WITH EFFECT FROM THE ACADEMIC YEAR 2015 - 2016

SCHEME OF INSTRUCTION & EXAMINATION

B.E. II YEAR

(Mechanical Engineering & Production Engineering)

SEMESTER - II

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration In Hours	Maximum Marks	
			L	D/P		Univ. Exam	Sessionals
		THEORY					
1.	MT 251	Mathematics - IV	4	-	3	75	25
2.	ME 251	Kinematics of Machines	3	2	3	75	25
3.	EE 221	Electrical Circuits & Machines	4	-	3	75	25
4.	ME 253	Thermodynamics	4	-	3	75	25
5.	EC 222	Basic Electronics	4	-	3	75	25
6.	CE 271	Fluid Dynamics	4	-	3	75	25
		PRACTICALS					
1.	EE 291	Electrical Circuits & Machines Lab	-	3	3	50	25
2.	EC 242	Basic Electronics Lab	-	3	3	50	25
		TOTAL	**23**	**8**	**-**	**550**	**200**

WITH EFFECT FROM THE ACADEMIC YEAR 2015 - 2016

SCHEME OF INSTRUCTION & EXAMINATION

B.E. II YEAR

(SERVICE COURSES OFFERED TO OTHER DEPARTMENTS)

SEMESTER - II

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration In Hours	Maximum Marks	
			L	D/P		Univ. Exam	Sessionals
		THEORY					
1.	ME 271	Part B : Mechanical Technology (for Civil)	3	-	1.30	37	13
2.	ME 272	Thermodynamics & Fluid Mechanics (for IE)	4	-	3	75	25
		PRACTICALS					
1.	ME 291	Mechanical Technology Lab (for IE & EEE)	-	3	3	50	25

MT 251

MATHEMATICS-IV

(For CSE, Mechanical, Production and Automobile Engg.)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To impart the knowledge of essential mathematics tool like functions of complex variables and their properties
2. To introduce the concepts of Z- transforms, Fourier transforms and their properties
3. To introduce a few numerical methods to solve certain types of problems

Unit-I

Functions of Complex variables: Limits and Continuity of function, Analytic functions, Cauchy- Riemann equations , Cartesian and Polar forms, Harmonic functions, Complex integration, Cauchy's theorem, Derivative of Analytic functions, Cauchy's integral formula and its applications.

Unit-II

Residue theory and Transformations: Taylor's and Laurent's series expansions, Zeros and Singularities, Residues, Residue theorem, Evaluation of real integrals using Residue theorem, Conformal mapping, Bilinear transformation.

Unit-III

Z-Transforms: Introduction, Basic Theory of Z-transforms, Z-transform of some standard sequences, Existence of Z-transform, Linearity property, Translation theorem, Scaling property, Initial and Final value theorems, Differentiation of Z-transform, Convolution theorem, Solution of difference equations using Z-transforms.

Unit -IV

Fourier Transforms: Introduction, Fourier integrals, Fourier sine and cosine integrals, Complex form of Fourier integral, Fourier transform, Fourier sine and cosine transforms, Finite Fouriers sine and cosine transforms, Properties of Fourier transforms, Convolution theorem for Fourier transforms.

Unit -V

Numerical Methods: Solutions of Algebraic and Transcendental equations, Bisection method and Newton-Raphson's method , Interpolation, Newton's Forward and Backward difference interpolation , Lagrange's interpolation, Newton's divided difference interpolation, Numerical differentiation, Solution of differential equations by Euler's method and Runge-Kutta method of order four.

Suggested Reading:

1. R.K.Jain & S.R.K Iyengar, *Advanced Engineering Mathematics,* Narosa Publication, 4th Edition 2014.
2. B.S.Grewal, *Higher Engineering Mathematics,* Khanna Publications, 43rd Edition, 2014.
3. Erwin Kreyszig, *Advanced Engineering Mathematics,* 9th Edition, 2012.
4. James Brown and Ruel Churchill, *Complex variables and Applications,* 9th Edition,2013.
5. Vasishtha and Gupta, *Integral Transforms,* Krishnan Prakashan Publications, 2014.

