VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY

Approved by AICTE, Permanently Affiliated to JNTU Kakinada,
NAAC Accredited with 'A' Grade, ISO 9001:2008 Certified,
DEPARTMENT OF MECHANICAL ENGINEERING
Accredited by NBA

R13 GRAND CO-PO-PSO MATRIX

ENGLISH-I

CO1	An ability to read and comprehend English stories and texts
CO2	ability to improve listening skills particularly related to technical English and to improve life skills
CO3	An ability to critically respond in English to a real life situations and to speak in English without inhibition and grammar
CO4	An ability to improve essential grammar necessary for English communication and to write effectively using appropriate format
CO5	An ability to expand vocabulary range and use it effectively and respond to real life situations and An ability to transfer verbal information into nonverbal information and vice versa
CO6	An ability to improve life skills and core skills necessary for effective communication

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3	2	
CO2						2		2	3	3		3	3	2
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		2
CO5						2		2	3	3		3	3	
CO6						2		2	3	3		3	2	1

MATHEMATICS-I

CO1	Able to solve first order ordinary Differential equations and their applications.
CO2	Able to solve higher order ordinary differential equations
CO3	Able to learn Laplace transforms and solve initial value problems in ordinary differential equations using Laplace transforms.
CO4	Able to learn Partial differentiation
CO5	Able to Solve first order partial differential equations
CO6	Able to Solve higher order partial differential equations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1						3				2	
CO2	3	3	3						3				3	2
CO3	2	3	3						2					
CO4	3	3	2						3					2
CO5	3	3	3						2				3	
CO6	3	2	1						2				2	1

ENGG.CHEMISTRY

CO1	Able to know about water used in industries (boilers etc.)and for drinking purposes and Apply modern methods of softening of hard water to avoid boiler troubles ,construction and working of lime soda process
CO2	Understanding the principles, Construction and working of galvanic cells, electrode potentials, concentration cells , rechargeable batteries and Analyze various types of fuel cells
CO3	Apply the knowledge of electro chemistry to corrosion, distinguish various types of corrosions and able to solve corrosion problems
CO4	Able to explain about synthesis, physical and mechanical properties, compounding and reframing & fabrication of polymers, plastics and elastomers and Applications of fibre reinforced polymers along with conducting polymers
CO5	Recognize specific characteristic properties of fuels including calorific value determination , Ranking and Analysis of coal by proximate and ultimate method
CO6	Use of advanced materials i.e.nano materials,liquid crystals, super conductors and Illustrate the applications of cleaner and greener synthetic methods adapt in industries for healthy living

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3		3		1			3	3	3	1	3	2	
C02	3		3		2			3	3	3	2	3	3	2
C03	2		3		2			3	3	2	2	2		
C04	3		2		1			3	3	1	2	3		2
C05	3		3		1			3	3	2	1	3	3	
C06	3		3		1			3	2	1	2	3	2	1

COMPUTER PROGRAMMING

CO1	Able to Design algorithmic solutions to problems and implementing algorithms inC.
CO2	Able to Illustrate branching, iteration and data representation using arrays.
CO3	Able to Implement modular programming and recursive solution formulation.
CO4	Able to Comprehend pointers and dynamic memory allocation.
CO5	Able to Implement user defined data types like structures and unions in C.
CO6	Able to Comprehend file operations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	1	1	3	1	1								3	3
C02	2	2	2	2									3	2
C03	2	2	3	2	2								3	2
C04	2	2	2	3	2								3	3
C05	1	2	3	2	2								3	2
C06	1	2	3	2	2								3	2

CO1	Able to Understand The concepts of the ecosystem
CO2	Able to Understand The natural resources and their importance

ENVIRONMENTAL STUDIES

CO3	Able to learn The biodiversity of India and the threats to biodiversity ,and Apply conservation practices
CO4	Able to learn Various attributes of the pollution and their impacts
CO5	Able to Understand Social issues both rural and urban environment
CO6	Able to Understand About environmental Impact assessment and Evaluate the stages involved in EIA

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3			3	2		3	3			3	2	2	
C02	2			2	2		2	2			3	2	3	2
C03	3			3	2		2	2			3	3		
C04	2			3	2		2	2			3	3		2
C05	3			1	3		3	3			3	2	3	
C06	3			3	3		3	3			2	2	2	1

ENGG.MECHANICS

CO1	Able to explain the concepts of force and friction, direction and its application.
CO2	Able to explain the application of free body diagrams. Solution to problems using
CO3	graphical methods and law of triangle of forces.
CO4	Able to explain the concepts of centre of gravity.
CO5	Able to explain the concepts, moment of inertia and polar moment of inertia including
CO6	transfer methods and their applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	1						2				2	
C02	2	2	1						2				3	2
C03	2	1	1						2					
C04	2	1	2						2					2
C05	2	2	1						1				3	
C06	3	2	1						1				2	1

ENGLISH COMMUNICATION SKILLS LAB-I

CO1	Ability to analysis a topic of discussion & reading to it.
CO2	Ability to participate in discussion & influence them.
CO3	Ability to communicate ideas effectively.
CO4	Ability to present opinions coherently within a stipulated time.
CO5	Ability to speak clearly & coordinate with them.
CO6	Ability to improve upon English language pronunciation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01						2		2	3	3		3	2	
C02						2		2	3	3		3	3	2
C03						2		2	3	3		3		
C04						2		2	3	3		3		2
C05						2		2	3	3		3	3	

