

~ पाठ्यक्रम ~

राज्य सेवा परीक्षा

ऐच्छिक विषय

14. यांत्रिकी इंजीनियरी

इंजीनियरी विषयों के प्रश्नपत्र केवल अंग्रेजी में होंगे. अतएव पाठ्यक्रम केवल अंग्रेजी में ही मुद्रित है ।
(परिशिष्ट एक पैरा 4 (घ) देखें)

Syllabi for optional subjects

14. MECHANICAL ENGINEERING

PAPER - I

1. Statics and Dynamics :

Analysis of framed structures, method of sections. Simple harmonic motions, simple and compound pendulum, work, energy , power, Gyroscopic motion.

2. Theory of Machines :

Higher and lower pairs, inversions, steering mechanisms, Hooks joint, velocity and acceleration of links inertia-forces, Cams, Conjugate action of gearing and interference , gear trains , epicyclic gears, Belt drives, brakes , dynamometers, Fly wheels, Governors Balancing of rotating and reciprocating masses. Free forced and damped vibrations for a single degree of freedom. critical speed and whirling of shafts.

3. Mechanics of solids:

Stress and strain in two dimensions, Mohr's circle. Theories of failure . Deflection of beams, Buckling of columns. Combined bending and torsion. Castigliano's theorem, Thin cylinders, closed coil helical springs, leaf springs.

4. **Manufacturing Science** : Taylor's equation. Machinability Unconventional machining methods including EDM, ECM and ultrasonic machining . Use of laser and plasmas. Surface roughness, gauging comparators, jigs and Fixtures.

5. Production Management :

Work simplification, work sampling. Value engineering . Line balancing , ABC analysis. Economic order quantity including finite production rate Graphical and simplex methods for linear programming , transportation model, elementary queuing theory Quality control and its uses in product designs Use of p and C charts., σ_X , R ,

PAPER - II

1. Thermodynamics

Applications of the first and second laws of thermodynamics. Detailed analysis of thermodynamic cycles & their limitations.

2. Fluid Mechanics

Continuity momentum and energy equations, Velocity distribution in laminar and turbulent flow. Dimensional analysis. Boundary layer on a flat plate; Adiabatic and isentropic flow, Mach number.

3. Heat transfer :

Critical thickness of insulation . Conduction in the presence of heat source. Heat transfer from fins. Momentum and energy equations for boundary layer on a flat plate. Dimensionless numbers. Free and forced convection . Boiling and condensation. Nature of radiant heat, Stefan-Boltzmann law, Configuration. factor, Logarithmic mean temperature difference Heat exchanger effectiveness.

4. Energy Conversion

Combustion phenomenon in C.I. and S.I. engines, Carburation and atomisation. Classification of hydraulic turbines, specific speed, Impulse and Reaction turbines, velocity triangles, diagram efficiency, open and closed cycle , Gas turbine plants, Nuclear power and MHD systems, Solar' thermal systems.

5. Environmental Control

Vapour, Compression, absorption and air refrigeration systems. Properties and characteristics of important refrigerants . Use of Psychrometric chart and comfort chart. Estimation of cooling and heating loads. Calculation of supply air, state and rate. Summer & winter, Air-Conditioning plants . layout.