ME 251

KINEMATICS OF MACHINES

(For Mechanical, Production and AE)

Instruction	
Lectures :	3 Periods per week
Drawing / Tutorials :	2 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To make students understand the basic concepts of mechanisms , inversions and its applications, analyse velocity and acceralations in a given mechanisms
2. To understand the concept of friction and its significance in engineering applications.
3. Student could able to construct a cam profile for a given motion conditions.
4. To make the students to understand gear terminology, significance of gears and different types of gear trains.

Unit-I

Definition of link, element, pair, kinematic chain, mechanism and machine, Grubler's criterion, inversions of quadratic cycle chain, inversions of single and double slider crank chains, mechanism with lower pairs and straight line motion mechanism, Pantograph, Peaucerlier, Hart, Robert's Law Davis and Ackerman's Steering gear mechanisms. Fundamentals of coupler curves, Hooke's law.

Unit-II

Analysis of mechanisms: Graphical methods to find velocities of mechanisms, instantaneous centre, body centrode and space centrode, Kennedy's theorem, Graphical determination of acceleration of different mechanisms including Coriolis component of acceleration. Analytical method to find the velocity and acceleration, Analysis of four bar mechanism with turning pairs. Introduction to type, number and dimensional synthesis.

Unit-III

Laws of Friction: Friction in screw threads, pivots, collars and clutches, friction axis of link and friction circle

Belts and Ropes: Open and closed belt drives, length of belt, ratio of tensions, effect of centrifugal tension and initial tension over power transmission, condition for maximum power

Brakes and Dynamometers: Block or shoe, band and block, internal expanding shoe brake, Prony, Rope brake, belt transmission, Torsion dynamometers.

Unit-IV

Cams: Types of cams and followers, Displacement diagrams for followers, uniform motion, parabolic motion, simple harmonic motion, cycloidal motion drawing cam profile with knife-edge follower, translating roller follower and translating Flat follower, cams of specified contour: Eccentric circle cam with translating flat power, Eccentric circle cam with translating roller follower.

Unit-V

Gears: Classification of gears. Spur gears- Nomenclature, law of gear tooth action, involute as gear tooth profile, interference of involute gears, minimum number of teeth to avoid interference, contact ratio, Cycloidal tooth profile, comparison of involute and cycloidal tooth profile.

Helical gears: Helical gear tooth relations, contact of helical gear teeth. Gear trains- Simple and compound, Reverted, and Epicyclic gear trains.

Suggested Reading:

1. S.S. Rattan, Theory of Machines, Tata McGraw-Hill, 3rd Edition, 2009.
2. J.E.Shigley, Theories of Machines, McGraw-Hill Publications, 2005.
3. Thomas Bevan, Theory of Machines, CBS Publishers, 2005.
4. John J. Uicker. Jr, Gordon R. Pennock, Joseph E. Shigley, Theory of Machines and Mechanisms, Oxford Higher Education, 4th edition, 2015.
5. R.L .Norton, Design of machinery, An introduction to the Synthesis and Analysis, mechanisms and machines, McGraw hill higher education, 3rd edition,2012
6. Lal and Jagadish, Theory of mechanisms and machines, 2009.

EE 221

ELECTRICAL CIRCUITS AND MACHINES

(For CSE, Mechanical and Production Engg.)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives :

1. To acquire knowledge in electrical circuits.
2. To be able to understand the basic principle operation and performance of electrical machines.

Unit-I

DC & AC Circuits: Analysis of circuits using loop current method, Thevenin's and Norton's theorems, Sinusoidal sources, Phasor representation of sinusoidal quantities, Average and rms values, Active power, Reactive power, Energy stored in inductance and capacitance, Mutual inductance, Dot convention, analysis of simple coupled circuits.

Unit-II

Production of 3-Phase Voltages: Analysis of 3-phase balanced circuits, 3-phase power measurement by two-wattmeter method. Transformers: Principle of transformation of voltages and currents, Equivalent circuit of transformer on no load and load, Efficiency and regulation of transformer, OC and SC tests, Auto-transformer.

Unit-III

DC Machines: Construction and working principle of a DC machine, Production of emf in a generator, Types of excitation, Characteristics of series, shunt and compound motors, Speed control and application of DC motors, Losses and efficiency, three point starter.

Unit-IV

Induction Motors: Production of rotating magnetic field, Construction and principle of operation of induction motors, Speed-torque characteristics, Methods of starting and Speed control of 3-phase induction motors,

Unit -V

Single-Phase & Special Motors: Various types of single phase motors, Spilt phase, Capacitor start and Capacitor run, Basic features of Stepper motor and Brushless DC motor.