E	CO6						2		2	3	3		3	2	1

ENGG.CHEMISTRY LABORATORY

CO1	Able to understand water quality analysis.
CO2	Able to understand significance of potentiometric &conductometric titrations.
CO3	Able to analyze redoxometric titrations.
CO4	Able to do quality analysis of cool drinks.
CO5	Able to estimate amount of vitamin-c present in capsules.
CO6	Able to determine concentration of unknown solutions by colorimeter.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3		1			3	3	3	1	3	2	
CO2	3		3		2			3	3	3	2	3	3	2
CO3	2		3		2			3	3	2	2	2		
CO4	3		2		1			3	3	1	2	3		2
CO5	3		3		1			3	3	2	1	3	3	
CO6	3		3		1			3	2	1	2	3	2	1

C.PROGRAMMING LAB

CO1	Able to Design solutions to the various problems in the field of computerscience.
CO2	Able to Implement the concepts of arrays and strings.
CO3	Ability to Analyze the concepts of modular programming and develop solutions.
CO4	Able to Implement Programs with pointers and comprehend the dynamic memory allocation functions.
CO5	Able to Develop programs that perform operations using derived data types
CO6	Able to Implement programs for data transfers between files

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	3	1	1								3	3
CO2	2	2	2	2									3	2
CO3	2	2	3	2	2								3	2
CO4	2	2	2	3	2								3	3
CO5	1	2	3	2	2								3	2
CO6	1	2	3	2	2								3	2

CO1	An ability to read and comprehend English stories and texts
CO2	ability to improve listening skills particularly related to technical English and to improve life skills
CO3	An ability to critically respond in English to a real life situations and to speak in English without inhibition and grammar
CO4	An ability to improve essential grammar necessary for English communication and to write effectively using appropriate format

ENGLISH-II

CO5	An ability to expand vocabulary range and use it effectively and respond to real life situations
CO6	An ability to improve life skills and core skills necessary for effective communication

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3	2	
CO2						2		2	3	3		3	3	2
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		2
CO5						2		2	3	3		3	3	
CO6						2		2	3	3		3	2	1

MATHEMATICS-III

CO1	An Ability to Solve the system of linear equations and Analyse their applications.
CO2	An Ability to Compute an Eigen values and eigen vectors
CO3	Evaluate double and Triple integrals and Apply to find surface area and volumes of solids.
CO4	Able to Compare definite integral with special functions
CO5	Able to Differentiate the scalar and vector functions.
CO6	Able to Understand line, surface and volume integrals and Establish vector integral theorems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1						3				2	
CO2	3	3	3						3				3	2
CO3	2	3	3						2					
CO4	3	3	2						3					2
CO5	3	3	3						2				3	
CO6	3	2	1						2				2	1

GG. PHYSICS

CO1	Able to Design an instrument to enhance the resolution for its operation and Application in physical Optics.
CO2	Able to Understand the concepts of Lasers as Non-linear coherent sources and the structure property relationship for materials.
CO3	Able to Understand the concepts of Magnetic, Dielectric and Superconducting properties and their Applications in various fields.
CO4	Able to Know the Designing aspects of Buildings using the concepts of acoustics and the Computation of velocity of EM waves.
CO5	Able to Understand the Classical and Quantum aspects of sub-atomic world dominated by electron and its presence and the formation of energy bands in solids using Band- Theory.

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CO6	Able to Know the Classification of Semiconductors and Apply their concepts in electronic transport Mechanism for LEDs, Photo conductors and solar cells.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2			3					3	2
CO2	2	2	2	3	2			3					3	2
CO3	3	2	2	2	3			3						2
CO4	2	2	3	3	3			2					3	2
CO5	3	2	3	2	2			3					1	1
CO6	3	3	2	2	1			3					2	1

MATHEMATICS-II (MM)

CO1	Appropriate Numerical methods to find roots of algebraic & transcendental equations
CO2	Able to Understand the interpolation and extrapolation techniques
CO3	Able to Apply different numerical methods to Solve differential equations.
CO4	Interpret Fourier series analysis which is central to many applications in engineering apart
CO5	Able to Apply Fourier transforms to Evaluate improper integrals
CO6	Able to Solve the discrete model problems using Z-transforms

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1						3				2	
CO2	3	3	3						3				3	2
CO3	2	3	3						2					
CO4	3	3	2						3					2
CO5	3	3	3						2				3	
CO6	3	2	1						2				2	1

PROFESSIONAL ETHICS & HUMAN VALUES

CO1	Able to introduce the basic philosophy of morals, values and ethics to the students that is relevant to resolving moral issues in engineering
CO2	Able to impart reasoning and analytical skills needed to apply ethical concepts to engineering decisions
CO3	Able to identify the moral issues involved in both management and engineering areas, and to provide an understanding of the interface between social, technological and natural environments
CO4	Able to understand the unethical errors committed by the engineers in the implementation of the engineering projects.
CO5	Able to minimize the occupational crimes in the corporate sector by the budding engineers and make them uncorrupted.
CO6	Able to Focus on intellectual property rights and ethical engineering.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1			1	1			3			1	1	2	1
CO2	2			2	1			2			3	2	1	2

