

## MECHANICAL ENGINEERING

### **Statics :**

Simple application of equilibrium equations.

### **Dynamics :**

Simple applications of equations of motion work, energy and power.

### **Theory of Machines :**

Simple examples of kinematic chains and their inversions. Different types of gears, bearings, governors, flywheels and their functions.

Static and dynamic balancing of grid rotors.

Simple vibrations analysis of bars and shafts.

Linear automatic control systems.

### **Mechanics of Solids :**

Stress, strain and Hooke's Law. Shear and bending moments in beams. Simple bending and torsion of beams, springs and thin walled cylinders. Elementary concepts of elastic stability, mechanical properties and material testing.

### **Manufacturing Science :**

Mechanics of metal cutting, tool life, economics of machining, cutting tool materials. Basic types of machine tool and their processes. Automatic machine tools, transfer lines. Metal forming processes and machines—shearing, drawing, spinning, rolling, forging, extrusion. Types of casting and welding methods. Powder metallurgy and processing of plastics.

### **Manufacturing Management :**

Methods and time study, motion economy and work space design, operation and flow process charts. Cost estimation, break-even analysis. Location and layout of plants, material handling. Capital budgeting. Job shop and mass production, scheduling, despatching, Routing, Inventory.

### **Thermodynamics :**

Basic concepts, definitions and laws, heat, work and temperature, Zeroth law, temperature scales, behaviour of pure substances, equations of state, first law and its corollaries, second law and its corollaries, analysis of air standard power cycles, carnot, otto, diesel, brayton cycles, vapour power cycles. Rankine reheat and regenerative cycles, Refrigeration cycles—Ben coleman. Vapour absorption and Vapour compression cycle analysis, open and closed cycle gas turbine with intercooling, reheating Energy Conversion.

Flow of steam through nozzles, critical pressure ratio, shock formation and its effect, Steam Generators, mountings and accessories. Impulse and reaction turbines, elements and layout of thermal power plants.

Hydraulic turbines and pumps, specific speed, layout of hydraulic power plants.

Introduction to nuclear reactors and power plants, handling of nuclear waste.

### **Refrigeration and Air Conditioning :**

Refrigeration equipment and operation and maintenance, refrigerents, principles of air conditioning, psychrometric chart, comfort Zones, humidification and dehumidification.

### **Fluid Mechanics :**

Hydrostatics, continuity equation. Bernoulli's theorem, flow through pipes, discharge measurement, laminar and turbulent flow, boundary layer concept.