Suggested Reading:

1. Naidu M.S. & Kamakshiah S, *Introduction to Electical Engineering,* Tata McGraw Hill, 1995.
2. Jhon Bird, *Electrical Circuit theory and Technology,* Routledge Taylor & Francis Group, Fourth Edition, 2012.
3. Mehtu V.K., *Principles of Electrical Engineering and Electronics,* S.Chand & Co., 1999.
4. A. Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, *"Basic Electrical Engineering"* Tata McGraw Hill Education PVT. LTD., 2009.

ME 253

THERMODYNAMICS

(For Mechanical and Production)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To make students to understand the basic concepts of thermodynamics as an energy approach to a system with their applications.
2. Analyse Laws of conservation of energy as applied to thermodynamic systems.
3. To make students to understand properties of pure substance and their representation and interpretation by graphical representation of pressure, volume, temperature, and enthalpy and entropy.
4. To understand the principles of air standard cycles and their applications.

Unit-I

Introduction: Microscopic and Macroscopic approach of thermodynamics system. surroundings and property, intensive and extensive properties, Measurement of temperature, Zeroth law of thermodynamics, Temperature Scales, ideal gas and ideal gas thermometer, Reversibility and irreversibility quasi– static process, Specific heats for ideal gases, Thermodynamics Equilibrium.

Unit-II

First Law of Thermodynamics: Statement of First Law, Heat and work interactions, Thermodynamics work and Internal energy, Energy as property of system, First Law applicable to Closed system, Thermodynamic processes and calculation of work, Heat transfer, and internal energy, Heat as Path Function, First law analysis of flow processes and limitation, Calculation of work done during flow processes.

Unit-III

Second Law of Thermodynamics: Physical description of second law, Kelvin– Planck and Clausius statement of Second Law of thermodynamics, Equivalence of Kelvin– Planck and Clausius statements, Reversible and irreversible processes, Carnot Theorems, Clausius Inequality, Calculation of entropy change during various thermodynamic processes principle of Entropy increase, T– S diagrams, Available and Unavailable energies in steady flow, Second Law Analysis of Control Volume, Helmholtz and Gibb's functions.

Unit-IV

Thermodynamic properties of Fluids: Properties of pure substances, Concept of phase change, Graphical representation of pressure, Volume and Temperature, (PVT), H-S and T-S diagrams, Properties of steam, Use of steam Tables and Mollier diagram, Thermodynamic relations involving entropy, Enthalpy, Internal Energy, Maxwell relations and Clapeyron equation.

Unit-V

Air standard cycles: Air standard cycles– Otto, Diesel, Dual Combustion Cycle, **Sterling and Rankine cycle.**

Mixture of Gases: Mole fraction and mass fraction, Partial pressure and Dalton's Law, Amagat-Leduc Law of Partial volumes, Relation between partial pressure, mole fraction and volume fraction; Gas Constant, molecular mass and specific heats of the gas mixtures; relation between volumetric and gravimetric analysis.

Suggested Reading:

1. P.K. Nag, *Basic & Applied Thermodynamics,* Tata McGraw Hill, 2nd Edn., 2008..
2. Y.V.C.Rao, *An Introduction to Thermodynamics,* Universities Press, 2nd Edn., 2010.
3. P.L Ballaney, *Thermal Engineering,* Khanna Publishers 2004.
4. E. Radha Krishnan, *Engineering Thermodynamics,* 2002.
5. D. S. Kumar, *Thermal science and Engineering,* 2006.

EC 222

BASIC ELECTRONICS

(For CSE, Mechanical and Production)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. Analyze the behavior of Semiconductor diodes in Forward and Reverse bias
2. Design of Half wave and Full wave rectifiers with L,C,LC & CLC Filters
3. Explore V-I characteristics of Bipolar Junction Transistor in CB,CE & CC configurations
4. Explain feedback concept and different oscillators.
5. Analyze Digital logic basics and Photo Electric devices.

Unit-I

Semi Conductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current. Hall Effect, Characteristics of P-N Junction diode, Parameters and Applications.

Rectifiers: Half wave and Full wave Rectifiers (Bridge, center tapped) with and without filters, ripple, regulation and efficiency. Zener diode regulator

Unit-II

Bipolar Junction Transistor: BJT, Current components, CE, CB, CC configurations, characteristics, Transistor as amplifier. Analysis of CE, CB, CC Amplifiers (qualitative treatment only).

