

B.E. IV SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME- 4301	Applied Thermal Engineering	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	3	-	2	4	70	22

Unit I

Steam Generators: Classification, high-pressure boilers; Lamont, Benson, Loeffler and Velox, performance and rating of boilers, combustion in boilers, heat balance sheet of boilers, super critical boilers, boiler draught.

Unit II

Vapour Power Cycles: Simple steam power cycle, Rankine cycle, Carnot vapour cycle and its limitations, comparison of Rankine and Carnot cycle, effect of boiler and condenser pressure and temperatures on efficiency of Rankine cycle, modified Rankine cycle, reheat cycle, ideal and actual regenerative cycle, feed water heaters, regenerative-reheat cycle, characteristics of ideal working fluid in vapour power cycle, binary vapour cycle, work done and efficiency calculations.

Unit III

Air Compressors: Classification of air compressors, construction and working of various compressors: reciprocating compressor, screw and vane compressor, centrifugal compressor, axial compressor.

Reciprocating Compressor: Ideal and actual indicator diagram, work done for single and multi stage compressor with and without clearance volume, efficiency of compressor: isentropic, isothermal, mechanical and volumetric efficiency; condition for minimum work done in multi stage compression.

Unit IV

Steam Condensers: Introduction, Types of condensers, comparison between jet and surface condenser, effect of back pressure and air leakage on performance of condensers.

Cooling Towers: Types of cooling towers, design of cooling towers.

Theory of Jet propulsion: Introduction to pulse jet and ram jet engines.

Unit V

Gas Dynamics: Velocity of pressure pulse in a fluid, speed of sound, Mach number (M), Mach cone, stagnation properties, one-dimensional steady isentropic flow, Ratio of areas as a function of Mach number, mass flow rate and critical pressure ratio, Normal shock.

Steam Nozzles: Types of nozzles, steady flow energy equation and momentum equation applied in steam nozzles, nozzle efficiency, isentropic and adiabatic flow of steam through nozzles, mass of discharge and condition for maximum discharge (choked flow), super-saturated flow.

Recommended Books:

1. Thermodynamics by Gordon J. Van Wylen; Wiley and Sons Inc.
2. Thermodynamics and Heat Engines by R. Yadav; Central Publishing House.
3. Heat Engines by Pandya and Shah; Charotar Books Distributors.
4. An Introduction to Energy Conversion – Vol II. Energy conversion cycles by V. Kadambi and Manohar Prasad; New Age International (P) Ltd.
5. Steam and Gas Turbines by R. Yadav; Central Pub. House.
6. Gas Dynamics by E. Rathakrishnan; Prentice-Hall of India.
7. Compressible Fluid Flow by E. Rathakrishnan; Prentice-Hall of India.

(Dr. H. K. Sharma)

(Dr. M. K. Gupta)

1. To study principle and working of Lamont high pressure boiler
2. To study principle and working of Benson high pressure boiler.
3. To study principle and working of Loeffler high pressure boiler.
4. To study principle and working of Velox high pressure boiler.
5. To study principle and working of two stage air compressors.
6. To study principle and working of surface type condensers.
7. To study principle and working of Jet type condensers.
8. To study different type of nozzles.

After completion of this course the student should be able to:

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1 - Low, 2 - Moderate, 3 - High

B.E. IV SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-4302	Fluid Mechanics	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	3	1	2	5	70	22

Unit I

Properties of Fluid: Pressure, density, specific weight, surface tension, capillarity, bulk modulus of elasticity, vapour pressure, viscosity, Newton's law of viscosity.

Fluid Statics: Pressure at a point, pressure variation in static fluid, manometers, forces on plane and curved surfaces, buoyant force, stability of floating and submerged bodies, relative equilibrium.

Unit II

Fluid Kinetics: Types of flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three-dimensional flow, velocity and acceleration of fluid particle, velocity potential, stream function, rotational flow, circulation, flownets, utility and method of drawing flownets, free and forced vortex flow.

Ideal Fluid Flow Theory: Introduction to 2 D flow, source, sink and doublet, flow past cylinder.

Unit III

Fluid Dynamics: Euler's equation, Euler's equation of motion along a streamline, Bernoulli's equation, engineering applications of Bernoulli's equation, Venturimeter, orificemeter, nozzlemeter, rotameter, pitot static probe, current meters, notches and weirs, linear momentum equation for steady flow and its applications, forces on pipe bends, moment of momentum equation and its applications, forces on fixed and moving vanes, momentum correction factor, energy correction factor.

