## Scheme for Teaching & Examination

### B. Tech. - II (M&P) Third Semester

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course</th>
<th>Code</th>
<th>Teaching Scheme</th>
<th>Exam Scheme</th>
<th>Total</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
<td>Hrs.</td>
</tr>
<tr>
<td>1</td>
<td>Theory of Machines</td>
<td>ME 201</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Machine Drawing</td>
<td>ME 203</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Manufacturing Technology</td>
<td>ME 205</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Measurement Systems (IS 1)</td>
<td>ME 207</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Solid Mechanics (IS 2)</td>
<td>AM 205</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>14</td>
<td>3</td>
<td>10</td>
<td>450</td>
</tr>
</tbody>
</table>

Total Theory Hrs. per week (27) Total Credits =22 Total Marks =775

### B. Tech. - II (M&P) Fourth Semester

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course</th>
<th>Code</th>
<th>Teaching Scheme</th>
<th>Exam Scheme</th>
<th>Total</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
<td>Hrs.</td>
</tr>
<tr>
<td>1</td>
<td>Materials Science &amp; Metallurgy</td>
<td>ME 202</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Engg. Mathematics - III (IS 3)</td>
<td>MH 210</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Mechatronics (IS 4)</td>
<td>ME 204</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Thermodynamics</td>
<td>ME 206</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Fluid Mechanics</td>
<td>ME 208</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>16</td>
<td>5</td>
<td>6</td>
<td>500</td>
</tr>
</tbody>
</table>

Total Theory Hrs. per week (27) Total Credits =24 Total Marks = 775
• **MECHANISMS AND MACHINES** (06 Hours)
  Introduction, Mechanism and machine, Rigid and resistant body, Link, Kinematic pair, Types of motion, Degrees of freedom (mobility), Classification of kinematic pairs, Kinematic chain, Linkage, Mechanisms, Kinematic inversion, Inversions of slider crank chain, Double slider-crank chain.

• **VELOCITY ANALYSIS** (08 Hours)

• **ACCELERATION ANALYSIS** (10 Hours)
  Definition of acceleration, Angular acceleration, A general case of acceleration, Radial and transverse components of acceleration, The coriolis component of acceleration, Examples of acceleration analysis, Acceleration diagrams, Computer-aided kinematic analysis of mechanisms.

• **BELTS, ROPES & CHAINS** (06 Hours)
  Introduction, Belt and rope drives, Open and crossed belt drives, Velocity ratio, Slip, Materials for belt and ropes, Law of belting, Length of belt, Ratio of friction tensions, Power transmitted, Centrifugal effect on belts, Maximum power transmitted by a belt, Initial tension, Creep, Chains, Cha in length, Angular speed ratio, Classification of chains.

• **GEARS & GEAR TRAINS** (10 Hours)
  Introduction, Classification of gears, Gear terminology, Law of gearing, Velocity of sliding, Forms of teeth, Cycloidal profile teeth, Involute profile Teeth, Comparison of cycloidal and involute tooth forms, Birth of contact, Arc of contact, number of pairs of teeth in contact, Interference in involute gears, Minimum number of teeth, Interference between rack and pinion, Undercutting, Introduction to helical, Spiral, Worm, Worm gear and bevel gears.

• **CAMs** (05 Hours)
  Introduction, Types of cams, Types of followers, Cam terminology, Displacement diagrams, Motions of the follower, Graphical construction of cam profile.

(Total Lecture Hours: 45)

**PRACTICALS:**
1. Study and demonstration of various types of mechanisms & their inversions.
2. To draw velocity diagram using instantaneous centre method.
3. To draw velocity and acceleration diagram for a simple mechanism.
4. To draw velocity & acceleration diagram of a mechanism involving coriolis component acceleration.
5. Study and demonstration of various types of cams & followers.
6. To draw the layout of cam profile for a reciprocating radial knife edge follower.
7. To draw the layout of cam profile for an offset reciprocating roller follower.
8. To draw the layout cam profile for a flat faced reciprocating follower.
9. To draw the layout of cam profile for an oscillating follower.
10. Study of various types of gears and gear trains.