JFET: Construction and working, parameters, CS, CG, CD Characteristics, CS amplifier.

Unit-III

Feedback concepts: Properties of negative feedback amplifiers, Classification, Parameters.

Oscillators: Barkhausen Criterion, LC Type and RC type oscillators and crystal oscillator. (Qualitative treatment only)

Unit-IV

Operational Amplifiers: Introduction to OP Amp, characteristics and applications - Inverting and Non-inverting Amplifiers, Summer, Integrator, Differentiator, Instrumentation Amplifier.

Digital System : Basic Logic Gates, Half, Full Adder and Subtractors.

Unit-V

Data Acquisition systems: Study of transducer (LVDT, Strain gauge, Temperature, Force).

Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics only.

Display Systems: Constructional details of C.R.O and Applications.

Suggested Reading:

1. Jacob Millman, Christos Halkias, Satyabrata jit, *Electronics Devices and Circuits , McGraw Hill,* 3rd edition, 2010
2. Ramakanth A. Gayakwad, *Op-AMPS and Linear Integrated Circuits,* 4th edition, Prentice Hall of India, 2000.
3. M. Morris Mano, Digital Design, 3rd edition, Prentice Hall of India, 2002
4. William D Cooper, aand A.D. Helfrick, *Electronic Instrumentations and Measurement Techniques,* Pearson/PHI 2007.
5. S. Shalivahan, N. Suresh Kumar, A. Vallava Raj, *Electronic Devices and Circuits,* Tata McGraw Hill, 2003.

CE 271

FLUID DYNAMICS

(For Mechanical and Production)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To know various fluid properties, concept and method of fluid pressure measurement.
2. To understand the basic concepts of fluid motion.
3. To study different equations of fluid motion and fluid dynamics.
4. To analyze different flow characteristics of laminar and turbulent flows.
5. To study the motion of gasses for different conditions of expansion.

Unit-I

Properties of fluids: Definition of fluid and concept of continuum. Fluid properties; pressure, density, specific weight, specific volume, dynamic and kinematic viscosity. Classification of fluids; ideal and real fluids.

Fluid Kinematics: General concepts of path lines, stream lines, streak lines and stream tubes. Classification of fluid flow; steady and unsteady, uniform and non-uniform, laminar and turbulent, rotational and irrotational, one, two and three-dimensional flows. Definition and properties of stream function and velocity potential function.

Unit-II

Fluid Dynamics: Energy of a fluid body, potential energy and potential head, pressure energy and pressure head, kinetic energy and kinetic head, energy equation. Derivation of Euler's and Bernoullis' equations, and their applications. Impulse momentum equation and its applications.

Unit-III

Measurement of Fluid Flows: Measurement of pressure, and use of pressure measuring devices such as manometers, Bourdon's

pressure gauge and transducers. Measurement of velocity, and use of velocity measuring devices such as pitot tube and hot wire anemometer. Measurement of discharge, and use of discharge measuring devices such as venturimeter, orifice meter and rotameter; derivation of relevant formulae. Discharge formulae for weirs and notches.

Unit-IV

Laminar and Turbulent Flow through Pipes: Distinction between laminar and turbulent flows; Reynold's number and its significance. Upper and lower critical values of Reynold's numbers for flow in pipes. Development of laminar and turbulent flow in circular pipes. Hagen-Poisciiille equation; frictional losses m pipes. Darcy's equation. Estimation ofDarcy's friction factor. Empirical formulae and Moody's chart.

Boundary Layer Theory: Development of laminar and turbulent boundary layers on a flat plate, pressure gradient, and phenomenon of separation. Fluid flow over an aerofoil, flow around a cylinder at rest, rotational flow around a cylinder at rest, lift and drag forces, and coefficients; circulation and Maimus effect.

Unit-V

Compressible fluid flow: Concepts of compressible flow, continuity, momentum and energy equation of compressible flow. Velocity of sound in compressible and incompressible fluids. Mach Number. Classification of compressible flow; adiabatic flow in perfect gas, stagnation pressure and temperature. Temperature, pressure, density ratios as functions of Mach number.