Unit IV

Flow through Pipes: Introduction to laminar and turbulent flow, Reynolds experiment, Critical Reynold's number, relation between shear stress and pressure gradient, laminar flow through circular pipes, Hagen-Poiseuille's equation, laminar flow between parallel plates, velocity distribution in pipes, friction factor, Moody's chart, hydraulic gradient line and total energy line, minor head losses in pipes, pipe networking, transmission of power through pipe.

Boundary Layer Theory: Development of boundary layer, displacement, energy and momentum thickness.

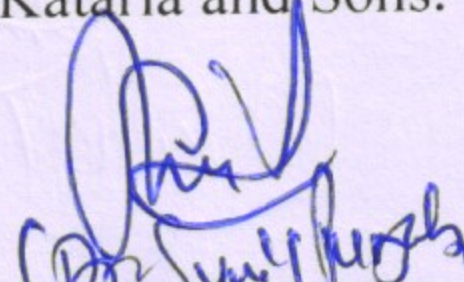
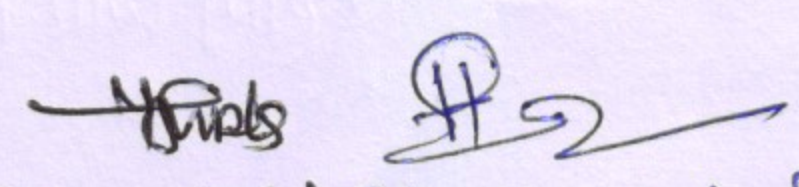
Unit V

Dimensional Analysis: Dimensional analysis, dimensional homogeneity, Rayleigh's method, Buckingham's Pi theorem, physical significance of various dimensionless numbers, similarity laws, model testing and its applications.

Flow over Immersed Bodies: Streamline and bluff bodies, lift and drag coefficients, flow over circular cylinder and aerofoils.

Recommended books:

1. Fluid Mechanics by Som and Biswas; Tata McGraw Hill.
2. Fluid Mechanics by Cengel; McGraw Hill Education.
3. Fluid Mechanics by Modi and Seth; Standard Book House.
4. Fluid Mechanics by Massey; Taylor and Francis.
5. Fluid Mechanics by D.S. Kumar; S.K.Kataria and Sons.

 (Dr. M.K. Gupta)  (Dr. Hemant Parmar)

B.E. IV SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-4303	Strength of Materials	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	3	1	2	5	70	22

Unit I

Simple Stress and Strains: Introduction, mechanical properties of materials, stress, strain, elastic limit, Hooke's law, analysis of a tapered bar and rod, composite bar, shear stress, shear strain, elastic constants, relationship between elastic constants, thermal stress, strain.

Strain energy: Concepts and problems.

Unit II

Principal Stresses and Strains: Introduction, principal planes, principal stresses and principal strains, methods of determination of stresses in oblique section, analytical and graphical methods for determine the stresses on oblique plane, Mohr's circle.

Theories of failures

Unit III

Stresses in Beam: Simple and pure bending, theory of bending, bending equation, flexural rigidity, bending stresses in beam, section modulus for various shapes of beam section, composite beam, strength of beam, shear stresses in beam, shear stress distribution in different section.

Columns: Euler's and Rankine formulae.

Unit IV

Deflection of Beams: Relation between slope, deflection and radius of curvature, double integration method, Macaulay method, moment area method, Castigliano's theorem, Maxwell reciprocal theorem.

Unit V

Torsion of Shafts: Introduction, shear stress, circular shaft, torsion formula, torsional rigidity, hollow, stepped and composite shafts, Helical spring.

Thin and Thick walled cylinder: Stresses due to internal pressure, compound cylinders.

Recommended Books:

1. Strength of Materials by Ryder; Palgrave McMillan.
2. Mechanics of Solids by Popov; Prentice Hall.
3. Strength of Materials by Gere and Timoshenko; PWS Publishing Company.
4. Mechanics of Materials by R.C. Hibbeler; Prentice Hall.
5. Strength of Materials by S.S. Rattan; Tata McGraw Education.
6. Strength of Materials by R.K. Bansal; S. Chand Publisher.

Suggested list of experiments:

1. Study of 100 Ton and 60 Ton Universal testing machine.
2. To conduct tensile test on M.S. specimen.
3. To conduct compression test on wooden piece.
4. To conduct bend test on M.S. specimen.
5. Study of Impact testing machine.
6. To Conduct Izod and Charpy test on impact testing M/c.
7. Study of Rockwell hardness testing machine.
8. To conduct Rockwell hardness test on different material specimen.
9. Study of Brinell Cum Vicker's hardness tester.