**BOOKS RECOMMENDED:**
### B. Tech. (Mechanical & Production), Semester – 3

#### ME 203: MACHINE DRAWING

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

- Machining symbols & Surface textures. \( (01 \text{ Hours}) \)
- Screw threads and screw fastenings. \( (02 \text{ Hours}) \)
- Riveted joints, Pin joints, Keys and cotter joints. \( (01 \text{ Hours}) \)
- Welding symbols and welded joints. \( (01 \text{ Hours}) \)
- Shaft couplings. \( (02 \text{ Hours}) \)
- Shaft bearings, Brackets and hangers. \( (02 \text{ Hours}) \)
- Pulleys. \( (01 \text{ Hours}) \)
- Pipe joints, Piping drawing. \( (01 \text{ Hours}) \)
- Engine parts: Stuffing box, Cross head, Connecting rod, Cranks, Eccentric, etc. \( (02 \text{ Hours}) \)
- Pattern making drawing, Production drawing & construction drawing of chimney, Funnels, & Pressure vessels. \( (02 \text{ Hours}) \)
- Exposure to drafting packages

(Total Lecture Hours: 15)

### TERM WORK:
- Each student will submit a set of drawing sheets and sketch book based on the above syllabus.
- Interpretation of industrial drawings & machining symbols
- Free hand sketches

### BOOKS RECOMMENDED:
5. BIS – 696 – 1972
# ME 205: MANUFACTURING TECHNOLOGY

**L**  | **T**  | **P**  | **C**
---|---|---|---
3 | 1 | 2 | 5

## INTRODUCTION TO MANUFACTURING TECHNOLOGY (02 Hours)
- Primary manufacturing processes - Secondary manufacturing processes.

## CASTING (10 Hours)
- **Introduction**, Casting terms:
  - Patterns - Allowances - Types of patterns - Moulding materials - Properties and testing cores, Type, Chaplets, CO₂ moulding, Gating & riser system, Spure, Ingates, Gating, Ration, Trapping of slag, Cleaning of casting, Product design, Special casting processes, Shell moulding, Die casting investment, Precision casting, Permanent moulding, Centrifugal casting, Low pressure die casting, Continuous casting process, Cosworth process, Squeeze casting, Semisolid meal working process, Rapid solidification process, Cupola, Cokeless cupola.

## METAL WORKING (10 Hours)
- True stress, True strain, Hot working, Hot working temperatures, Cold working, Rolling, Principles of rolling, Forging, Principle of forging, Extrusion, Principle of extrusion, Hot & cold extrusion, Wire drawing, Principle of wire drawing, Tube drawing, Sheet metal working, Definitions of various operations like shearing, Blanking, Piercing, Trimming, Shaving, Hammers and presses.

## GAS WELDING (08 Hours)

## ELECTRIC ARC WELDING (08 Hours)

## RESISTANCE WELDING (07 Hours)

(Total Lecture Hours: 45)

## PRACTICALS:
1. Pattern making practice – 1
2. Pattern making practice – 2
3. Butt type welding joint
4. Lap type welding joint
5. Soldering practice
6. Tin smity practice
7. Molding practice
8. To find grain fineness number for given sand
9. To find clay content from mould sand
10. To find water content from mould sand
11. To find permeability numbers for given sample of mould material

## BOOKS RECOMMENDED:
B. Tech. (Mechanical & Production), Semester – 3

ME 207: MEASUREMENT SYSTEMS

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

- **BASIC CONCEPTS** (03 Hours)
  Terminology, Calibration, Standards and units, Generalized block Diagrams of measuring systems, Input output configuration of measuring systems, Standard deviation and variance.

- **PRESSURE MEASUREMENT** (06 Hours)
  Definition of pressure, Units, Types of pressure measurement devices, Manometers, Dead weight tester, Bourdon tube pressure gauge, Diaphragms and bellows, Low pressure measurement, The Mcleod gauge, Pirani thermal conductivity gauge, Knudsen gauge, Ionization gauge, Piezo electric transducer Selection of pressure measuring devices for specific applications, Calibration of pressure measuring devices.

- **TEMPERATURE MEASUREMENT** (07 Hours)
  Temperature scales, Ideal gas, Temperature measuring devices, Thermometer, Bi-metallic strip, Electrical resistance thermometer, Thermistors and thermocouples, Laws of thermocouples and their applications, Construction and calibration of thermocouples, Radiation pyrometers, total radiation pyrometers.

