

SYLLABUS FOR NSPCL ADV 01/2026

APTITUDE:

General Knowledge: Current Affairs/Events, General Science, History, Geography, Political Science, Date, Famous Place, Famous Personality, etc

English: Synonyms, Antonyms, Fill in the Blank, Correct Spelling, Gender, Singular & Plural, Idioms & Phrase, One word Substitution, Logical Sequence, etc

Quantitative Aptitude: Simplification, Fraction, LCM/HCF, Number System, Average, Simple Interest, Compound Interest, Percentage, Profit & Loss, Allegation & Mixture, etc

Reasoning: Classification/ Series, Blood Relation, Position/Direction/Distance, Coding-Decoding, Ranking Arrangement, Diagrammatic Reasoning, etc

SYLLABUS FOR SR. ASSISTANT ENGINEER – MECHANICAL

(SUBJECT KNOWLEDGE Test)

Turbomachines

- Classification - Basic laws and equations.
- Hydraulic turbines; Pelton, Francis, and Kaplan turbines - Turbine efficiencies - Cavitation in turbines.
- Centrifugal pumps; theory, components, and characteristics - Cavitation - Axial flow pumps.
- Centrifugal and axial flow compressors; slip, surging and choking.

Strength of Materials

- Axial and shear stresses and strains
- Shear force and bending moment diagrams for beams subjected to different types of loads – Theory of simple bending and assumptions.
- Springs
- Torsion of solid and hollow circular shafts – Power transmission, strength and stiffness of shafts.
- Testing of Materials & Strength

Engineering Thermodynamics

- Review of basic concepts of thermodynamics
- Vapour power cycles - Rankine cycle - Otto, Diesel, dual, Stirling and Brayton cycles.

Thermal Engineering

- Reciprocating air compressors - types - construction - Compressor efficiencies and mean effective pressure.
- Working of two and four stroke engines for SI and CI engines

Material Science & Engineering Metallurgy

- Atomic Arrangement and Phase Diagrams - Structure of metals and alloys, Critical temperature - Plain carbon steel and other steels.
- Heat Treatment of steel.
- Structure of Composites, Plastics, Adhesives
- Corrosion & its Prevention
- Testing of Materials - tensile testing procedure, stress strain curve Hardness testing, Fatigue testing: Creep testing.

Mechanics of Machines

- Mechanisms - classification of mechanisms, Kinematic inversions, slider crank mechanism
- Gears Trains - Law of gearing - profile for gears
- Static and dynamic force analysis of mechanisms, Balancing of rotating/reciprocating masses, Governors
- Vibrations - free and forced vibrations, degree of freedom; Vibration control - Passive and active control

Design of Mechanical Drives

- Introduction to transmission elements - Positive and friction based drives.
- Design of material handling & conveying systems - flat and V-belts, rope and chain drives.
- Design of various types of gears - Force analysis
- Design of Shafts, couplings, screws, fasteners

Fluid Mechanics

- Basic concepts - Fluid properties - Basic hydrostatic equation - Submerged and floating bodies.
- Hydrostatic equations for incompressible and compressible fluids
- Buoyancy and equilibrium of floating bodies
- Fluid dynamics - Laminar and turbulent flows - Flow through pipes, Boundary layer concept - Lift & Drag

Boiler & Pressure Parts:

- Natural vs. forced circulation, once-through (Benson) systems, tube failure mechanisms (DNB, hydrogen damage, short-term overheating), soot blowing optimization, and air preheater performance.