CO3	1			3	1			2			1	1	2	1
CO4	2			1	2			2			1	1		2
CO5	2			1	1			3			1	1		1
CO6	1			1	2			3			1	1	1	2

ENGG. DRAWING

CO1	Able to understand different scales used in industry and draw various curves.
CO2	Able to recognize principles of projections to draw orthographic projections.
CO3	Able to interpret the projection principles to draw projections of straight lines.
CO4	Able to understand the various ways to draw projection of planes.
CO5	Able to draw projections of solids by applying principles of orthographic projections and isometric projections
CO6	Able to convert isometric views into orthographic views and orthographic views to isometric views

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2						1			1	1	
CO2	3	2	2						1			1	1	2
CO3	3	2	2						1			1	1	2
CO4	2	2	2						1			1	2	2
CO5	2	2	3						1			1	3	1
CO6	2	2	3						1			1	1	1

ENGLISH-COMMUNICATION SKILLS LAB-II

CO1	Ability to analysis a topic of discussion & reading to it.
CO2	Ability to participate in discussion & influence them.
CO3	Ability to communicate ideas effectively.
CO4	Ability to present opinions coherently within a stipulated time.
CO5	Ability to speak clearly & coordinate with them.
CO6	Ability to improve upon English language pronunciation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3	2	
CO2						2		2	3	3		3	3	2
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		2
CO5						2		2	3	3		3	3	
CO6						2		2	3	3		3	2	1

CO1	Able to under stand basic knowledge fphysics &experimental experience like sound, acceleration &time.
CO2	Able to understand basic electronics & experimental experience of electrical circuits.

ENGINEERING PHYSICS LAB

CO3	Able to understand electromagnetism and experimental experience.
CO4	Able to understand the light properties & experimental experience of interference & diffraction.
CO5	Able to understand basic electronics & experimental experience of electrical circuits.
CO6	Able to understand electromagnetism and experimental experience.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	2	2			3					3	2
C02	2	2	2	3	2			3					3	2
C03	3	2	2	2	3			3						2
C04	2	2	3	3	3			2					3	2
C05	3	2	3	2	2			3					1	1
C06	3	3	2	2	1			3					2	1

ENGINEERING WORKSHOP & IT WORKSHOP

CO1	To select suitable carpentry tools to prepare different types of joints.
CO2	To identify tools required in the fitting operation to perform joint preparations.
CO3	To understand the process of making different objects with thin sheets using proper tin smithytools.
CO4	To differentiate single phase, 3 phase wiring connections.
CO5	Identify the basic computer peripheral and gain sufficient knowledge on assembling and disassembling aPC.
CO6	Learn the installation procedure of Windows and Linux OS, Acquire knowledge on basic networking infrastructure and acquire knowledge on basics of internet and worldwide web.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3				2		2				3	2	
C02	3	3				2		2				3	3	2
C03	3	3				2		2				3		
C04	3	3				2		2				3		2
C05	3	3				2		2				3	3	
C06	3	3				2		2				3	2	1

ANCIAL ANALYSIS

CO1	Able to Introduce Managerial Economics to engineering students, concepts of demand like law determinants.
CO2	Able to evaluate the student knowledge of production & cost estimation.
CO3	Able to introduce markets, theory of the firm and pricing policies in different markets.
CO4	Able to know the different forms of business organization and their merits and demerits of both public and private enterprises.

MANAGERIAL ECONOMICS & FIN

CO5	Able to understand the different accounting systems preparation of financial statements.
CO6	Able to understand the concepts of capital, capitalization techniques used to evaluate capital budgeting.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	1										1	2	1
C02	2	2	2									1	2	2
C03	1	2	2	1								1	2	1
C04	1	2	2	2								1	2	2
C05	1	2	2	2					1		1	1	2	1
C06	1	2	2	2					1		1	1	2	2

Mechanics of solids

CO1	To understand the contents like stress, strain simple stress, combined stress, strain energy under different loading and also problem solving technique.
CO2	To sketch S.F.D and B.M.D for statically determined beams under different loads.
CO3	To Assess flexural and flexural shear stress induced in the beams which are made with different cross sections.
CO4	To Analyze the slope and deflection of beams under different loading by double integration method Macaulay's method and moment area method.
CO5	To Compute different types of stress developed in thin thick cylinders subjected to internal and external pressures.
CO6	To Examine the columns from statically point of view with different end conditions at fixed shear stresses induced in shafts subjected to torque.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	1	1			1	1						2	1
C02	2	1	1			1	1						2	1
C03	1	1	1			1	1						2	1
C04	2	1	1			1	1						2	1
C05	1	2	1			1	1						2	1
C06	2	1	1			1	1						2	1

Materials Science

CO1	To understand the basic concepts of Solid solutions and Bonds in Metals & Alloys
CO2	To understand the Phase Diagrams in Alloy system
CO3	To differentiate Cast Iron and Steels with respect to their properties and Applications
CO4	To study the effect of various Alloying elements on Iron & Iron Carbide Diagram,Various Heat treatment process
CO5	To study the properties and applications of Non Ferrous metals

