INSPECTOR – FACTORIES & BOILERS /A.E. MECH COURSE

TECH. PSC

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EXAM DETAILS

METHOD OF RECRUITMENT
Direct

AGE LIMIT
23-36

QUALIFICATION:
Must possess a degree in Mechanical Engineering of a recognized University or equivalent qualification recognized by the central or state Government

NAME OF POST
INSPECTOR - FACTORIES & BOILERS / A.E. MECH

DEPARTMENT
FACTORIES & BOILERS

NUMBER OF VACANCY
02 (anticipatory)

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EXPECTED SYLLABUS

INSPECTOR - FACTORIES & BOILERS / A.E. MECH COURSE

Thermodynamics

Thermodynamic processes, entropy, irreversibility and availability, basic thermodynamic cycles, behaviour of ideal and real gases, properties of pure substances, computation of work and heat, ideal processes, analysis of thermodynamic cycles related to energy conversion.

Fluid mechanics

Fluid properties, fluid statics, manometry, buoyancy, control volume analysis of mass, momentum and energy, fluid acceleration, differential equations of continuity and momentum. Euler's equation, Bernoulli's equation, laminar flow through pipes, boundary layer displacement, momentum and energy thickness, flow through pipes, minor and major losses, dimensional analysis.

Heat transfer

Modes of heat transfer, one dimensional heat conduction, thermal resistance, fins, free and forced convective heat transfer, dimensionless parameters, problems in convective heat transfer with the help of correlation, thermal boundary layer, radiation, black and grey surfaces, shape factors, network analysis. Heat exchangers - LMTD and NTU methods

Mechanics of Solids:

Stress-strain relationship and elastic constant, principal stress and strains, Mohr's circle for plane stresses and plane strains, shear force and bending moment diagrams, bending of beams, torsion of circular shafts, Euler's theory of columns, strain energy, thermal stresses

Theory of Machines

Kinematic and dynamic analysis of planer mechanisms. Cams, Gears and gear trains. Flywheels, Governors, Balancing of rigid rotors and field balancing, Balancing of single and multi cylinder engines, free and forced vibrations of single degree of freedom systems, effect of damping, vibration isolation and transmissibility, resonance, Critical speeds and whirling of shafts.

Machine design
Design for static and dynamic loading, failure theories, fatigue strength and S-N diagram, Principles of design of machine elements such as bolted, riveted and welded joints. Design of shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

I.C. Engines
SI and CI engines, two-stroke and four-stroke engines, efficiencies, heat balance, combustion in IC engines, abnormal combustion, engine fuels and fuel rating, alternate fuels, carburetion and fuel injection – MPFI, CRDI, super charging and turbo charging methods, engine emission and control.

Refrigeration and air conditioning
vapour compression and absorption refrigeration cycles, heat pumps, properties of moist air, psychrometric chart, basic psychrometric processes

Hydraulic machines and Turbomachinery
Steam and gas turbines, Rankine and Brayton cycles with regeneration and reheat, heat transfer equation,–turbo machines – impulse and reaction principles, Pelton wheel, Francis and Kaplan turbines, velocity diagram and performances of turbo machines

Nonconventional energy sources – solar, wind, wave, biomass, geothermal and fuel cells.

Material science
Classification of materials, Structure and properties of common engineering materials, Crystalline materials, crystal structure, defects in crystals, phase diagrams, iron-carbon equilibrium diagram, Phase transformation, T-T-T diagram, heat treatment, fracture – brittle and ductile materials, powder metallurgy.

Manufacturing Processes
Metal casting – stand casting, die casting, investment casting, centrifugal casting, gating and riser design, melting furnaces, forming – hot and cold processes, forging, drawing, extrusion, shearing, bending, high energy forming, joining processes – welding, weldability, metallurgy of welding,

Manufacturing Processes

Machining processes – single and multi point cutting tools, tool geometry and materials, mechanics of machining, tool life and wear, jigs and fixtures, unconventional methods, EBM, ECM, LBM, ultrasonic machining, computer integrated manufacturing, CNC machining

Metrology and instrumentation

limits, fits and tolerances, accuracy, precision, repeatability, comparators, gauges, interferometry, surface structure, measurement of displacement, velocity, acceleration, temperature, Transducers.

Industrial Management and Industrial engineering

Principles and functions of scientific management, Levels and skills of management, organisational structure – authority, responsibility and span of control – system concept of management – line, line and staff, project and matrix organizations, proprietary partnership and joint stock companies, private limited, public limited companies, cooperative organizations and Government organizations

Industrial Management and Industrial engineering

Marketing management – objectives and function, forecasting – moving average, exponential smoothing, break-even analysis, capacity planning, Factors in selection of site, plant layout, types of layouts: process, product, fixed and group layouts.

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