E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

NAGAPATTINAM – 611 002.

(Affiliated to Anna University, Chennai | Accredited by NAAC with 'A++' Grade

Accredited by NBA | Approved by AICTE, New Delhi)

REGULATIONS - R2023

B.E. / B.Tech. – THIRD SEMESTER CURRICULUM

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			CREDITS
				L	T	P	
Theory Courses							
1.	2301MA303	Transforms and Partial Differential Equations	BSC	3	2	0	4
2.	2302ME301	Engineering Thermodynamics	PCC	3	0	0	3
3.	2302ME302	Fluid Mechanics and Machinery	ESC	3	0	0	3
4.	2301GEX07	Environmental Sciences and Sustainability	BSC	2	0	0	2
5.	2302ME303	Manufacturing Technology I	PCC	3	0	0	3
6.		Engineering Mechanics	ESC	3	0	0	3
LABORATORY COURSES							
7.	2302ME351	Computer Aided Machine Drawing	ESC	0	0	4	2
8.	2302ME352	Manufacturing Technology Laboratory I	PCC	0	0	2	1
9	2302ME353	Fluid Mechanics and Machinery Laboratory	ESC	0	0	2	1
10.	2304GE301	Professional Development course 1$	EEC	0	0	2	1
11.		**Life skill course** 3#	MC	0	0	0	-
TOTAL				-	-	-	**24**

2301MA303	TRANSFORMS AND PARTIAL DIFFERENTIALEQUATIONS (Common to Mechanical & Civil)	L	T	P	C
		3	1	0	4

PREREQUISITE:

	1.	Basic Calculus
	2.	Sequences and Series

COURSE OBJECTIVES:

1.	To develop the Fourier series in $(0,2\pi)$,odd and even functions and Half range cosine and sine series $(0,l)$
2.	To familiarize the students with Fourier Transforms and Inverse Transforms
3.	To familiarize the student with formation of partial differential equations, linear partial differential equations of second order with constant coefficient
4.	To make the students understand Steady state solution of two dimensional equation of heat conduction.
5.	To acquaint the student, Inverse Z - transform (using partial fraction and residues) Solution of difference equations using Z - transform.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Determine the Fourier series, Half range sine and cosine series
CO2:	Evaluate Fourier Transforms, Inverse Fourier Transforms and Convolution theorem
CO3:	Compute Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.
CO4:	Solve one dimensional wave and heat equations.
CO5:	Formation of difference equations – Solution of difference equations using Z - transform.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1									
CO2	3	2	1									
CO3	3	2	1									
CO4	3	2	1									
CO5	3	2	1									

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	1		
CO2	1		
CO3	1		
CO4	1		
CO5	1		

COURSE CONTENTS:

MODULE I	FOURIER SERIES	9 Hours
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.		
MODULE II	**FOURIER TRANSFORMS**	**9 Hours**
Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity		
MODULE III	**PARTIAL DIFFERNTIAL EQUATIONS**	**9 Hours**
Formation of partial differential equations – Singular integrals -- Solutions of standard types of first order partial differential equations - Lagrange"s linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types		
MODULE IV	**APPLICATION OF PARTIAL DIFFERENTIAL EQUATIONS**	**9 Hours**
Classification of PDE – Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.		
MODULE V	**Z TRANSFORMS AND DIFFERENCE EQUATIONS**	**9 Hours**
Z- Transforms - Elementary properties – Inverse Z - transform (using partial fraction and residues) – Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.		

TOTAL:45+15= 60 HOURS

REFERENCES:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012.

2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers Delhi,2012.

3. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematic for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.

4. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd , 2007.

5. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Limited, New Delhi, 2008.

6. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

7. Datta.K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd,

2302ME301	ENGINEERING THERMODYNAMICS	L	T	P	C
		3	2	0	4

PREREQUISITE:

1. Engineering Mathematics I & II

COURSE OBJECTIVES:

1. Impart knowledge on the basics and application of zeroth and first law of thermodynamics.
2. Impart knowledge on the second law of thermodynamics in analysing the performance of thermal devices.
3. Impart knowledge on availability and applications of second law of thermodynamics
4. Teach the various properties of steam through steam tables and Mollier chart.
5. Impart knowledge on the macroscopic properties of ideal and real gases.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Understand concepts and principles of thermodynamics.
CO2: Utilize first law of thermodynamics for closed and open systems.
CO3: Use second law of thermodynamics for heat Engine, heat pump and refrigerator.
CO4: Explain thermodynamic properties of pure substances and its phase change processes.
CO5: Determine properties of gas mixtures.
CO6: Make use of psychometric properties in Air conditioning process.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	2
CO2	3	2	1	1	-	-	1	-	-	-	-	2
CO3	3	2	1	1	-	-	1	-	-	-	-	2
CO4	2	1	-	-	-	-	-	2	-	-	-	2
CO5	2	1	-	-	-	-	-	-	-	-	-	2
CO6	3	2	1	1	-	1	1	2	-	-	-	2

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	1		
CO2	2	3	
CO3	2	3	
CO4	1	3	
CO5	1	3	
CO6	2		

COURSE CONTENTS:

MODULE I	INTRODUCTION AND ZEROTH LAW OF THERMODYNAMICS	12 Hours

Macroscopic and Microscopic approaches, Definitions and concepts- heat, work, thermodynamic equilibrium, system and types, surroundings, Properties- intensive and extensive properties, Path and point functions, Energy- macroscopic and microscopic modes of energy, Thermodynamic processes and cycle, State postulate, Zeroth law of thermodynamics- temperature scale, perfect gas scale.

MODULE II	FIRST LAW OF THERMODYNAMICS	12 Hours

First law of thermodynamics, I law for Closed systems - constant pressure process, constant volume process, constant temperature process, adiabatic process, polytropic process, throttling process. I law for open systems - Steady state flow processes, Steady flow energy equation (SFEE), Application of SFEE- turbines and compressors, nozzles and diffusers, throttling valves, heat exchangers.

MODULE III	SECOND LAW OF THERMODYNAMICS	12 Hours

Limitations of I law of thermodynamics, Second law of thermodynamics- Kelvin - Planck and Clausius statements, Heat Engine, heat pump and refrigerator, Reversibility and irreversibility- irreversible and reversible processes, Carnot's principles, Carnot cycle, Carnot engine, Thermodynamic temperature scale, Clausius inequality, Entropy- principle of entropy increase, Availability & irreversibility – Introduction about third law of thermodynamics.

MODULE IV	PROPERTIES OF PURE SUBSTANCES	12 Hours

Thermodynamic properties of fluids. Pure substance-phases - Phase change processes, Property diagrams - pressure-volume (P-v), pressure-temperature (P-T), temperature volume (T-v), temperature entropy (T-s) and enthalpy-entropy (h-s) diagrams. Steam tables - Problems on flow and non-flow processes.

MODULE V	GAS MIXTURES AND PSYCHROMETRIC PROPERTIES	12 Hours

Thermodynamics of ideal gas mixture- mixture of ideal gas, mixture of perfect gases, Dalton's law of partial pressure, Amagat's law, Thermodynamics properties, Ideal gas – equation of state, Van der Waals equation and compressibility chart. Psychrometric properties and processes – Psychrometric chart.

TOTAL: 60 HOURS

REFERENCES:

2302ME302	FLUID MECHANICS AND MACHINERY	L	T	P	C
		2	2	0	3

PREREQUISITE:

	1. Engineering Mathematics I & II

COURSE OBJECTIVES:

	1. To introduce the students about properties of the fluids, behaviour of fluids under static conditions
	2. To expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent)
	3. To expose the students to basic principles of working of hydraulic machineries and to design Peltonwheel, Francis and Kaplan turbine, centrifugal and reciprocating pumps.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Explain various properties of fluids and flow measurements.
CO2:	Calculate the energy losses in pipes.
CO3:	Explain the dimensional analysis of fluids.
CO4:	Determine the performance characteristics of hydraulic turbines.
CO5:	Calculate the performance characteristics of hydraulic pumps.