Suggested Reading:

1. K. L. Kumar, *Engineering Fluid Mechanics.* Eurasia Publishing House 1997.
2. R. K. Rajput, *Fluid. Mechanics and Hydraulic Machines,* S Chand & Co., 2003.
3. P. N. Modi and S. M. Seth, *Hydraulic and Fluid Mechanics,* Standard Book House, Delhi, 1995.
4. V L. Streeter, *Fluid Mechanics.* McGraw-Hill Co. Ltd., 2002.

EE 291

ELECTRICAL CIRCUITS & MACHINES LAB

(For Mechanical and Production)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

Course Objectives :

1. To understand the verification of Thevenin's and Norton's Theorems.
2. To acquire knowledge in electrical circuits.
3. To understand the basic principle operation and performance of electrical machines.

List of Experiments:

1. Verification of Thevenin's and Norton's Theorems.
2. Measurement of Power by Two-Wattmeter Method.
3. Study of Single-Phase R, L & C Series & Parallel Circuits.
4. Study of Self and Mutual Inductance of Coils and their interconnections.
5. Magnetization Curve of a Separately Excited DC Generator.
6. Load Characteristics of a Shunt Generator.
7. Performance Characteristics of a Shunt Motor.
8. Performance Characteristics of a Compound Motor.
9. Performance Characteristics of a Series Motor.
10. Speed Control of DC Shunt Motor.
11. O.C. and S.C. Tests on Single-Phase Transformer.
12. Performance Characteristics of 3-Phase Induction Motor.
13. Speed Control Methods of Induction Motors.

Note: Minimum ten experiments should be conducted in the semester.

EC 242

BASIC ELECTRONICS LAB

(For CSE, Mechanical and Production)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

Course Objectives:

1. Demonstrate the characteristics of Semiconductor diodes
2. Realize the filters and rectifiers.
3. Verify the characteristics of different transistor Configurations
4. Design of Biasing Circuits for BJT and FET Amplifiers
5. Design different circuits using Operational Amplifiers.

List of Experiments:

1. CRO-Applications, Measurements of R, L and C using LCR meter, Color code method and soldering practice.
2. Characteristics of Semiconductors diode (Ge, Si and Zener)
3. Static Characteristics of BJT-Common Emitter
4. Static Characteristics of BJT-Common Base
5. Static Characteristics of FET
6. RC-Phase Shift Oscillator
7. Hartley and Colpitt's Oscillators
8. Common Emitter Amplifier
9. Astable Multivibrator
10. Full-wave rectifier with and without filters using BJT
11. Operational Amplifier Applications
12. Strain Gauge Measurement
13. Analog-to-Digital and Digital to Analog Converters

Suggested Reading:

1. David Bell A., *Operational Amplifiers and Linear ICS,* PHI, 2005
2. David Bell A., *Laboratory Manual for Electronic Devices and Circuits,* PHI, 2007
3. Boylestad R.L and Nashelsky, *Electronics Devices and Circuit Theory,* PHI, 2006

Note: Minimum ten experiments should be conducted in the semester.

ME 271

PART - B
MECHANICAL TECHNOLOGY
(For Civil Engineering)

Instruction	3 Periods per week
Duration of University Examination	1 & 1/2 Hours
University Examination	37 Marks
Sessional	13 Marks

Course Objectives:

1. To know the working principle of earth moving equipment
2. To study types and working principle of conveying and hoisting equipment
3. To understand the working principle of concrete producing, concrete screening and concrete mixing equipment
4. To know the principle of pneumatic equipment and tools

Unit-I

General description, operation, maintenance and selection of the following: Earth moving and Excavating Equipment: Shovels, Dragline, Clamshell, Cable excavator, Bucket wheel excavator, Tractor, Bulldozer, Scraper, Trenchers, Grader, Earth compactors.

Unit-II

Conveying Equipment: Belt conveyor, Screw Conveyor, Bucket Conveyor, Apron Conveyer, Aerial ropeway

Hoisting Equipment: Hoist winch, Differential and Worm geared chain hoists, Fork lift trucks, Guyed and stiffly derricks, swing and non-swing mobile crane, Whirler, crane, Construction elevator, Passenger lift. Bucket elevators.

Unit-III

Aggregate and Concrete Producing Equipment: Crusher's jaw, Gyratory, Hammer and Roll crusher. Screens-stationary, shaking and vibrating screens, concrete mixers, concrete pumps.