- **FLOW MEASUREMENTS** (07 Hours)
  Types of flow measuring devices, Constructional features, Obstruction meters like orifice, Venturi nozzle and their calibration, Flow measurement by drag effects (rotameter), Pitot tube, Hot wire anemometers, Magnetic flow Meters, Flow visualization Techniques, Shadowgraph, Interferometer, Laser doppler anemometer, Ultra sonic flow meter.

- **MISCELLANEOUS MEASUREMENTS** (07 Hours)
  Basic methods of force measurements, Torque measurement on rotating shaft, Poney brake and eddy current dynamometers, Stress and strain measurements, Types of strain gauges, Electric resistance strain gauges, Wheatstone bridge, Gauge factor of strain gauge, Rosettes, Speedometer and stroboscope, Ballast circuit, Vibration measurement using accelerometer.

- **INTRODUCTION TO MEASURING INSTRUMENTS** (09 Hours)
  Ammeter, Voltmeter, Wattmeter, energy meter, potential transformer and current transformer, frequency meter and megger.

- **EFFICIENCY OF TRANSFORMER AND RELATED MEASUREMENT** (06 Hours)
  Measurement of losses of transformer by open circuit and short circuit tests, Determination of voltage regulation, efficiency and parameter calculation using the result of above tests for single-phase & three-phase transformers, Polarity test and determination of three phase connection of transformer.

- **EFFICIENCY OF INDUCTION MOTOR AND RELATED MEASUREMENT** (05 Hours)
  Measurement of losses of three phase induction motor by No load and blocked rotor tests, efficiency, Torque and parameter calculation to find characteristic of motor.

- **EFFICIENCY OF DC MOTOR AND RELATED MEASUREMENT** (04 Hours)
  Measurement of speed, Power determination of torque of DC motor, efficiency calculation from no load test & load test.

- **DETERMINATION OF VOLTAGE REGULATION & EFFICIENCY IN POWER SYSTEM** (06 Hours)
  Measurement of power, Energy, Power factor, Determination of cost of generation and supply, Comparison of AC & DC supply system & related measurements to determine voltage relationships, voltage regulation & determination of losses & determination of efficiency from there of.

(Total Lecture Hours: 60)

**PRACTICALS:**
1. Calibration of thermocouple.
2. Calibration of bourdon tube type pressure gauge.
3. Calibration of eccentric orifice meter.
5. To find out velocity distribution.
6. Hysteresis curve for bourdon tube type pressure gauge.
7. No load and blocked rotor test on induction motor.
8. Polarity test on single phase transformer.
9. Load test on induction motor.
10. Speed control of DC motor.
12. Exposure to oscilloscopes
13. Exposure to data acquisition systems

BOOKS RECOMMENDED:

B. Tech. (Mechanical & Production), Semester - III
AM 205 : SOLID MECHANICS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRESSES AND STRAINS</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td>SHEAR FORCE DIAGRAM AND BENDING MOMENT DIAGRAM</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td>Types of beams – Types of supports – Types of loads – shear force – Bending moment – Sign conventions – Overhanging beams – Point of contraflexure – Varying loads – Relation between SF and BM.</td>
<td></td>
</tr>
<tr>
<td>STRESSES IN BEAMS</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td>SPRINGS</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td>Types of springs – Close coiled helical spring subjected to axial load and twist – Leaf springs – Semi elliptical and Quarter elliptical leaf springs</td>
<td></td>
</tr>
<tr>
<td>PRINCIPAL STRESSES</td>
<td>(03 Hours)</td>
</tr>
<tr>
<td>Principal plane – Principal stress – Tangential and normal stress – Derivation of Major and Minor principal stresses for different cases – Mohr’s circle graphical method</td>
<td></td>
</tr>
<tr>
<td>THEORIES OF FAILURE</td>
<td>(03 Hours)</td>
</tr>
<tr>
<td>THIN CYLINDERS</td>
<td>(03 Hours)</td>
</tr>
<tr>
<td>Stresses in cylinders – Thin cylinders and thin spheres – Volumetric strain – Wire wound thin cylinders</td>
<td></td>
</tr>
<tr>
<td>WELDED JOINTS</td>
<td>(02 Hours)</td>
</tr>
<tr>
<td>TORSION</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td>Basic theory of Torsion – Solid shaft – Hollow shaft – Power transmitted by shaft – Composite shafts</td>
<td></td>
</tr>
<tr>
<td>COLUMN AND STRUTS</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td>Euler’s theory for columns – Different end conditions – Rankine’s formula – Limitations of Euler’s theory</td>
<td></td>
</tr>
<tr>
<td>STRAIN ENERGY</td>
<td>(04 Hours)</td>
</tr>
<tr>
<td>Strain energy – Resilience – Strain energy due to Tension and compression - Strain energy due to freely falling load</td>
<td></td>
</tr>
</tbody>
</table>