COs Vs POs MAPPING:

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

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	2	-	2
CO2	2	-	2
CO3	1	-	-
CO4	2	-	-
CO5	-	-	-

COURSE CONTENTS:

MODULE I	INTRODUCTION TO FLUID AND FLUIDMOTION	9 Hours

Fluid-Fluid mechanics - LawsofFluidMechanics-PropertiesoffluidanditsApplication-Typesoffluid- Types of fluid Flow-Measurement of Pressure-U-tube and differential manometer-Measurement of velocity using Discharge –Flow characteristics-Momentum –continuity equation.

MODULE II	FLUID DYNAMICS AND FLUID FLOW OVER CONDUITS	9 Hours

Forces acting on a fluid element- Eulers and Bernoulli theorem Application in internal and external flows measuring instruments- Major losses and Minor losses in pipes using standard charts and tables pipes in series and pipes in parallel.-Darcy Weisbach equation. Identification of laminar and turbulent flow in closed conduits, flow in circular pipe.

MODULE III	DIMENSIONAL AND MODEL ANALYSIS	9 Hours

Need for dimensional analysis - dimensional analysis using Buckingham pi theorem – Similitude - types of similitude - Dimensionless parameters- application of dimensionless parameters - Model analysis through Reynolds and Froudes Model law.

MODULE IV	HYDRAULIC TURBINES	9 Hours

Definition of turbine - Classification -Types of head and efficiencies of turbine-Impulse turbine - Reaction turbine-Francis turbine, Kaplan turbine - working principles and velocity triangle- Work done by water on the runner Specific speed - unit quantities performance curves.

MODULE V	HYDRAULIC PUMPS	9 Hours

Definition -Centrifugal pump Classification Construction working principle and velocity Triangle Definition of heads-Losses and efficiencies - Multistage Centrifugal pump-Specific speed - Priming and cavitation effects of centrifugal pump. Reciprocating pump Classification Working Principle Coefficient of discharge and slip- Indicator diagram (Descriptive treatment only).

TOTAL: 45 HOURS

REFERENCES:

1.R.K.Bansal, *A Textbook of Fluid Mechanics and Machinery, Laxmi Publications Ltd., New Delhi, Revised Tenth edition, 2018.*

2.Modi P.N. and Seth, S.M. *Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 22nd edition (2019)*

3.Jain A. K. *Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2014..*

4.Kumar K. L., *Engineering Fluid Mechanics, Eurasia Publishing House(p) Ltd. New Delhi, 2016*

5.Fox W.R. and McDonald A.T., *Introduction to Fluid Mechanics John-Wiley and Sons, Singapore, 2011.*

6.Pani B S, *Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.*

7.Cengel Y A and Cimbala J M, *Fluid Mechanics, McGraw Hill Education Pvt. Ltd., 2014*

8.S K Som; Gautam Biswas and S Chakraborty, *Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2012.*

9.https://archive.nptel.ac.in/courses/112/105/112105171/#

2301GEX07	ENVIRONMENTAL SCIENCESAND SUSTAINABILITY (COMMON TO ALL BRANCHES OF B.E/ B.TECH)	L	T	P	C
		1	0	2	2

COURSE OBJECTIVES:

- Realize the interdisciplinary and holistic nature of the environment.
- Understand how natural resources and environment affect the quality of life and stimulate the quest for sustainable development.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Describe the importance of ecosystem.
CO2: Describe the various environmental issues and its prevention.
CO3: Organise various natural resources and the immediate need to conserve it.
CO4: Select the various ways of conservation of biodiversity.
CO5: Investigate the different types of pollution and its effects.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1					3					
CO2	2	1					3					
CO3	3	2	1	1	1	1	3	2	2	2	3	2
CO4	3	2	1	1	1	1	3	2	2	2	3	2
CO5	3	2	1	1	1	1	3	2	2	2	3	2

