

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 – ELECTRICAL

(SUBJECT KNOWLEDGE Test)

- Equipment and switchyard Earthing system design and philosophy.
- Lightning protection philosophy and design for substations/switchyards and buildings
- Numerical Protection system: Different types of protections for transmission Line, transformer, Switchyard, Switchgear, feeders and their working principle.
- Substation automation system and their working principle and communication protocols, data telemetry.
- Fundamental laws of electrical engineering circuit parameters, elementary network theory forced and transient response, sinusoidal steady state response three-phase circuits, magnetic circuit and transformers, Kirchhoff's Laws: KCL, KVL and their limitations.
- Classification of devices of an electrical circuit; Basic devices: resistors, controlled sources, diodes, capacitors and inductors, ideal transformers.
- Basic circuit analysis methods: nodal, mesh and modified nodal analysis. Transient analysis of RL, RC and RLC circuits.
- Network Theorems: superposition theorem, Thevenin-Norton theorem, substitution theorem, reciprocity theorem, Maxpower-transfer theorem, star-delta- transformation.
- Steady state sinusoidal analysis: phasors, phasor diagrams; Power in ac circuits, network analysis methods and network theorems recalled; Polyphase circuits. Circuits with ideal transformers.
- Semiconductor Diodes: Barrier formation in metal-semiconductor junctions, PN homo- and hetero-junctions; CV characteristics and dopant profiling; IV characteristics.
- Components of a power system; Modelling and representation of transformers, synchronous machines, and sub- systems; Per-unit representation. Transmission Lines: ABCD parameters; Classification; Travelling wave equation for a long line; Surge impedance; Voltage profile along the line; Ferranti effect; Steady-state performance - efficiency and regulation.
- Load-flow studies: Steady-state analysis of power network; Gauss-Seidel and Newton-Raphson methods; Reactive power compensation and Flexible AC Transmission Systems (FACTS) devices; Tap changing and phase-shifting transformers. Penalty factors including real losses; Automatic generation and control; Steady-state analysis and dynamic response of a single area system. Fault analysis: Symmetrical 3-phase faults; Symmetrical components; Unsymmetrical faults. Transient stability studies: Swing equation Equal area criterion; Step-by-step solution of swing curve. Introduction to protection; Introduction to HVDC systems.
- Power electronic devices: Power diodes, power transistors, thyristors, GTO, their characteristics, ratings, protection, and cooling; Power circuit topologies: Series parallel operation of devices; Firing and typical control circuits.
- Power electronic converters: Phase controlled (AC/DC), 1-phase/3-Phase, semi/full; Analysis and performance with passive load, typical control circuit; Harmonics and power factor; Voltage controllers (AC/DC), 1-phase/3-phase.
- Testing & basics of power & control cables, battery system, energy meters, CT, CVT, CB, LA, isolators, earth switches, EHV & MV Transmission lines, MV & LV Switchgear and Power transformers.