(Total Lecture Hours : 45)

PRACTICALS:

1. Tension Test on MS and CI specimens
2. Torsion Test on MS Specimen
3. Charpy Impact Test
4. Transverse Test on Wooden beam
5. Spring Test
6. Compression test on CI Columns
7. Shear Strength Test
8. Hardness Test
BOOKS RECOMMENDED:

INTRODUCTION TO THE SUBJECT AND ITS APPLICATION IN ENGINEERING FIELD

SCIENCE OF METALS
Crystal structure, Types of crystal systems, Crystal lattice, Lattice parameters, Metallic structures, Miller indices, Atomic radius & atomic packing factors for various cubic systems, Crystalline materials, Amorphous materials, Crystal imperfections, Bragg's law of X-ray diffraction.

MECHANICAL BEHAVIOR OF METALS
Properties of metals, Deformation of metals, Mechanisms of deformation, Deformation in polycrystalline materials, Mechanical testing of materials (destructive & non-destructive testing methods).

IRON MAKING
Definition & classification of metallurgy, Extractive metallurgy classification & composition of pig iron, Manufacturing of pig iron, Principle, Construction & operation of blast furnace.

STEEL MAKING

CLASSIFICATION OF MATERIALS AND METALS
Semiconductor, Magnetic materials, Dielectric materials, Superconductor, Nanomaterials, Biomaterials, Engineering alloy steels, Cast irons, Non-ferrous metals & alloys, Basic concept of metallography.

PHASE DIAGRAM
Objectives & classification, System, phases & structural constituent of phase diagram, Coring & dendritic segregation, Gibb's, solid phase rule, Eutectic, Peritectic & eutectoid system, Equilibrium diagrams for non-ferrous alloys, Lever rule.

SOLIDIFICATION OF METALS
Concept of solidification of metals, Solidification of pure metals, Nucleation, Growth, Growth of the new phase, Solidification of alloys, Progressive, Directional solidification & control of solidification to obtain sound castings.

HEAT TREATMENT PROCESSES
Definition, Purpose & classification of heat treatment processes for various types of special steels, Introduction & applications of various case hardening & surface hardening treatments. TTT & CCT curves

POWDER METALLURGY
Concept, Processes, Characteristics of metal powders, Production of metal powders, Blending & mixing, Compacting, Pre-sintering & sintering secondary operations.

POLYMERS, CERAMICS & COMPOSITES
Definition, Classification & characteristics of polymers, Types of polymerization, Polymer processing, Elastomers, Properties of ceramic materials, Cermets, Composite materials, Fiber reinforced plastic (FRP).

(Total Lecture Hours: 45)

PRACTICALS:
1. To discuss in detail various application of iron-carbon equilibrium diagram.
2. To study of a metallurgical microscope.
3. To prepare the specimen for microscopic observation.
4. To study of microstructure of wrought iron cast iron & plastic steel.
5. To study of the microstructure of non ferrous metals and alloys.
7. To determine the hardenability by Jominy end quench test.
8. To determine machine defects by dye-penetant & magnetic flow detection NDT technique.
9. To determine flows by ultrasonic technique.

BOOKS RECOMMENDED:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH 210</td>
<td>ENGG. MATHEMATICS – III</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

- **CALCULUS, MULTIPLE INTEGRALS** (08 Hours)
  Reorientation of concepts of integrals, Double and Triple integrals evaluation techniques, Change of order of Integration, Change of variable, Application of double and triple integrals for evaluation of area, volume and mass.