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	3		
CO2	3	3	
CO3	3	3	
CO4	3	3	
CO5	3	3	

COURSE CONTENTS:

MODULE I	ECOSYSTEM	8 Hours

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers. Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, rivers, oceans)

MODULE II	ENVIRONMENT AL ISSUES AND SOLUTIONS	7 Hours

Current Environmental Issues: Acid rain, Ozone layer depletion, Global warming, Green house effect
Solutions: 12 principles of green chemistry-Rain water harvesting.

MODULE III	BIODIVERSITY	10 Hours

Introduction to biodiversity -genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – conservation of biodiversity: In-situ

and ex-situ conservation of biodiversity.

MODULE IV	NATURAL RESOURCES	10 Hours

Forest resources: Use and over-exploitation, deforestation- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over utilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity– Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Energy Conversion processes Biogas – production and uses, anaerobic digestion – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

MODULE V	ENVIRONMENTAL POLLUTION	10 Hours

Definition – Source, causes, effects and control measures of: (a) Air pollution (b) Water pollution(c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution –(f) Nuclear pollution (g) Thermal pollution role of an individual in prevention of pollution.

TOTAL: 45 HOURS

MINI PROJECT ADDITIONAL TOPICS

Soil Science

1. Effects of climate change on soil erosion.
2. The role of land management in maintaining soil health.
3. Effects of salinity in coastal region Agricultural activity.
4. The effects of climate change on agriculture.

Urban Ecology

1. How road construction impacts biodiversity and ecosystems.
2. The effects of urbanization and city planning on water cycles.
3. Impacts of noise pollution on human health.

Pollution and Bio-remediation

1. The role of bio-remediation in removing "forever" chemicals from the environment.
2. Impacts of air pollution on human health.
3. How to improve plastic recycling processes.
4. Individual measures to reduce consumption and creation of microplastics.

General Topics

1. Impact of Urbanization on Local Biodiversity
2. Renewable Energy Options for Sustainable Living.
3. Waste Management Strategies in Urban Areas
4. Climate Change and Its Effects on Local Ecosystems
5. Air Quality Monitoring in Urban centers
6. Water Quality Assessment in Local Water Bodies
7. Green Roof Technology and Its Environmental Benefits
8. Impact of Plastic Pollution on Marine Life.
9. Eco-friendly Practices in Agriculture:

10. The Role of Community Gardens in Urban Sustainability
11. Alternate energy sources for community Development.
12. E-Waste Management.
13. Energy Audit of a building.
14. Rainwater harvesting system.
15. Population growth variation among nations.
16. Population explosion.
17. Family welfare programme.
18. Women welfare programme.
19. Child welfare programme.
20. Environmental impact analysis.
21. Role of information technology in environmental protection and human health.

REFERENCES:

1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.
5. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006
6. https://en.wikipedia.org/wiki/Carbon_capture_and_storage
7. Ravikrishnan "Environmental Science and Engineering" Sri Krishna Hi-tech Publishing Company Pvt
8. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.

2302ME303	MANUFACTURING TECHNOLOGY – I	L	T	P	C
		3	0	0	3

PREREQUISITE:

| 1.Workshop Practice Laboratory |
| 2. Fundamentals of Mechanical Engineering |

COURSE OBJECTIVES:

| 1.To impart knowledge about the methods of manufacturing process.(Casting, Moulding ,forging and sheet metal operations) |
| 2.To impart knowledge about the metal joining process. |
| 3.To impart knowledge about the operation of lathe machine. |

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Produce simple components using sand casting process, moulding machines, melting furnaces also advanced techniques to manufacture plastic components.
CO2:	Use various metal joining processes (Arc welding, Gas welding, Brazing and Soldering).
CO3:	Explain the various metal forming processes (Forging, Rolling, Drawing and Extrusion)
CO4:	Produce simple sheet metal components using sheet metal operations
CO5:	Explain lathe machine and their operation

