



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 TECHNICAL ASSISTANT

(Department of Electronics & Communication 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.

CORE BRANCH SYLLABUS

Networks, Signals, and Systems:

- (1) Node and mesh analysis, superposition, Thevenin's theorem, Norton's theorem, reciprocity theorem. Maximum power transfer theorem.
- (2) Sinusoidal steady state analysis: phasors, complex power, Time and frequency domain analysis of linear circuits: RL, RC and RLC circuits, solution of network equations using Laplace transform, Linear 2-port network parameters, Y-delta transformation,
- (3) Continuous-time signals: Fourier series and Fourier transform, sampling theorem and applications.,
- (4) Discrete-time signals: DTFT, DFT, z-transform, discrete-time processing of continuous-time signals. LTI systems: definition and properties, causality, stability, impulse response, convolution, poles and zeros, frequency response, group delay, phase delay.

Electronic Devices and systems

- (1) Energy bands in intrinsic and extrinsic semiconductors, equilibrium carrier concentration, direct and indirect band-gap semiconductors,
- (2) Carrier Transport Mechanism: diffusion current, drift current, mobility and resistivity, generation and recombination of carriers, Poisson and continuity equations., P-N junction, Zener diode, photo diode, solar cell, BJT, JFET, MOSFET.
- (3) Analog Circuits: clipping, clamping and rectifiers, BJT and MOSFET amplifiers: biasing, ac coupling, small signal analysis, frequency response, differential amplifiers, Amplifiers, summers, differentiators, integrators, active filters and oscillators.
- (4) Digital Electronics: number systems, binary, octal, hexadecimal and BCD numbers., Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates, arithmetic circuits, code converters, multiplexers, decoders., latches and flip-flops, counters, shift-registers, propagation delay, ROM, SRAM, DRAM, sample and hold circuits, ADCs and DACs.,
- (5) Microprocessors fundamentals; Machine instructions and addressing modes, ALU, data-path and control unit, instruction pipelining.



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Control Systems:

- (1) Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response;
- (2) Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; State variable model and solution of state equation of LTI systems.

Communications:

- (1) Concept of signal, bandwidth, power spectral density and Autocorrelation, white noise and its properties, filtering of random signals through LTI systems
- (2) Amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM signals, superheterodyne receivers, SNR and matched filtering.
- (3) Sampling and quantization of signals, PCM, DPCM and ADPCM.
- (4) Digital modulation schemes (ASK, PSK, FSK, QAM), inter-symbol interference, MAP, ML detection and BER, Fundamentals of error detection and correction, Hamming codes, entropy, mutual information and channel capacity theorem.

Electromagnetics:

- (1) Maxwell equations, Plane waves and propagations of waves through various media, phase and group velocity, characteristic impedance, poynting vector and skin depth
- (2) Wave phenomenon like polarization, scattering, reflection and refraction.
- (3) Basic concepts of radiations and antenna, half wave dipole antenna and monopole antennas, linear antenna arrays.