- **BASIC CONCEPTS OF VECTOR CALCULUS** (08 Hours)
  Line Integrals, Scalar and vector point function, Differential operator, Gradient, Directional derivative, Physical meaning of gradient, Divergence, Curl and Laplacian with their properties, Surface Integral, Volume integral, Green’s, Gauss and Stoke’s theorem & application.

- **FOURIER SERIES** (06 Hours)
  Definition, Fourier series with arbitrary period, in particular periodic function with period $2\pi$. Fourier series of even and odd function, Half range, Fourier series.

- **PARTIAL DIFFERENTIAL EQUATION** (08 Hours)
  Second order PDE of mathematical physics (Heat, wave, one dimensional equation and Laplace equation with standard boundary conditions), Solution by separation of variable method using Fourier series.

- **INTRODUCTION TO ENGINEERING ANALYSIS** (06 Hours)
  Types of problems encountered in Mechanical Engineering, Classification of problems based on methods of solution.

- **SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS** (12 Hours)
  Euler’s method, Runge-Kutta method, Boundary value and eigen value problems, Application to mechanical engineering problems, Taylor’s series and Predictor-Corrector method.

- **FINITE DIFFERENCE METHOD** (12 Hours)
  Methods to derive finite difference equations, Elliptic and parabolic equations, Boundary conditions, Explicit and Implicit method, Application to mechanical engineering problems

(Total Lecture Hours: 60)

**BOOKS RECOMMENDED:**

• **INTRODUCTION TO MECHATRONICS & SUBJECT OVERVIEW**
  (01 Hour)

• **MECHATRONIC SYSTEM ELEMENTS**
  Measurement system, Control system, Microprocessor based controllers & its applications, Other applications with mechatronic approach, Building blocks of mechatronic system.

  (04 Hours)

• **SENSORS & TRANSDUCERS**

  (09 Hours)

• **ACTUATION SYSTEMS**
  o Pneumatic & hydraulic actuation systems:
    System configuration, Control System & its elements, Linear actuators, Rotary actuators.
  o Mechanical actuation:
    System types & its configuration, Fixed ratio type, Invariant motion profile type, variator etc.
  o Electrical actuation system types & configurations, Mechanical switches, Solid state switches, Solenoids.

  (16 Hours)

• **DIGITAL CIRCUITS**
  Boolean algebra combinational circuits. (adders, subtractors, encoders, decoders, multiplexers, de–multiplexers, memory units: RAM, ROM, EPROM etc.), Sequential circuits.

  (05 Hours)

• **ANALOG SIGNAL PROCESSING**
  Amplifiers, Operational amplifiers, Ideal model for operational amplification, Inverting amplifier, Non-inverting amplifier, Summer, Difference amplifier, Instrumentation amplifier, Integrator, Differentiator, Sample & hold circuit, Comparator, The real operational amplification ADC & DAC, Timers, Signal Modulation.

  (05 Hours)

• **ELECTRONIC SYSTEM DESIGN**

  (05 Hours)

  (Total Lecture Hours: 45)

**BOOKS RECOMMENDED:**

B. Tech. (Mechanical & Production), Semester – 4  
MED 206: THERMODYNAMICS  

| Lectures | 3 | 1 | 2 | 5 |

- **BASIC CONCEPTS & DEFINITIONS** (06 Hours)  
  Classical thermodynamics & statistical thermodynamics, Thermodynamic: system, properties, states, processes, cycle & equilibrium, The zeroth law of thermodynamics & its applications.

- **WORK AND HEAT** (04 Hours)  
  Definition of work & heat and their evaluation for various thermodynamics processes, Comparison of heat & work.

- **PROPERTIES OF PURE SUBSTANCE** (05 Hours)  
  Definition of pure substance, Phases of a pure substance, P-V-T behaviour of a pure substance, Critical & triple point of a pure substance, Mollier diagram, steam table & dryness fraction of steam, Measurement of dryness fraction of steam.

- **PROPERTIES OF GAS AND GAS MIXTURE** (04 Hours)  
  Equation of state for ideal gas, Change in entropy, internal energy, enthalpy of gas in various thermodynamics processes, Dalton's law of partial pressure & properties of gas mixture.

- **FIRST LAW OF THERMODYNAMICS** (07 Hours)  
  The first law of thermodynamics for a cycle & for a process, First law of thermodynamics for a non flow and flow process, Application of 1st law of thermodynamics to boilers, Engines, turbines, Components etc.

