



राष्ट्रीय प्रौद्योगिकी संस्थान श्रीनगर
NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR
(An autonomous Institute of National Importance under the aegis of Ministry of Education, Govt. of India)
 हजरतबल, श्रीनगर, जम्मू-कश्मीर, 190006, भारत
 Hazratbal, Srinagar Jammu and Kashmir, 190006, INDIA

SYLLABUS FOR JUNIOR ENGINEER (ELECTRICAL)

GENERAL APTITUDE SYLLABUS

Verbal Aptitude Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech; Basic vocabulary: words, idioms, and phrases in context Reading and comprehension Narrative sequencing.

Quantitative Aptitude: Data interpretation: data graphs (bar graphs, pie charts, and other graphs representing data), 2 and 3 dimensional plots, maps, and tables; Numerical computation and estimation: ratios, percentages, powers, exponents and logarithms, permutations and combinations, and series Mensuration and geometry Elementary statistics and probability.

Analytical Aptitude: Logic: deduction and induction; Analogy Numerical relations and reasoning;

Spatial Aptitude; Transformation of shapes: translation, rotation, scaling, mirroring, assembling, and grouping, paper folding, cutting, and patterns in 2 and 3 dimensions.

ELECTRICAL ENGINEERING SYLLABUS

Electric Circuits: Network elements: ideal voltage and current sources, dependent sources, R, L and C elements; Network solution methods: KCL, KVL, Node and Mesh analysis; Network Theorems: Thevenin's, Norton's, Superposition and Maximum Power Transfer theorem; Transient response of DC and AC networks, sinusoidal steady-state analysis, resonance, two port networks, balanced three phase circuits, star-delta transformation, complex power and power factor in AC circuits. Faraday's law, Magneto-motive force, Reluctance, Magnetic circuits, Self and Mutual inductance of simple configurations.

Signals and Systems: Representation of continuous and discrete time signals, shifting and scaling properties, linear time invariant and causal systems, Fourier series representation of continuous and discrete time periodic signals, Sampling theorem, Laplace Transform.

Electrical Machines: Single-phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency; Three-phase transformers: connections, vector groups, parallel operation; Auto-transformer, Electromechanical energy conversion principles; DC machines: separately excited, series and shunt, motoring and generating mode of operation and their characteristics, speed control of DC motors; Single phase induction motor: Operating principle, starting, torque-speed characteristics, speed control; Three-phase induction machines: principle of operation, types, performance, torque-speed characteristics, no-load and blocked-rotor tests, equivalent circuit, starting and speed control; Synchronous machines: cylindrical and salient pole machines, performance and characteristics, regulation and efficiency, starting of synchronous motors.

Power Systems: Basic concepts of electrical power generation, Models and performance of transmission lines and cables, Series and shunt compensation, Electric field distribution and insulators, Sag and tension, Skin effect, Ferranti effect, Distribution systems, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential, directional and distance protection; Circuit breakers, System stability concepts.



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Power Electronics: Static V-I characteristics and firing/gating circuits for Thyristor; Rectifiers: Uncontrolled, Controlled, Single-phase and Three-phase; DC to DC converter: Buck, Boost and Buck-Boost Converters; Inverters: Single phase, Three phase, VSI, CSI and PWM; Single phase AC to AC converter, Dual converter.

Analog and Digital Electronics: Simple diode circuits: clipping, clamping, rectifiers; Amplifiers: biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; operational amplifiers: characteristics and applications; passive filters, Digital Signal Oscilloscope, timers, combinatorial and sequential logic circuits, multiplexers, de-multiplexers, Schmitt triggers, sample and hold circuits, A/D and D/A converters.