Metallurgy &

CO6	To understand the propeties and applications of Ceramic Composite and other Advanced materials

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1		1			2		2		2
CO2	3	2	2	2	1		1			2		2		2
CO3	3	2	2	2	1		1			2		2		2
CO4	3	2	2	2	1		1			2		2		2
CO5	3	2	2	2	1		1			2		2		2
CO6	3	2	2	2	1		1			2		2		2

Thermodynamics

CO1	Explain the fundamental concepts of Thermodynamics.
CO2	Define the concept of heat, work and energy and apply the same to the respective problems.
CO3	Identify the need of second law of thermodynamics and its applications; apply the concept of entropy, its principle and Maxwell's relations to thermodynamic processes.
CO4	Determine thermodynamic properties of pure substances from tables, Mollier charts also explain about Clausius – Clapeyron equation and Steam Calorimetr.
CO5	Define the quantities that describe the composition of a mixture and mixture properties with respect to ideal and real-gas mixtures, Analyze the Psychrometric terms through steam tables and psychrometric chart.
CO6	Analyze the performance of gas power, vapor power and Refrigeration cycles.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1			1	1							
CO2	3	2	1			1	1							
CO3	3	2	1			1	1							
CO4	3	2	1			1	1							
CO5	3	2	1			1								
CO6	3	2	2			1	1							

Mechanics & Hydraulic Machines

CO1	Understand the concepts of fluid, its properties, manometry, and compute the hydrostatic forces acting on different surfaces.
CO2	Associate with the basic laws of fluids, flow patterns, viscous flow through ducts and apply all these to their corresponding problems.
CO3	Explain about the concepts related to boundary layer theory, dimensionless numbers and dimensional analysis.
CO4	Compute the hydrodynamic forces acting on vanes and their performance.
CO5	Understand the importance and functions of hydraulic pumps also compute their performance.
CO6	Analyze the performance characteristics of hydraulic turbines and also understand about the hydraulic systems and fluidics.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

Fluid															
	CO1	3	2	1			2	1						2	1
	CO2	3	2	1			1	1						2	1
	CO3	2	2	1			1	1						2	1
	CO4	3	2	1			0	1						2	1
	CO5	3	2	1			2	1						2	1
	CO6	3	2	1			2	1						2	1

Computer Aided Engineering Drawing Practice	
CO1	Able to Understand Projections of solids
CO2	Able to Understand Sections and Developments of solids
CO3	Able to Understand the Interpretation of Solids and Perspective Views
CO4	Able to understnd the concepts of Computer Aided drafting

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		2											
CO2	2		2											
CO3	2		2											
CO4	2		2		3									

Electrical & Electronics Engg. Lab	
CO1	Able to find out the efficiency of dc shunt machine without actual loading of the machine.
CO2	Able to estimate the efficiency and regulation for different load conditions and power factors of
CO3	Able to analyse the performance characteristics and to determine efficiency of DC shunt motor &3-phase induction motor.
CO4	Able to pre-determine the regulation of an alternator by synchronous impedance method.
CO5	Able to control the speed of dc shunt motor using speed control methods.
CO6	Able to find out the characteristics of PN junction diode & transistor

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		2											
CO2	2		2											
CO3	2		2											
CO4	2		2											
CO5	2		2											
CO6	2		2											

Mechanics of Solids & Metallurgy Lab	
CO1	Able to understand and perform the tension and compression test
CO2	Able to understand and perform the Bending test
CO3	Able to understand and perform the Torsion,Hardness & Impact test
CO4	Able to understand and analyze the microstructure of different materials.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2									1	
CO2	2	2	2	2									1	
CO3	2	2	2	2									1	
CO4	2	2	2	2									1	

Kinematics of Machinery

CO1	Analyze the nature and role of the kinematics of machinery , the mechanisms and machines
CO2	Examine various mechanisms with lower pairs including straight line motion mechanisms and steering mechanisms.
CO3	Analyze the planar mechanisms for position, Velocity and acceleration
CO4	
co5	Compute the power transmission through different types of gears including gear profiles and its efficiency
CO6	Assess various power transmission mechanisms, methodologies and working principles.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2		2	1	1	1					2	1
C02	3	2	1		1	1	1						1	1
C03	3	3	1		1	1	1						1	1
C04	3	2	1		1	1	1						1	1
C05	3	2	1		1	1	1						1	1
C06	3	2	1		1	1	1						2	1

Thermal Engineering -I

CO1	Identify the reasons for deviation of actual cycle and fuel air cycle from air standard cycles of IC Engines
CO2	Interprut the ic engine systems like fuel supply ,cooling ,lubrication and ignition
CO3	Discuss about normal and abnormal combustion in IC engines and fuel rating
CO4	Analyze the performance of IC engines
CO5	Evalute the performance of reciprocating air compreesors
CO6	Analyse the performance of rotary type compressors

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	1	1	1			1							1
C02	2	2											1	1
C03	2	2				1	1						1	
C04	3	3	1										1	1
C05	3	3											1	1
C06	3	3											1	1