- **SECOND LAW OF THERMODYNAMICS** (06 Hours)  

- **ENTROPY** (07 Hours)  
  Inequality of Clausius theorem, Entropy as a property, Change in entropy in reversible and irreversible processes, Principle of increase of entropy, Entropy change of an ideal gas in various thermodynamics processes, Second law of thermodynamics for steady flow process & its application.

- **FUELS AND LUBRICANTS** (06 Hours)  
  Definition & classification of fuels, Its composition & calorific value, Proximate and ultimate analysis of fuel, Types & properties of lubricants. Flash point, fire point, Viscosity, Vap. pressure, Cloud point, pour point etc.  
  (Total Lecture Hours: 45)

**PRACTICALS:**

1. To determine flash point and fire point of a given sample of oil.
2. To determine penetration number of grease by grease – penetrometer.
3. To determine viscosity of an oil by Redwood viscometer.
4. To determine calorific value of gaseous fuel by Junker’s calorimeter.
5. To determine carbon residue by conradson apparatus.
6. To determine vapour pressure of a fuel by Reid’s vapour pressure apparatus.
7. Determination of calorific value of solid fuels by Bomb Calorimeter
8. Proximate Analysis of a given fuel by proximate analyzer

**BOOKS RECOMMENDED:**

# ME 208: FLUID MECHANICS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLUID PROPERTIES</strong> :</td>
<td>(04 Hours)</td>
</tr>
<tr>
<td>Ideal Fluid, Continuum, Properties of Fluid, Classification of Fluids.</td>
<td></td>
</tr>
<tr>
<td><strong>FLUID STATICS</strong> :</td>
<td>(06 Hours)</td>
</tr>
<tr>
<td>Pressure at a Point, Forces on Areas - Horizontal, Inclined and Vertical, Centre of Pressure, Forces on Curved Surfaces, Buoyant Forces, Stability of Floating and Submerged Bodies, Relative Equilibrium under Linear Acceleration and Constant Rotation.</td>
<td></td>
</tr>
<tr>
<td><strong>DIMENSIONAL ANALYSIS</strong> :</td>
<td>(02 Hours)</td>
</tr>
<tr>
<td>Dimensions, Dimensional Homogeneity, Buckingham-π Theorem, Dimensional Grouping, Non-Dimensional Numbers, Geometrical, Kinematics and Dynamic Similarity.</td>
<td></td>
</tr>
<tr>
<td><strong>FLUID KINEMATICS</strong> :</td>
<td>(10 Hours)</td>
</tr>
<tr>
<td><strong>FLUID DYNAMICS</strong> :</td>
<td>(08 Hours)</td>
</tr>
<tr>
<td>Newton's Laws of Motion, Reynolds Transport Theorem, Euler's Equation, Bernoulli's Equation, Flow Through Confined Passages, Navier-Stokes Equation, Exact solution of Navier-Stokes Equation for simple flows.</td>
<td></td>
</tr>
<tr>
<td><strong>LAMINAR AND TURBULENT FLOWS</strong> :</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td><strong>PIPE SYSTEMS</strong> :</td>
<td>(05 Hours)</td>
</tr>
<tr>
<td><strong>BOUNDARY LAYER THEORY</strong> :</td>
<td>(05 Hours)</td>
</tr>
</tbody>
</table>
| Concept of Boundary Layer, Boundary Layer over Flat Plates and Tubes, Boundary Layer Parameters, Boundary Layer Thickness, Momentum Thickness, Displacement Thickness, Von-Karman Momentum Integral Equation, Boundary Layer Separation and Control, Concept of Drag, Streamlined and Bluff Bodies. | (Total Lecture Hours: 45)

---
PRACTICALS:

1. Flow of an Incompressible Fluid through an Orifice meter and its calibration for measurement of discharge.
2. Flow of an Incompressible Fluid through a Nozzle meter and its calibration it for measurement of discharge.
5. Determination of metacentric height of a floating body
6. Variation of friction factor with Reynolds number for Laminar flow through circular pipe
7. Variation of friction factor with Reynolds number for Turbulent flow through circular pipe
8. Determination of the velocity distribution in circular pipe.

BOOKS RECOMMENDED: