

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 – C&I

(SUBJECT KNOWLEDGE Test)

Sensors and Industrial Instrumentation

- Measurement Fundamentals
- Transducers & Sensors: Resistive, capacitive, inductive, piezoelectric, Hall effect, and optoelectronic sensors.
- Measurement of Parameters: Techniques for measuring temperature, pressure, flow rate, liquid level, velocity, force, torque, vibration, and acceleration.
- Signals & Standards: 4-20 mA current loops, pneumatic signals, and industrial grounding/shielding practices.

Control Systems & Process Control

- Control Systems: Transfer functions, block diagrams, signal flow graphs, transient and steady-state response, stability analysis (Routh-Hurwitz, Bode plots, Nyquist criteria, Root locus), and state-space analysis.
- Process Dynamics: Characteristics of diverse industrial processes, dead-time, and interactive systems.
- Control Actions: Tuning and application of P, PI, PID, feed-forward, cascade, and split-range control strategies.

Digital and Automation Systems

- PLC & SCADA: Programmable Logic Controllers (hardware architecture, ladder logic programming) and Supervisory Control and Data Acquisition architectures.
- DCS: Distributed Control Systems and their hierarchy in plant automation.
- Industrial Networks: Fieldbus, Profibus, Modbus, Ethernet, and protocol configurations.

Electronic Devices and Digital Circuits

- Analog Electronics: Operational amplifiers (Op-amps) characteristics, instrumentation amplifiers, filters, and wave-shaping circuits, power supplies, Linear ICs
- Digital Electronics: Combinational and sequential logic circuits, multiplexers, counters, and registers, Logic Families
- Microprocessors & Microcontrollers: architectures, memory interfacing, peripheral devices, and embedded system basics.
- Power Electronics – Power Semiconductor Devices, Controlled Rectifier, DC Chopper Inverter, SMPS
- Semiconductor devices: BJT, FET, MOSFET, Organic Semiconductor

Signals, Systems, and Data Converters

- Signal Conditioning: Bridge circuits, filters, and voltage-to-current/current-to-voltage converters.
- Data Conversion: Sampling theorems, Analog-to-Digital Converters (ADCs), and Digital-to-Analog Converters (DACs).
- Probability, Random Variables, Random Processes, Representation of systems

Circuit Theory

- Network Theorems, Transient Circuit Analysis, Sinusoidal Analysis, AC Circuits, Network Analysis and Synthesis

Communication systems

- Modulation & Detection, AM/FM Transmitters and Receivers, Pulse Modulation, Antennas & Wave Propagation, Fibre Optics Communication