Production Technology

CO1	Able to understand various steps ,elements involved in sand casting process.
CO2	Able to understand various types of casting processes and melting.
CO3	Able to apply the principles involved in Gas welding and Arc Welding in preparation of various types of joints.
CO4	Able to understand various types of welding technique and various defects in welding.
CO5	Able to understand principles involved in Different types of Metal Forming Processes.
CO6	Able to understand principles of different types of Sheet Metal Forming processes and processing of plastics.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2						2			1	2	1
CO2	2	1	2						2			1	2	1
CO3	2	1	2						2			1	2	1
CO4	2	1	2						2			1	2	1
CO5	2	1	2						2			1	2	1
CO6	2	1	2						2			1		

Design of Machine Members -I

CO1	Apply the design methodology to machine elements under static loading by considering theories of failure and manufacturing aspects.
CO2	Assess the concepts of stress conciderations,design against fatigue loading by considering fatigue theories of failure.
CO3	Analyse the design of riveted, welded and bolted joints under axial and eccentric loading.
CO4	Apply the basic concepts to the designing keys, cotters, knuckle joints and shafts.
CO5	Examine the design of rigid and flexible couplings.
CO6	Assess the stress and deflections of tortion and bending springs under static and dynamic loading.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3		2	1	1						2	1
CO2	3	2	3		2	1	1						2	1
CO3	3	3	2		2	1	1						2	1
CO4	3	2	2		2	1	1						2	1
CO5	3	2	2		2	1	1						2	1
CO6	3	2	2		2	1	1						2	1

wing

CO1	To enhance the student's Knowledge the skills is fastening arrangements.
CO2	To enhance and identify and represent mechanical elements.
CO3	To enhance conventional methods to identify and represent materials.
CO4	To identify and represent machine components.
CO5	To select suitable material for machine component.

Machine Dra

CO6	To enable and prepare the assembly of various machine or engine components.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2								2	-	2
CO2	3	2	3	2	2	2						3	1	2
CO3	3	2	2	2	2	2	2					1	-	1
CO4	3	2	3	3	3	2						1	2	-
CO5	2	2	2	3	2	1	1					2	-	2
CO6	3	3	3	1	1	2						3	2	2

Thermal Engg Lab

CO1	Compute the property of fuels by suitable test
CO2	Demostarte the performance of I.C Engines
CO3	Interpret the emission characteristics of I.C Engine
CO4	Identify and dis-assembly/assembly of all components of I.C Engine also understand its working
CO5	Understand the Working of Boilers along with the mountings and accessories

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1			2							1	1
CO2	3	2	1			1							1	1
CO3	3	2	1			1							1	1
CO4	3	2	1			1							1	0
CO5	3	3	1			1							1	1
CO6	3	2	1			2	2						1	1

Fluid Mechanics & Hydraulic Machines

CO1	Able to Undestand and evaluate the performance of various flow measuring equipment
CO2	Able to Undestand and evaluate the performance of various Hydraulic Turbines and pumps

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2									1	1
CO2	3	3	2	2									1	1

Production Technology Lab

CO1	Able to perform the various manufacturing processes like Casting,Welding,Forming and Processing of plastics

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3							3		

chinery

CO1	Analyze the stabilization of sea vehicles , aircrafts and automobiles.
CO2	Compute the frictional losses, torque transmission of mechanical systems.
CO3	Examine the dynamic force analysis of slider crank mechanism and design of flywheel.
CO4	Assess the dynamiccs of governors.

Dynamics of Mac

CO5	Apply the balancing of rotary and reciprocating masses.
CO6	Find the natural frequencies of continuous systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2		2	1	1						2	1
CO2	3	2	1		1	1	1						2	1
CO3	3	2	1		1	1	1						2	1
CO4	3	2	1		1	1	1						2	1
CO5	3	2	1		1	1	1						2	1
CO6	3	2	1		1	1	1						2	1

Metal Cutting & Machine Tools

CO1	Able to understand the principles involved in material removal processes.
CO2	Able to apply the fundamentals of metal removal process in lathe.
CO3	Able to apply the fundamentals of metal removal process in shaper, planer and slotter.
CO4	Able to apply the fundamentals of metal removal process in Milling.
CO5	Able to apply the fundamentals of metal removal process for dimensional accuracy and surface finishing using grinding, lapping, honing.
CO6	Able to apply the principles of location and work holding in Jigs and fixtures and able to understand the fundamentals of CNC machines.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				1							1	2	1
CO2	2		2		2							1	2	1
CO3	3		2		2							1	2	1
CO4	3		2		2							1	2	1
CO5	2		1		1							1	2	1
CO6	2		2		2							1	2	1

Design of Machine Members–II

CO1	Analyze the pressure distribution and design of slider and roller bearings
CO2	Analyze the design procedure of IC engine parts such as connecting rod, crankshaft, crank pin, pist
CO3	Compute the stresses in curved beams and their impact on crane hooks and C-clamps
CO4	Assess the power transmission systems such as pulleys, belt, rope and chain drives
CO5	Analyze the design procedure of spur and helical gears
CO6	Investigate various types of levers and wire ropes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	1	2	1	1	-	-	-	1	2	1
CO2	3	3	2	-	1	1	1	1	-	-	-	1	2	1
CO3	3	2	1	-	1	1	1	1	-	-	-	1	2	1
CO4	3	2	1	-	1	1	1	1	-	-	-	1	2	1
CO5	3	3	1	-	1	1	1	1	-	-	-	1	2	1
CO6	3	3	2	-	1	1	1	1	-	-	-	1	2	1