COs Vs POs MAPPING:

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

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	-	3	-
CO2	-	2	-
CO3	-	3	-
CO4	-	2	-
CO5	-	3	-

COURSE CONTENTS:

MODULE I	CASTING PROCESSES AND FORMING OF PLASTIC	9 Hours

Introduction to production processes and its classifications - Pattern - Types, Materials and Allowances. Moulding sand - Types, Properties and Testing. Moulding machines and its types. Melting furnaces – Cupola , Electric and Induction.. Sand casting defects. Special casting processes - Shell moulding, Die casting, Centrifugal casting and Investment casting - Introduction to plastics - Blow moulding, Rotational moulding, Thermoforming and Extrusion. Moulding of Thermosets - Principle and applications of Compression moulding.

MODULE II	METAL JOINING PROCESSES	9 Hours

Introduction to welding processes and its classifications - Principle of Gas welding and its flames - Principle of arc welding - Electrodes, Fluxes and filler materials. Principle of Resistance welding - Spot, butt and seam. Principle of Gas metal arc welding, Submerged arc welding, Tungsten Inert Gas welding, Plasma arc welding, Thermit welding, Electron beam welding and Friction welding - Weld defects - Brazing and soldering.

MODULE III	BULK DEFORMATION PROCESSES	9 Hours

Introduction - Hot and cold working of metals - Forging processes - Open and close die forging, Forging equipment and operations. Rolling - Types of Rolling mills, shape rolling operations, Tube piercing and Defects. Principle of Extrusion and its types. Principle of rod and wire drawing.

MODULE IV	SHEET METAL FORMING AND SPECIAL FORMING PROCESSES	9 Hours

Introduction - Shearing, bending and drawing operations - Stretch forming operations - Principle of special forming processes - Hydro forming, Rubber pad forming, Metal spinning, Explosive forming, Magnetic pulse forming, Peen forming and Super plastic forming.

MODULE V	LATHE, SEMI AUTOMATS AND AUTOMATS	9 Hours

V/f and self-control of synchronous motor drive; Margin angle control and Power factor control; VSI and CSI fed synchronous motor drive; Permanent magnet synchronous motor - Construction, Types, BLPM DC motor and BLPM AC motor.

	TOTAL: 45 HOURS

REFERENCES:

1. *P. N. Rao, Manufacturing Technology vol. I, Tata McGraw-Hill Publishing Company rivate Limited, New Delhi, 2010.*

2. *J. P. Kaushish, Manufacturing Processes, Prentice Hall of India Learning Private Limited, New Delhi, 2013*

3. *P.C. Sharma, Manufacturing Technology - I, S Chand and Company Private Limited, New Delhi, 2010*

4. *S K Hajra Choudhury, Elements of Workshop Technology - Vol. I, Media Promoters & Publishers Private Limited, Mumbai,2013.*

5. *Serope Kalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology, Pearson Education Limited, New Delhi, 2013*

6. *S. K. Hajra Choudhury, Elements of Workshop Technology. Vol. II, Media Promoters & Publishers Private Limited., Mumbai, 2013.*

7. *http://nptel.ac.in/courses/112107144/1.*

2302ME304		ENGINEERING MECHANICS	L	T	P	C
			3	0	0	3

PREREQUISITE:

NIL

Course Objective

To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

MODULE I	BASIC CONCEPTS AND FORCE SYSTEM	09 Hours

Introduction to mechanics - idealization of mechanics - laws of mechanics - principle of transmissibility - vector - addition, subtraction and product. Force- types - system of forces - resultant forces - composition of forces - resolution of force-free body diagram for real world systems.

MODULE II	STATICS OF PARTICLES AND FORCE SYSTEM	09 Hours

Equilibrium of particle in space, moment of couple-equilibrant Moment about point and specific axis- moment at couple- simplification of force and couple systems.

