राष्ट्रीय प्रौद्योगिकी संस्थानश्रीनगर
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 TECHNICAL ASSISTANT

(Department of Electrical Engineering)

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

Electromagnetic Fields: Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line, plane and spherical charge distributions, Effect of dielectric medium, Capacitance of simple configurations, Biot-Savart's law, Ampere's law, Curl, Faraday's law, Lorentz force, 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 operations, Linear Time Invariant and Causal systems, Fourier series representation of continuous periodic signals, Sampling theorem, Applications of Fourier Transform, Laplace Transform and Z-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, starting and speed control of DC motors; Single phase induction motor: Operating principle, starting, torque-speed characteristics, speed control; Three phase induction motor: 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, regulation and parallel operation of generators, starting of synchronous motor, characteristics; Types of losses and efficiency calculations of electric machines.

Power Systems: Power generation concepts, 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 (AC and DC), Per-unit quantities, Bus admittance matrix, Gauss-Seidel and Newton-Raphson load flow methods, Voltage and frequency control,

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Power factor correction, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential and distance protection; Circuit breakers, System stability concepts, Equal area criterion, Economic Load Dispatch (with and without considering transmission losses).

Control Systems: Mathematical modelling and representation of systems, Feedback principle, Transfer function, Block diagrams and Signal flow graphs, Transient and Steady-state analysis of linear time invariant systems, Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Stability analysis, Lag, Lead and Lead-Lag compensators; P, PI and PID controllers; State space model, State transition matrix.

Electrical and Electronic Measurements: Bridges and Potentiometers, Measurement of voltage, current, power, energy and power factor; Instrument transformers, Digital voltmeters and multimeters, Phase, Time and Frequency measurement; Oscilloscopes, Error analysis.

Analog and Digital Electronics: Characteristics of diodes, BJT, MOSFET; Simple diode circuits: clipping, clamping, rectifiers; Amplifiers: Biasing, Equivalent circuit and Frequency response; Oscillators and Feedback amplifiers; Operational amplifiers: Characteristics and applications; Active and passive filters, Voltage-controlled oscillators, Digital Signal Oscilloscope,Timers, Combinational and Sequential logic circuits, Multiplexer, De-multiplexer, Schmitt trigger, Sample and hold circuits, A/D and D/A converters, 8085Microprocessor: Architecture, Programming and Interfacing.

Power Electronics: Characteristics of power semiconductor devices: Diode, Thyristor, TRIAC, GTO, MOSFET, IGBT; 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; AC to AC converter: Single phase and Three phase; Line commutated thyristor based converters, Dual Converter, Bidirectional AC to DC voltage source converters, Harmonics, Power factor, Distortion factor.