CO1	Able to understand working principles of basic measuring instruments. Select a transducer for

Instrumentation & Control Systems

CO2	Able to apply the principles of measuring the Temperature and pressure
CO3	Able to apply the principles of measuring Speed, Acceleration, Vibration, Flow
CO4	Able to apply the principles of measuring Stress and Strain.
CO5	Able to apply the principles of measuring Humidity, Force and Strain
CO6	Able to understand the control systems and design the control system for measuring different

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	1									1	1
C02	3	2	2	1									1	1
C03	3	2	2	1									1	1
C04	3	2	2	1									1	1
C05	3	2	2	1									1	1
C06	2	2	2	1									1	1

Thermal Engineering -II

CO1	Analyze the methods to improve the efficiency of the rankine cycle and also understand about the fuels and combustion.
CO2	Understand the working of various types of boilers and its mountings with accessories and compute the height of chimney for a given draught system.
CO3	Understand about steam nozzle, impulse type steam turbine and also apply the same to the respective problems.
CO4	Compute the thermodynamic analysis of reaction type steam turbines and also steam condensers.
CO5	Interpret the brayton cycle working and various methods to improve the thermal efficiency for an open cycle gas turbine.
CO6	Compute the thermodynamic analysis of jet engines and rockets.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	1			1	1						1	
C02	3	2	1			1	1						1	1
C03	3	2	1			1	2						1	
C04	3	2	1			1	2						1	
C05	3	3	1			1	1						1	1
C06	3	2	1			1	1						1	1

CO1	Apply the concept of limits and fits while designing components
CO2	Understand and apply the principles of linear and angular measurements and compare the dimensions of a work piece with a working standard.

Metrology

CO3	Familiarized and apply the concept of optics, the optical measuring instruments
CO4	Understand surface roughness nomenclature and familiarize with surface measuring instruments. Understand various types of comparators and their uses.
CO5	Understand the nomenclature of gear and screw thread measuring instruments and apply the knowledge for the measurement of gear and screw threads.
CO6	Familiarized and apply using flatness measuring instruments and understand the importance of different machine tool alignment tests.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1		-	-	-	-	-	-	-	-	2
CO2	2		-		1	-	-	-	-	-	-	-	-	1
CO3	2		-	1	1	-	-	-	-	-	-	-	-	1
CO4	2		-	1	1	-	-	-	-	-	-	-	-	1
CO5	2	1	-	1	1	-	-	-	-	-	-	-	-	1
CO6	2		-		1	-	-	-	-	-	-	-	-	1

Machine Tools Lab

CO1	students can operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2		3						2			

Metrology & Instrumentation Lab

CO1	Students will be able to select the necessary/ required instrument for measuring Physical variables
CO2	Student will be able to perform the calibration the procedure
CO3	Student will be able to apply the priniples of geometrical dimensioning and tolerencing

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		2		2							1		
CO2	1		2		2							1		
CO3	1		2		2							1		

CO1	The formulation of linear programming problem models involving mathematical simplex method models were understood by the students.
CO2	Transportation problems and various methods of it were explained clearly and Various sequencing problems were made understood.
CO3	The replacement policy -- how to replace the items in various cases when money and time are
CO4	Game theory and queing theory applications in various cases and models were understood by them.

Operations Research

CO5	Inventory and its models, to solve various problems involved were analyzed by them
CO6	Dynamic programming and apply it to solve capital budgeting problems and linear programming problems were understood by them and simulation and languages to solve inventory and queuing problems were explained clearly

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	2	-	-	-	-	-	-	-	1	2	2
CO3	3	2	2	2	-	-	-	-	-	-	-	1	2	2
CO4	3	2	2	2	-	-	-	-	-	-	-	1	2	2
CO5	3	2	2	1	-	-	-	-	-	-	-	1	2	2
CO6	2	2	2	2	-	-	-	-	-	-	-	1	2	2

Interactive Computer Graphics

CO1	To Understand and apply basic color theory,color interaction and human response to different colors
CO2	To utilise various graphics appilications to solve different visual communication problem
CO3	Understnad and use the basic software and hardware tools for various graphics problems
CO4	Apply the asthetic judgements and critial thinking skills to art and graphics related issues
CO5	Ablle to communicate effectively on research and creative issues.
CO6	Demonstarte mastery of specific technical and conceptual and critical abilities within computer graphics.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					2				1					1
CO2					2				1					1
CO3					2				1					1
CO4					2				1					1
CO5									2					1
CO6					2									1

Refrigeration & Air-conditioning

CO1	Identify the necessity, applications and classification of refrigeration system, also analyze the refrigearation systems used in aircrafts. {Analyze level}
CO2	Compute the performance of vapour compression refrigeration systems.
CO3	Identify the desirable properties of refrigerators and classification and working principles of components of VCR system
CO4	Analyze the vapour absorption system and understand about steam jet refrigeration systems.
CO5	Understand, apply the psychometric properties & processes to air conditioning load calculations.
CO6	Classify the equipment and understand of working of various air conditioning systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1			2	2						2	2
CO2	3	2	1			2	1						2	1

