	1
AVG	3	2	1	1	-	2	2	-	-	-	-	2

1- low,2-medium,3-high, '-'- nocorrelation

Chairman
BoS / S&H

23MEL41	MATERIALS TESTING AND FLUID MECHANICS AND MACHINERY LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives:

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

- Study the mechanical properties of metals
- Study the mechanical properties ofwood
- Test spring in spring testing machine
- Study the principles in fluid mechanics by performing experiments in laboratory.
- Study the principles in fluid machinery theory by performing experiments in laboratory.

MATERIALS TESTINGLABORATORY **(30)**

LIST OF EXPERIMENTS:

(1) Tension test on mild steel rod.
(2) Torsion test on mild steel rod
(3) Hardness test on metal (Rockwell and BrinellHardness).
(4) Compression test on helical spring
(5) Deflection test on carriage spring.

FLUID MECHANICS AND MACHINERY LABORATORY **(30)**

LIST OF EXPERIMENTS:

(1) (a)Determination of coefficient of discharge of a venture meter
(b)Determination of friction factor for flow through pipes
(2) (a) Determination of metacentric height
(b) Determination of forces due to impact of jet on a fixed plate
(3) Characteristics of centrifugal pumps
(4) Characteristics of reciprocating pump
(5) Characteristics of Pelton wheel turbine

TOTAL :60PERIODS

COURSE OUTCOMES

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

CO1 Determine the tensile, torsion and hardness properties of metals by testing

CO2 Determine the stiffness properties of helical spring and carriage spring.

CO3 Apply the conservation laws to determine the coefficient of discharge of a Venture meter and finding the friction factor of given pipe.

CO4 Apply the fluid static and momentum principles to determine the metacentric heightand forces due to impact of jet.

CO5 Determine the performance characteristics of turbine, rotodynamic pump and positive displacement pump.

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CO's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	1	-	-	3	-	-	2	2	2	1
CO2	3	2	1	3	3	1	-	-	3	-	-	2	3	2	1
CO3	3	3	2	3	2	1	-	-	3	-	-	2	3	2	1
CO4	3	3	1	3	3	1	-	-	3	-	-	2	3	2	1
CO5	3	3	1	3	3	1	-	-	3	-	-	2	3	2	1
Avg	**3**	**2.6**	**1.2**	**3**	**2.9**	**1**	**-**	**-**	**3**	**-**	**-**	**2**	**2.9**	**2**	**1**

REFERENCE:

1. Manual prepared by the faculty of Mechanical Department, SVHEC

Chairman
BoS / Mech

23MEL42 **THERMAL ENGINEERING LABORATORY**

L	T	P	C
0	0	4	2

Course Objectives:

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

- Study the valve timing diagram
- Study the port timing diagram
- Perform the characteristics test of IC engines.
- Study the Performance of refrigeration cycle / components.
- Study the Performance and Energy Balance Test on a Steam Generator.

PART I IC ENGINES LABORATORY **45**

List of Experiments

1. Valve Timing and Port Timing diagrams.
2. Actual p-v diagrams of IC engines.
3. Performance Test on four – stroke Diesel Engine.
4. Heat Balance Test on 4 – stroke Diesel Engine.
5. Morse Test on Multi-Cylinder Petrol Engine.
6. Retardation Test on a Diesel Engine.
7. Determination of p-θ diagram and heat release characteristics of an IC engine.
8. Determination of Flash Point and Fire Point of various fuels / lubricants
9. Performance test on a two stage Reciprocating Air compressor
10. Determination of COP of a Refrigeration system

PART II STEAM LABORATORY **15**

List of Experiments

1. Study of Steam Generators and Turbines.
2. Performance and Energy Balance Test on a Steam Generator.
3. Performance and Energy Balance Test on Steam Turbine.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Conduct tests to draw valve timing diagram

CO2: Conduct tests to draw port timing diagram

CO3: Conduct tests to evaluate performance characteristics of IC engines

CO4: Conduct tests to evaluate the performance of refrigeration cycle

CO5: Conduct tests to evaluate Performance and Energy Balance on a Steam Generator

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CO's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	-	-	-	-	1	-	-	1	1	1	1
CO2	2	2	1	1	-	-	-	-	1	-	-	1	1	1	1
CO3	2	2	1	1	-	-	-	-	1	-	-	1	1	1	1
CO4	2	2	1	1	-	-	-	-	1	-	-	1	1	1	1
CO5	2	2	1	1	-	-	-	-	1	-	-	1	1	1	1
Avg	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**1**	**1**	**1**

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

Reference:

1. Manual prepared by the faculty of Mechanical Department, SVHEC.

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