MODULE III	STATICS OF RIGID BODIES	09 Hours

Equilibrium of rigid bodies in two and three dimensions - beams - types of loads, supports and their reactions Two and three force Members-Static determinacy.

MODULE IV	PROPERTIES OF SURFACES AND SOLIDS	09 Hours

Determination of centroid of areas, volumes and mass - Pappus and Guldinus theorems - moment of inertia of plane and areas Parallel axis theorem radius of gyration of area- product of inertia- mass moment of inertia.

MODULE V	FRICTION	09 Hours

Introduction - mechanism of friction-types -laws of friction - friction on horizontal and inclined planes, ladder and wedge friction - rolling resistance.

TOTAL: 45 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Determine various forces using free body diagrams.
CO2:	Calculate moment of a couple about any specified area by simplification of couple system.
CO3:	Measure various loads and their reactions in beam.
CO4:	Measure moment of inertia and radius of gyration of various surfaces and solids
CO5:	Determine the friction and the effects by the laws of friction

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							1
CO2	3	3	2	2	1							1
CO3	3	3	2	2	1							1
CO4	3	3	2	3	1							1
CO5	3	2	2	3	1							1

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1			3
CO2			3
CO3			3
CO4			3
CO5			3

REFERENCES:
1. F.P. Beer, and Jr. E.R Johnston, Vector Mechanics for Engineers - Statics and Dynamics, Tata McGraw-Hill Publishing Company, New Delhi, 2007.
2. N.H. Dubey, Engineering Mechanics- Statics and Dynamics, Tata McGraw-Hill Publishing Company, New Delhi, 2013
3. Irving H. Shames, Engineering Mechanics - Statics and Dynamics, Pearson Education Asia Pvt. Ltd., 2006.
4. R.C. Hibbeller, Engineering Mechanics: Combined Statics & Dynamics, Prentice Hall, 2009.
5. D. P. Sharma, Engineering Mechanics, Dorling Kindersley (India) Pvt. Ltd., New Delhi, 2010.
6. https://nptel.ac.in/courses/112/106/112106286/

2302ME351	COMPUTER AIDED MACHINE DRAWING LABORATORY	L	T	P	C
		0	0	4	2

PREREQUISITE:

1. Engineering Graphics
2. CAD Laboratory

COURSE OBJECTIVES:

1. To provide knowledge on reading of machine drawing with Geometric Dimensioning and Tolerancing (GD & T)
2. To impart the significance of sectional views and its representation in drawings
3. To familiarize the representation of various machine element drawings
4. To provide knowledge on assembly drawings of mechanical supporting components
5. To develop skill to draw the assembly drawings of machine tool and automobile components

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Describe the basics of machine drawing and GD&T.
CO2:	Explain the concept of sectional views in drawings.
CO3:	Represent the machine elements in industrial drawings.
CO4:	Draw the sectional views of mechanical supporting components.
CO5:	Sketch the assembly drawings of machine tool and automobile components.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2					1		2		2		
CO2	2					2		2		2		
CO3	2					2		2		3		
CO4	3					3		3		3		
CO5	3					3		3		3		
CO6	2					1		2		2		

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	2	2	2
CO2	2	2	2
CO3	2	2	2
CO4	2	2	2
CO5	2	2	2

CO6	2	2	2		

COURSE CONTENTS:

MODULE I

Limit System- Tolerance, Limits, Deviation, Actual Deviation, Upper Deviation, Lower Deviation, Allowance, Basic Size, Design Size, Actual Size. Fits- Types, Tolerances of Form and Position- Form and Position Variation, Geometrical Tolerance, Tolerance Zone, Indicating Geometrical Tolerances. Indication of Surface Roughness, Standard Abbreviations and Symbols used in industries.

MODULE II

Sections- Hatching of Sections, Cutting Planes, Revolved or Removed Section, Sectional Views- Full Section, Half Sections and Auxiliary Sections- Conventional Representation-One-view, Two-view and three view Drawings.