CO3	2	2	1			2	2						1	1
CO4	3	3	1			2	1						2	1
CO5	3	2	1			2	1						2	1
CO6	2	2	1			2	1						2	1

Heat Transfer

CO1	Understand the various modes of heat transfer compute the rate of heat transfer through composite slabs, cylinders and spheres under steady state conditions and knew the importance of the critical radius of insulation in case of steam pipes and electrical cables
CO2	Compute the rate of heat transfer from a finned surface and the time of cooling or heating in transient heat conduction problems.
CO3	Understand the significance of dimensional analysis and dimensionless numbers in convective mode of heat transfer.
CO4	Understand and apply the concepts of forced convection- external and internal flows and use of empirical correlations and also concept of free convection.
CO5	Understand and apply the concepts of heat transfer with phase change boiling condensation and working and evaluation of heat exchangers by using LMTD and NTU methods.
CO6	Understand and apply the concepts of radiation heat transfer, radiation laws, concept of shape factor and radiation shields.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1			2							1	1
CO2	3	2	1			1							1	1
CO3	3	2	1			1							1	1
CO4	3	2	1			1							1	0
CO5	3	3	1			1							1	1
CO6	3	2	1			2	2						1	1

Robotics

CO1	Understanding basic concepts of robots and their development.
CO2	Select appropriate actuators and sensors for a robot based on specific application
CO3	Carry out kinematic and dynamic analysis for simple serial manipulator
CO4	perform trajectory planning for a manipulator by avoiding obstracles
CO5	Transformation of motion for robot endeffector with Denavit and Hartenberg parameters

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1			1					1	2	1
CO2	2	1		1									2	1
CO3	2	1	1	1	1		1			1			2	1

CO4	2	1	1	1	1		1			1			2	1
CO5	2	1	1	1	1		1			1			2	1
CO6	2		1									1	2	1

Heat Transfer Lab

CO1	Understand the basic laws of heat transfer and to evaluate rate of heat transfer involving steady
CO2	Understand the fundamentals of convective heat transfer process and to evaluate heat transfer
CO3	Analyze heat exchanger performances by using the method of log mean temperature difference
CO4	Understand the fundamentals of radiation heat transfer process and to evaluate Stefan
CO5	Understand the fundamentals of Phase change heat transfer process and to evaluate rate of

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

Industrial Engineering and Management

CO1	To impart fundmental knowledge in Industrial Engineering and Management and also to understa
CO2	To classify different types of Plant Layout and to understand Preventive and Breakdown Maintena
CO3	To explain the relvance of Work Study in Modern Context
CO4	To apply the Stastical Quality Control and its Applications in Total Quality Management
CO5	To understand the concept of Human resource Management
CO6	To understand Project Management and to differentiate PERT and CPM and understanding Value Analysis

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1		2	1	1	1	2	2	2		
CO2	2	2	2	2	2	1	1	1	2	2	1	2		
CO3	2	2	2	2	2	1	1	1	1	2	2	2		
CO4	2	2	2	2	2	1	1	1	1	2	2	2		
CO5	2	2	2	2	2	1	1	1	1	2	2	2		
CO6	2	2	2	2	2	1	1	1	1	2	2	2		

CO1	To understand the basic fundamentals of Computer aided design and manufacturing.

CAD/CAM

CO2	To learn 2D & 3D transformations of the basic entities like line,circle,ellipse etc...
CO3	To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc..and to visualize how the components look like before its manufacturing or fabrication
CO4	To learn the part programming, importance of group technology, computer aided process plannin
CO5	To learn about the computer aided quality control.
CO6	To learn the overall configuration and elements of computer integrated manufacturing systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	3	2	1	-	3	3	1	3	1	3
CO2	3	2	3	3	3	2	1	-	-	1	1	1	1	3
CO3	3	3	2	1	3	2	1	-	1	1	1	2	1	3
CO4	3	2	3	2	3	2	1	-	3	3	1	3	1	3
CO5	3	2	3	2	3	2	1	-	1	2	2	3	1	3
CO6	3	2	3	2	3	2	1	-	1	1	2	3	1	3

Finite Element Methods

CO1	To explain the fundamentals in Finite Element Methods with Potentail Energy Approach and weigl
CO2	To explain local and global coordinate systems and stifness matrix for two dimensional truss elem
CO3	To explain local and global coordinate systems and stifness matrix for CST element
CO4	To explain local and global coordinate systems and stifness matrix for 4 noded Quadilateral
CO5	To understand the concepts of Pnuemarical integration used in FEM
CO6	To apply the concept of Iron values and IGON Vectors in FEM

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	-	-	-	-	-	-	-	2	1	1
CO2	3	2	3	2	-	-	-	-	-	-	-	3	2	2
CO3	3	2	2	2	-	-	-	-	-	-	-	1	2	1
CO4	3	2	3	3	-	-	-	-	-	-	-	1	2	1
CO5	2	2	2	3	-	-	-	-	-	-	-	2	2	2
CO6	2	3	3	1	-	-	-	-	-	-	-	3	2	1

t Engineering

CO1	Identify the sources of energy and understand about working of all components of the steam power plant.
CO2	Describe the functioning of internal combustion heat engines and gas turbine power plants.
CO3	Explain about working of hydro electric power plants and hydro projects.
CO4	about the classification and working of nuclear power stations.
CO5	Understand about the combined operations of different power plants and power plant instrumentation and control.