Pneumatic Equipment: Reciprocating air compressor, Construction pneumatic jack hammer, paving breaker, Rock drill, concreter vibrator.

Suggested Reading:

1. R.L. Peurifoy, *Construction Planning Equipment and Methods*, McGraw Hill Publishers, 1956.
2. Mahesh Varma, *Construction Equipment and its Planning and Applications*. Metropolitan Books Co, Delhi, 2004.
3. Goodes Spence, *Building and Civil Engineering Plant,* Crossby Lock Wood, 1995.

ME 272

THERMO DYNAMICS AND FLUID MECHANICS

(For Instrumentation Engineering)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To understand the basic concepts of thermal Engineering
2. To understand design of reciprocating machinery such as IC Engines and Reciprocating air compressors etc.
3. To study the working principles of thermal experiments used in thermal power plants
4. To analyze different flow characteristics of laminar and turbulent flows

Unit-I

Thermodynamics: Zeroth law, First law of thermodynamics, Concept of internal energy and enthalpy, Application to closed and open loop systems, Second law of thermodynamics, Concept of entropy, Clausius inequality and principles of increase in entropy in irreversible process.

IC Engines: Concept of Air standard cycles, Otto, Diesel and Dual combustion cycles. Working of four stroke and two stroke petrol and diesel engine with p-V diagrams, valve timing diagram, calculation of indicated power, brake power, specific fuel consumption, mechanical and thermal efficiencies.

Unit-II

Reciprocating Air compressors: Single and multistage compressors, work done, efficiency of multistage compressors, effect of clearance volume.

Steam turbines: Classification of steam turbines, velocity diagrams for simple impulse and reaction turbines, problems on work done, blade angles, power and thermal efficiency of the turbine.

Gas turbine: Classification of gas turbine-constant pressure combustion cycle, open cycle, closed cycle and constant volume

combustion gas turbine plants, use of gas turbines, Fuels used and calculation of efficiencies.

Unit-III

Properties of Fluids: Definition of fluid and concept of continuum, fluid properties- density, pressure, specific weight, specific volume, dynamic and kinematic viscosities.

Fluid Kinematics: General concepts of path lines, streak lines, stream lines, stream tubes, classification of fluid flow- steady and unsteady flow, uniform and non-uniform flow, one-two and three dimensional flows.

Definition and properties of stream function and velocity potential function, concept of continuity.

Unit-IV

Measurement of Fluid Flows: Devices used for measurement of pressure, velocity and discharge and derivation of relevant formulae.

Fluid Dynamics: Derivation of Euler's and Bernoulli's equations, and their applications, impulse moment equation and its applications.

Unit-V

Laminar and Turbulent flows through pipes: Distinction between laminar and turbulent flows, Reynolds number and its significance, Critical Reynold's number, laminar and turbulent flow in circular pipes, Hagen Poiseullc equation, frictional losses in pipes, Darcy's equation, estimation of Darcy's friction factor, empirical formulae and Moody chart, Development of laminar and turbulent boundary layer on a flat plate, Dimensional analysis and dynamic similarity.

Suggested Reading:

1. R.K.Rajput, Thermal Engineering, Laxmi Publications, 2005.
2. Modi, P.N. and Seth, S.M., Fluid Mechanics, Standard Book House New Delhi-2004.
3. Streeter, Fluid Mechanics Victor L&Wylie, E.Benjamin 7th Edition.
4. V.Ganesan, Internal Combustion Engines, Tata McGraw Hill Publishing, 5th Edn., 1994.

ME 291

MECHANICAL TECHNOLOGY LAB

(For Instrumentation Engineering & EEE

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

Course Objectives:

1. To gain knowledge on working principle of petrol and diesel engines
2. To understand the working of pressure gauges and other measuring equipment

List of Experiments:

1. Determination of absolute and kinematic viscosity of lubricants
2. Determination of Flash and Fire points of lubricants
3. Valve timing diagram of 1C engine
4. Performance test on multi-cylinder petrol/diesel engine
5. Heat Balance Sheet on IC-engine
6. Performance test on reciprocating air compressor
7. Study and Calibration of pressure gauges
8. Measurement of velocity by pilot tube
9. Measurement of velocity by hot-wire anemometer
10. Measurement of discharge by venture meter
11. Measurement of discharge by orifice meter/rotameter
12. Determination of Reynolds's Number.

Note: Minimum ten experiments should be conducted in the semester.