MODULE III

Drawing standards and Designation of Bolts, nuts, screws, keys, pins, Rivets, Welded Joints-Dimensioning of Welds, Belt Driven Pulleys, Chain and Gears Drives.

MODULE IV

Preparation of manual parts drawing and assembled sectional views from orthographic part drawings, Automobile components - stuffing box, Machine Tool Parts – Plummer block, Joints – knuckle joints, Couplings – Protected type flanged coupling, Bearings – swivel bearing.

MODULE V

Preparation of manual parts drawing and assembled sectional views from real time products- Internal combustion engine parts - connecting rod, couplings – universal coupling, machine tool parts – tailstock, Automobile components – screw jack, stuffing box - Commercial products - Preparation of Bill of materials and tolerance data sheet.

TOTAL: 30 Hours

REFERENCES:

1. N.D. Bhatt, Machine Drawing, Charotar Publishing House Pvt. 51st Edition 2022.
2. P.S. Gill, A Textbook of Machine Drawing, Katson books, 2023.
3. R.K. Dhawan, A Textbook of Machine Drawing, S. Chand,2012.
4. K.C. John, Textbook of Machine Drawing, PHI Learning Pvt. Ltd.,2009.
5. http://nptel.ac.in/syllabus/112106075/

2302ME352	MANUFACTURING TECHNOLOGY- I LAB	L	T	P	C
		0	0	2	1

PREREQUISITE:

1. Workshop Practice Laboratory

COURSE OBJECTIVES:

1. To impart the knowledge about the basic operation of lathe.
2. To impart the knowledge about the basic operation of welding machines.
3. To impart the knowledge about stir casting process.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Use lathe machine for manufacturing various operation.
CO2:	Use various machine tools for finishing operation of simple step turning in capstan lathe and turret lathe.
CO3:	Join the materials by welding machines (Gas, Arc, TIG and MIG).
CO4:	Manufacture the simple component by using Stir casting machine.
CO5:	Calculate the cutting force of lathe machine.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	-	2	-	3	3	-	-	-
CO2	3	2	3	-	-	2	-	3	3	-	-	-
CO3	3	2	3	-	-	2	-	3	3	-	-	-
CO4	3	2	3	-	-	2	-	3	3	-	-	-
CO5	3	2	3	-	-	2	-	3	3	-	-	-
CO6	3	2	3	-	-	2	-	3	3	-	-	-

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	3	3	-
CO2	3	3	-
CO3	3	3	-
CO4	3	3	-
CO5	3	3	-
CO6	3	3	-

LIST OF EXPERIMENTS:

	● Make a Taper turning.
	● Make a External Thread cutting.
	● Make a Internal Thread cutting.
	● Make a Eccentric turning.
	● Process Simple turning using capstan lathe.
	● Process Step turning using turret lathe.
	● Join the given metal using Spot Welding.
	● Join the given metal using Arc Welding.
	● Join the given metal using Gas Welding.
	● Join the given metal using TIG Welding.
	● Manufacture simple component by using Stir Casting.
	● Reduce the thickness of the metal by Two-High roll mill.
	● Produce the simple component by using Water Hammer setup.
	● Cutting force calculation using dynamometer in lathe machine.

TOTAL: 30 HOURS

REFERENCES:

1. P. N. Rao, *Manufacturing Technology vol. I, Tata McGraw-Hill Publishing Company Private Limited, New Delhi, 2010.*

2. *Serope Kalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology, Pearson Education Limited, New Delhi, 2013.*

3. *J. P. Kaushish, Manufacturing Processes, Prentice Hall of India Learning Private Limited, New Delhi, 2013.*

4. *P.C. Sharma, Manufacturing Technology - I, S Chand and Company Private Limited, New Delhi, 2010.*

5. *S K Hajra Choudhury, Elements of Workshop Technology - Vol. I, Media Promoters & Publishers Private Limited, Mumbai,2013.*

6. *http://nptel.ac.in/courses/112107144/1.*

2302ME353	FLUID MECHANICS AND MACHINERY LAB	L	T	P	C
		0	0	2	1

PREREQUISITE:

	2. Fluid Mechanics basics

COURSE OBJECTIVES:

	1. 1. To verify the principles studied in fluid mechanics and machinery theory by performing experiments in laboratory.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Understand the various basic experiences in flow of measurements.
CO2:	Measure the major and minor losses associated in a pipe flow
CO3:	Experimental verification of Bernoullis theorem in a pipe flow.
CO4:	Perform the characteristics study on impulse, reaction and axial turbine.
CO5:	Perform the characteristics study on different types of water pumps.
CO6:	Perform the characteristics study on gear oil pump.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	-	-	-	-	-	-	-	1
CO2	3	2	1	2	-	-	-	-	-	-	-	1
CO3	3	2	1	1	-	-	-	-	1	-	-	-
CO4	3	2	1	2	-	-	-	-	1	-	-	1
CO5	3	2	1	2	-	-	-	-	1	-	-	1
CO6	3	2	1	1	-	-	-	-	-	-	-	1

COs Vs PSOs MAPPING:

COs	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	2	-	-
CO3	1	-	-
CO4	2	-	-
CO5	2	-	-
CO6	2	-	-

LIST OF EXPERIMENTS:

1. Experimental verification of Bernoulli"s theorem in a pipe flow.

2.	Measurement of flow rate using venturimeter and calculate the coefficient of discharge.
3.	Measurement of flow rate using orifice meter and calculate the coefficient of discharge
4.	Performance test on tangential flow impulse (Pelton wheel) turbine against constant head.
5.	Performance test on Francis turbine against constant head.
6.	Performance test on reaction (Kaplan) turbine against constant head.
7.	Performance characteristics of a reciprocating pump.
8.	Performance characteristics of a gear pump.
9.	Performance test on centrifugal pump.
10.	Performance test on submersible pump.
11.	Determination of loss of head in different pipes (major loss) and fittings (minor loss) for various flow rates.
	TOTAL: 30 HOURS

2304GE301	Professional Development Courses - I	L	T	P	C
		0	0	2	1

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1:	Learners should be able to understand number and solving problems least time using various shortcuts
CO2:	Solve problems on averages; compare two quantities using ratio and proportion.
CO3:	Calculate concept of percentages, implement business transactions using profit and loss
CO4:	Have idea about recruitment process & to have a positive social image
CO5:	The students will learn the relevant application of different word with suitable meanings.
CO6:	Mastering the students on understanding the concept of vocabulary and the application of vocabulary in finding the root words.

COURSE CONTENTS:

MODULE I	Introduction to Soft Skills	

Introduction to placement - Training process, Interview process, Important terms related to placement, Resume Awareness, Etiquettes - Dressing etiquettes, Social etiquettes, Email etiquettes, Introduction etiquettes, Telephone etiquettes, Debate, Creative thinking, Team work.

MODULE II	Numerical Ability	

Basic Number System, Average, Percentage, Ratio and Proportion, HCF and LCM

MODULE III	Verbal Ability	

Word List (Synonyms and Antonyms), Identifying meaning from context, Sentence Completion, Cloze Test, Analogies, Relationships Explanation, One Word Substitutes, Idioms and Phrases, Spellings, Homonyms, Homophones, Odd Man out Series.

TOTAL: 30 HOURS

REFERENCES:

1. Arun Sharma, _How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.
2. R S Agarwal, _Quantitative Aptitude for Competitive Examinations', revised edition, S.Chand publication, 2017.
3. Rajesh Verma, ―Fast Track Objective Arithmetic‖, 3rd edition, Arihant publication, 2018.
4. Objective General English by SP Bakshi.
5. A Modern approach to verbal and non verbal reasoning by R.S. Agarwal.
6. Complete reference campus recruitment book.
7. Grammar for IELTS by Hopkins.
8. English Grammar in use by Murphy.