Power Plan

CO6	Discuss about power plant economics and environmental considerations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2	1	-	-	2	2						2	1
C02	2	2	1	-	-	2	2						2	1
C03	2	2	1	-	-	2	1						2	1
C04	2	2	1	-	-	2	2						2	1
C05	2	2	1	-	-	2	1						2	1
C06	2	2	1	-	-	1					2		2	1

MEMS

CO1	Upon successful completion of this course the student shall be able to know the importance and various devices of MEMS and their applications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2	2	2	2									

Automation in Manufacturing

CO1	Solve the line balancing problems in the various flow line systems with and without use buffer storage.
CO2	Understand the different automated material handling, storage and retrieval systems and automated inspection systems.
CO3	Use of Adaptive Control principles and implement the same online inspection and control.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2	3	1	1									
C02	2	2	3	1	1									
C03	2	2	3	1	1									

Simulation Lab

CO1	student will be able to appreciate the utility of the tools like ANSYS or FLUENT in solving real time problems and day to day problems.
CO2	Use of these tools for any engineering and real time applications
CO3	Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they willbe prepared to handle industry problems with confidence when it matters to use these tools in their Employment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3				3								1	
C02	3				3								1	
C03	3				3									

CO1	Will be able to Measure load, displacement and temperature using analogue and digital sensors.

Mechatronics Lab

CO2	Able to Develop PLC programs for control of traffic lights, water level, lifts and conveyor belts.
CO3	Able to Simulate and analyse PID controllers for a physical system using MATLAB.
CO4	Able to Develop pneumatic and hydraulic circuits using Automaton studio.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2		3									
CO2	3		2		3									
CO3	3		2		3									
CO4	3		2		3									

Production Planning and Control

CO1	To explain the scope of Production Planning Control and different types of Production systems
CO2	To describe different Forecasting Methods to estimate Demand
CO3	To understand the concepts of Materials Management like EOQ,JIT,VED Analysis
CO4	To Analyse different Functions of PPC like routing,scheduling and loading
CO5	To differentiate follow up and despatch
CO6	To summarise the applications of Computers in PPC

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1								2			1
CO2	2	2		2							3			1
CO3	3				1						3			1
CO4	1	2									3			1
CO5	3			2							3			1
CO6	2										3			1

ntional Machining Processes

CO1	Able to understand the principle of Ultrasonic Machining process.
CO2	Able to understand the principle of Electro chemical and chemical Machining process.
CO3	Able to understand the principle of Electric Discharge Machining process.
CO4	Able to understand the principle of Electron Beam and laser beam Machining process.
CO5	Able to understand the principle of Plasma Arc Machining process.
CO6	Able to understand the principles of abbrasive Jet Machining process and water Jet Machining process and also finishining processes.

Unconvel

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3				1							1	2	1
C02	2		2		2							1	2	1
C03	3		2		2							1	2	1
C04	3		2		2							1	2	1
C05	2		1		1							1	2	1
C06	2		2		2							1	2	1

Automobile Engineering

CO1	Understand the four wheel drive mechanism and engine systems
CO2	Describe the power transmission systems in automobiles
CO3	Describe the working principles of steering systems of automobiles
CO4	Discuss about the suspension, braking and electrical systems in automobiles
CO5	Understand the engine specification and safety systems in automobiles
CO6	Understand the engine emission control systems and engine servicing systems of automobiles

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2	1			2	1						2	1
C02	2	2	1			2	1						2	1
C03	2	2	1			2	1						2	1
C04	2	2	1			2	1						2	1
C05	2	2	1			2	1						2	1
C06	2	2	1			2	2						2	1

Non Destructive Evaluation

CO1	Comprehensive, theory based understanding of the techniques and methods of non- destructive testing using radiography are exposed.
CO2	Comprehensive, theory based understanding of the techniques and methods of non- destructive testing using ultra sonic tests are exposed.
CO3	Comprehensive, theory based understanding of the techniques and methods of non- destructive testing using liquid penetrant and eddy current tests are exposed.
CO4	Comprehensive, theory based understanding of the techniques and methods of non- destructive testing using magnetic particle test are exposed.
CO5	Comprehensive, theory based understanding of the techniques and methods of non- destructive testing using Infrared and thermal testing are exposed.
CO6	Apply methods knowledge of non - destructive testing to evaluate products of railways, automobi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

C01	2	-	-	-	1	-	1	-	-	-	-	1	1	-
C02	2	-	-	-	1	-	1	-	-	-	-	1	1	-
C03	2	-	-	-	1	-	1	-	-	-	-	1	1	-
C04	2	-	-	-	1	-	1	-	-	-	-	1	1	-
C05	2	-	-	-	1	-	1	-	-	-	-	1	1	-
C06	2	-	-	-	1	-	1	-	-	-	-	1	1	-