

## STUDY PLAN

### Mechanical - Recording Classes

#### Machining

Lathe – Principle, Types, Construction, Specifications

Cutting Tool – Geometry, Nomenclature, Signature, Tool Angle

Special Operations – Taper Turning, Thread Cutting, Knurling, Forming, Drilling, Boring, Reaming, Keyway Cutting

Cutting Fluids – Coolants, Lubricants, Shaper, Slotter, Planner

#### Welding

Introduction, Principles, Types, Equipment, Advantages, Limitations

Gas Welding – Principle, Types, Equipment, Soldering – Types, Solders, Brazing

Flame Cutting – Principle, Process, Equipment, Advantages, Limitations

Welding Defects, Inspection Types, MIG & TIG Welding

#### Grinding & Finishing Processes

Metal Removal – Principle, Types, Applications, Abrasives (Natural & Artificial)

Grinding Machines – Cylindrical, Surface, Tool & Cutter, Centreless, Wheel Types, Maintenance, Balancing

Honing, Lapping, Finishing, Electroplating – Principles, Applications

Hot Dipping, Galvanising, Parkerising, Anodising, Metal Spraying – Wire & Powder Processes, Applications

#### Metrology

Linear and Angular Measurement – Types

Comparators – Mechanical, Electrical, Optical, Pneumatic

Surface Roughness – Methods, Interferometer, Collimator, Measuring Microscope

Inspection, Shadow Projection Principle, Profile Projector – Principle, Advantages, Applications

#### Industrial Management

Job Analysis, Motivation, Theories, Performance & Reward Systems

Production Planning and Control – Routing, Scheduling, Dispatching, PERT and CPM

Materials in Industry, Inventory Control, ABC Analysis, EOQ, Break-Even Analysis

Stores Layout, Equipment – Bin Card, Cardex, Material Handling – Hoist, Cranes, Conveyors, Trucks, Fork Trucks

#### Fluid Mechanics & Hydraulic Machinery

Fluid Properties – Density, Specific Weight, Specific Gravity, Viscosity, Surface Tension, Compressibility, Capillarity

Pascal's Law, Buoyancy, Reynold's Number, Pressure, Energy Concepts

Laws of Conservation – Mass, Energy, Momentum, Velocity of Liquids, Discharge

Bernoulli's Equation – Assumptions, Venturi Meters, Pitot-Tube, Current Meters

Pumps – Centrifugal, Jet, Submersible, Efficiencies – Manometric, Volumetric, Mechanical, Overall

<b>Thermal Engineering</b>
Laws of Thermodynamics, Heat-Work Conversion, Perfect Gases – Laws
Thermodynamic Processes – Isochoric, Isobaric, Isothermal, Hyperbolic, Isentropic, Polytropic, Throttling
Heat Transfer – Modes, Thermal Conductivity, Convective Heat Transfer Coefficient
Stefan-Boltzmann Law, Overall Heat Transfer Coefficient, Air Standard Cycles – Carnot, Otto, Diesel
Internal Combustion Engines – Diesel vs Petrol, Refrigeration Plant
<b>Engineering Mechanics</b>
Resolution of forces, Equilibrium and Equilibrant, parallelogram law of forces, triangle law of forces
Polygon law of forces, Lami's theorem, couple, moment of a couple, condition for equilibrium of rigid body
Definition of static friction, dynamic friction, derivation of limiting angle of friction and angle of repose
Calc of moment of inertia and radius of gyration of: I-Section, channel section, T, L, Z-Section, Built up sections
Static and Dynamic Friction – Definitions, Limiting Angle, Angle of Repose
laws of motion, motion of projectile, D'Alembert's principle, definition law of conservation of energy, momentum
<b>Strength of Materials</b>
Stress, strain, stress strain diagram, factor of safety, thermal stresses, strain energy
proof resilience and modules of resilience, Shear force and bending moment diagram
cantilever beam, simply supported beam, continuous beam, fixed beam
Torsion in shafts and springs, thin cylinder shells
<b>Material Science</b>
Mechanical properties of engineering materials – tensile strength, compressive strength, ductility, malleability
Hardness, Toughness, Brittleness, Impact Strength, Fatigue, Creep Resistance
Classification of Steels – Mild & Alloy Steels, Importance of Heat Treatment
Heat Treatment Processes – Annealing, Normalizing, Hardening, Tempering, Carburizing, Nitriding, Cyaniding
<b>Previous Year Questions (PYQ) Discussion</b>
PYQ – 1
PYQ – 2
PYQ – 3
PYQ – 4
PYQ – 5
PYQ – 6
PYQ – 7