Syllabus for B.E. Mechanical (Evening) Entrance Test

There will be one paper comprising questions in Engg. Mechanics Design, Production and Thermal Engineering. The standard of questions shall be the same as expected in a three-year Diploma (Mechanical) Examination of the Polytechnics.

Engg. Mechanics: Co-planer and non-co-planer force system, triangle, parallelogram and polygon law of forces. Moments, couple, centre of gravity. Centroid, moment of inertia. Motion and displacement. Velocity and acceleration, equations of motion. Newton's Laws of Motion. Momentum. Conservation of momentum. Work, power and energy. Types of energy. Conservation of energy. Curvilinear motion. Angular velocity and acceleration. Centripetal and centrifugal force. Simple machines (lever, wheel, axle, pulley, jack and wrinch crab). Mechanical advantage, velocity ratio and efficiency of a machine. Laws of friction.

Properties of fluids (specific weight, specific mass, specific volume, capillary). Pascal's Law. Pressure of vertically inclined surface. Centre of pressure. Types of fluid flow. Rate of discharge and equation of continuity Bernoulli's theorem. Fluid flow through a pipe, an orifice and a venturimeter. Pitot tube. Loss of pressure head due to friction sudden area enlargement, contractions, obstruction and bends.

Design: Types of stress and strain. Strain energy due to direct stresses. Stress due to gradual, sudden and falling load. Theory of simple bending Stress in beams of rectangular/circular/I/T sections under different types of loads (Concentrated/UDL). Deflection in simply supported beams and cantilevers under UDL/ Concentrated loads.

Types of columns and their modes of failure. Buckling. Crushing loads. Factors affecting strength of a column. Riveted and welded joints for pressure vessels and structural members. Bolts and nuts. Power transmitted by shafts under torsion. Design of flanged coupling. Design of leaf and close-coiled helical springs. Cotter and Knucle joints.

Production Engineering: Types of welding/Metal Forming/Moulding processes and their applications. (Introduction only). Introduction to a machine tools and metal cutting. Common fracture of machine tools. Geometry of single point cutting tools, drills and milling cutters. Types of chips. Tool wear and tool life. Use of Cutting fluids and their types. Working principle and mechanism of ashaper. Specification of a shaper. Types of shaper tools types, angle and materials. Industrial Management. Source of capital, Joint, stock, private, partnership and private limited company. Line staff and functional organisations. Trade unions. Labour laws. Industries disputes. Inventories and wages.

Thermal Engineering: Thermodynamic systems and their properties. Laws of thermodynamics. Enthalpy. Thermodynamic processes (constant volume, constant pressure, isothermal, adiabatic and polytropic). Conditions (wet saturated, dry saturated and super-heated) and properties of steam. Details of boilers for low and high pressure generation of steam, fire tube and water tube types. Principle, construction and working of impulse and reaction turbines. Classification of I.C. Engines S. I. and C.I. engines. Working principle of 2-stroke and 4-stroke cycle engines. Power cycles (ideal, air, fuel-air, otto, diesel dual combustion) their thermal efficiencies and comparisons. Principle of refrigeration. Refrigeration cycle, common refrigerants and their properties. Psychometric process and properties.