**APGENCO ASSISTANT ENGINEERS (AE) MECHANICAL SYLLABUS**

**Strength of Materials:**

Simple stresses and strains Hooke’s law, elastic constants, stress strain curve of mild steel bars of uniform strength, compound bars, temperature stresses, stresses on oblique planes – principal stresses and strains, Mohr’s stress circle, shear force and bending moment diagrams for beams, bending and shear stresses in beams, deflections of beams, columns and struts, strain energy, torsion of circular shafts and springs.

**Fluid Mechanics and Machinery:**

Basic fluid properties, fluid static – pressure measurements, buoyancy and flotation, truid Kinematics, fluid dynamics – Euler’s, Bernoulli’s and Impulse momentum equations, laminar and turbulent flows, flow through pipes and losses in pipes, bends, boundary layer theory, compressible fluid flow, impact of jets, Hydraulic turbines and pumps, Ram, accumulator and intensifier.

**Material Science and Metallurgy:**

Structure and properties of engineering materials, bonding in solids, imperfections in crystals and metals, structure of alloys, manufacture of iron and steel, heat treatment, alloy steels, principles of powder metallurgy.

**Theory of Machines:**

Displacement, velocity and acceleration analysis of plane mechanisms. dynamic analysis of slider – crank mechanism, gear trains, flyWheels. .

**Vibrations:**

Free and forced vibrations, effect of damping, resonance. Vibration isolation, critical speeds of shafts.

**Design of Machine Elements:**

Design for static and dynamic loading, failure theories, fatigue strength, S-N diagram, design of joints, shafts, bearings, gears, brakes, clutches, screws, springs, cranks, piston, gyroscopes, balancing and governors.

**Heat Transfer:**

Various modes of heat transfer, fins, heat exchangers, LMTD & NTU methods, unsteady state heat conduction, dimensionless parameters, free and forced convective heat transfer, thermal boundary layer, heat Transfer in flow-over flat plates and through Pipes, effect of turbulence, radiative heat transfer, shape factors, network analysis, eondensation and boiling.

**Thermodynamics:**

Zeroth, first and second laws of thermodynamics, thermodynamics systems and processes, Carnot cycle, Air-standard cycles, irreversibility and availability, properties of pure substances. Psychometry, Refrigeration and Air-conditioning, working principles and their applications.

**Applied Thermodynamics:**

Classification of compressors and its working principles, Classification of I.C . Engines and its working principles, performances, Design considerations of combustion chambers for C.!. & S.L Engines, knocking, Rating of fuels, Lubrications, Ignition systems.

**Turbo machines:**

Working principles of gas turbines, steam turbines, Rankine’s cycle. modified Rankine’s cycle, jet propulsion and nozzles.

**Metal cutting and Machine tools:**

Mechanics of machining, single and multi point cutting tools, tool geometry, tool life, wear, cutting force analysis, micro finishing machines-EDM, ECM and USM, NC machines, jigs and fixtures. Standards of measurements, limits, fits, tolerances, linear and angular measurements, comparators, lathes, drilling, shaping, planning, milling, gear cutting. broaching and grinding machines.

**Foundry, Welding and Forging:**

Design of patterns moulds and cores, solidification, design consideration of runner, riser and gate. Physics of welding, types of welding and their principles, brazing, soldering, adhesive bonding. Fundamentals of hot and cold working processes, forging, rolling, extrusion, drawing, shearing and bending.

**Production and operation management:**

Plant layout, material handling, production planning and control, materials, management and work studies, inspections, quality control, cost analysis, operation research, basic concepts of CADI CAM, inventory control