(Dr. Sun) Punjab

(Dr. M.K. Gupta) (Dr. Hemant Kumar)

Department of Electronics and Communication Engineering

Ujjain Engineering College, Ujjain

Course Contents

EC 4304

Category of Course	Course Title	Course Code	Credits- 4C			Theory Papers (ES)
Engineering Science - ES13	Energy Environment Engineering & Science	EC 4304	L	T	P	Max. Marks -70 Min. Marks- 30 Duration- 3 Hrs.
			3	1	0	

Unit –I

Introduction of energy scenario, Conventional and non-conventional resources of energy, utility and waste management of thermal, hydal energy. General idea of solar, Wind, Bio-mass. Geothermal, Tidal and Wave energy, Sources and waste management of nuclear power energy. Electromagnetic energy, radio frequency and microwaves, its biological effects.

Unit –II

Global warming, depletion of ozone layer" human activity and meteorology. Genetic and plant bio-diversity, EL-Nino phenomenon and its effects. Solid waste, waste disposal methods, recycling of solid waste and its management.

Unit –III

Atmosphere - introduction. Structure of the atmosphere. Chemical and Photochemical reactions in the atmosphere, primary air pollutants - Sources, control and harmful effects of CO, NO_x, SO_x, HC, particulars, sampling techniques, Air pollution from automobiles, Photochemical smog, Acid rain some case studies of air pollution.

Unit –IV

Hydrosphere - Aquatic environment, organic and inorganic water pollutants, Domestic and Industrial waste water treatment, -Aerobic and anaerobic treatment processes, sampling and preservation, some case studies of water pollution.

Unit –V

Lithosphere and Noise Pollution - introduction of Land and Soil pollution. Control and disposal, harmful effects. General introduction of noise pollution and its effects. Sound unwanted form of noise, changes, and traffic noise. Prediction and control.

References:

1. Environmental Engineering - Howand S. Peavy, Rowe, Mc.Graw Hill.
2. Environmental Protection - Emil T. Chanlett.
3. E, Environmental Chernistry - A.K. Dey. Wiley Eastern Ltd.
4. Environmental Science - Cumingham, Saigo, Mc.Graw Hill.
5. Ecology Concepts and Application - Manuel C. Mrnoller, Jr.-Mc.Graw Hill.
6. Environmental Chemistry and Pollution Control - S. S. Dora, S.Chand & co.

13/3/2020

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B.E. VI SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
MS 4806	Industrial Engineering	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	4	-	-	4	70	22

Unit I

Introduction: Concept of industrial engineering, techniques of I.E., important applications of I.E. productivity, concept of productivity, importance of productivity, factors affecting productivity, basic work content of a job, various techniques to minimize ineffective work and inefficient time added to a job measurement of productivity, productivity of indirect labor.

Unit II

Work study: Introduction and concept of work study, work study and management, work study and productivity.

Method Study: Definition and concept, scope and objective of method study, criteria of selection of a job for method study, various charts used for method study, critical examination.

Unit III

Work Measurement: Introduction, scope and objectives of work measurement, procedure of work measurement, time study, basic procedure of time study, advantages and limitations of time study, various time elements considered in time study, estimation of number of cycles to be timed. Performance rating, methods of performance rating, various allowances considered in time study. Estimation of standard time, memo-motion and micromotion study, Therbligs, work sampling, PMTS, work factor.

Unit IV

Wages and Incentives: Introduction, definition, factors influencing wages, minimum guaranteed wages to employees, characteristics of a satisfactory wages system, time wages system, concept of wage incentives, causes for failure of incentives plans, workers attitude towards incentive. Halsay's premium plan, Emerson's efficiency plan, Taylor's differential piece rate system, Merrick's multiple piece rate system.

Cost Estimation: Meaning, objectives, functions, constituents of costs, cost structure, fixed and variable costs, semi variable cost, Break-even analysis, direct and indirect costs, overheads. Using standards in estimating, role of industrial engineering in estimating costs, activity based costing.

Unit V

Ergonomics and Human Factor Engineering: Introduction, objectives and scope of ergonomics, introduction to information theory, human sensory system, relative capabilities of human beings and machines displays, visual displays, qualitative and quantitative type of displays, human motor activities, bio-mechanisms of motion, energy expenditure in physical activities, human input and output channels, anthropometry, anthropometric data and their uses, work – space dimensions, design of seat and seating arrangements, location of components, design of work place.