



Instructions:

- 1. Entrance test question paper consists of multiple choice questions for 100 Marks and it is Classified as Part-A, Part-B & Part- C**
- 2. Entrance Test Duration shall be 3 hours**
- 3. Part-A shall be Subject specific for 50 Marks.**
Part – B shall be General Aptitude for 30 Marks
Part – C shall be Mathematics for 20 Marks

Part – A
Subject Specific (Engineering Discipline)
Electronics & Communication Engineering - 50 Marks

1.Control Systems & Networks Basic control system components; Feedback principle; Transfer function; Block diagram representation, error coefficient, steady state error, Frequency response; Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems, Closed loop response - Basics of Non Linear controls, Industrial Automation and Robotics.

Network theorems Superposition, Thevenin's and Norton's, maximum power transfer; Wye-Delta transformation; Time domain analysis of simple linear circuits; Transients, Resonance – Series and Parallel Resonance Solution of network equations using Laplace transform; Frequency domain analysis of RLC circuits

2.Signals and Systems: Fourier series and Fourier transform representations, sampling theorem and applications; Discrete-time signals: Various types, discrete-time Fourier transform (DTFT), DFT, FFT, Z-transform, interpolation of discrete-time signals; LTI systems: definition and properties, stability, impulse response, convolution, poles and zeros, frequency response, group delay, phase delay, digital filter design techniques.

3.Electronic Devices: Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Poisson and continuity equations; P-N junction, Zener diode, BJT, MOS Capacitor, MOSFET, SCR, IGBT, LED, photo diode and solar cell; Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process.

4.Analog & Digital Circuits: BJTs and MOSFETs; Simple diode circuits: clipping, clamping and rectifiers; Single-stage BJT and MOSFET amplifiers: biasing, bias stability, BJT and MOSFET amplifiers: power and operational; Simple op-amp circuits; Sinusoidal oscillators: criterion for oscillation, single-transistor and op- amp configurations; Voltage reference circuits;

Number systems, Combinational circuits: Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, Logic Families. logic gates, CMOS implementations, Logic gates, code converters, multiplexers, decoders and PLAs; Sequential circuits: latches and flip-flops, counters, shift-registers ,Data converters: sample and hold circuits, ADCs and DACs; Semiconductor memories: ROM, SRAM and DRAM.

5.Communications: properties of white noise, filtering of random signals through LTI systems; Analog communications: amplitude modulation and demodulation, spectra of AM and FM, circuits for analog communications; Information theory: entropy, mutual information and channel capacity theorem; Digital communications: PCM, DPCM, digital modulation schemes, amplitude, phase and frequency shift keying (ASK, PSK, FSK, calculation of bandwidth, SNR and BER for digital modulation; Basics of Spread spectrum communications, TDMA, FDMA, CDMA and OFDM. CCN: Basics, Ethernet, Internet Relevant Protocols Services. Antennas: antenna types, radiation pattern, gain and directivity, return loss, antenna arrays; Light propagation in optical fibers, Dipole and Yagi antennas.

Reference Books:

1. J. Nagarath and M.Gopal, “ Control System s Engineering”, New Age International(P) Limited, Publishers, Fifth edition- 2005, ISBN: 81 - 224 - 2008-7.
2. M.E. Van Valkenberg (2000), —Network analysis, Prentice Hall of India, 3rd edition, 2000, ISBN: 9780136110958.
3. Roy Choudhury, —Networks and systems, 2nd edition, New Age International Publications, 2006, ISBN: 9788122427677
4. Simon Haykins and Barry Van Veen, “Signals and Systems”, 2nd Edition, 2008, Wiley India. ISBN 9971-51-239-4.
5. Ben. G. Streetman, Sanjay Kumar Banerjee, “Solid State Electronic Devices”, 7th Edition, Pearson Education, 2016, ISBN 978-93-325-5508-2.
6. Donald A Neamen, Dhruves Biswas, “Semiconductor Physics and Devices”, 4th Edition, MCGraw Hill Education, 2012, ISBN 978-0-07-107010-2
7. Microelectronic Circuits, Theory and Applications, Adel S Sedra, Kenneth C Smith, 6th Edition, Oxford, 2015. ISBN:978-0-19-808913-1
8. John M Yarbrough,-Digital Logic Applications and Design, Thomson Learning,2001.
9. Simon Haykin, “Digital Communication Systems”, John Wiley & sons, First Edition, 2014, ISBN 978- 0-471-64735-5
10. Analog and Digital Communications by T L Singal, McGraw Hill Education (India) Private Limited

Part - B

General Aptitude Test Syllabus (Weightage 30%)

Common to all branches

1. Arithmetical Ability,
2. Data Interpretation,
3. Verbal Ability,
4. Numerical Analysis Quantitative ability,
5. Reading Comprehension data Sufficiency
6. Logical Reasoning, computer awareness.

Reference Books:

1. Quantitative Aptitude by R S Agarwal
2. Fast Track Objective Arithmetic by Rajesh Verma

Part –C

Mathematics Entrance Test Syllabus for Ph.D - 20 marks Common to all branches

Linear Transformations: The algebra of Linear Transformation, singular and non-singular transformations, characteristic polynomials, minimal polynomials, Rank and Nullity, Eigen values and Eigen vectors.

Solutions of Linear System of Equations : Introduction to Direct Methods via., Gauss Elimination method, Gauss-Jordan method. Iteration Methods: Gauss Jordan methods, Gauss-Seidel method, Successive Over relaxation method and problems on each method.

Fourier Series : Dirichlet's conditions, Expansions of Periodic functions into Fourier series, Half range Fourier series.

Laplace Transforms: Properties of Laplace transformation, Unit step function, Convolution theorem, Solution of differential equation using Laplace transformation.

Statistical method : Curve fitting by the method of least squares – Fitting the curve of the form $y = ax + b$, $y = ax^2 + bx + c$ and $y = ax^b$. Correlation and regression.

Differential Calculus: polar curves, angle between polar curves, Curvature and radius of curvature, Taylor's and Maclaurin's expansion for a function of single variable.

Differential Equations: Ordinary Differential Equations (ODEs): Existence and Uniqueness of Solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs.

Numerical methods : Solution of ODE of first order : Taylor's series method , Modified Euler's method, RK - 4th method, Milne's method , Newton forward- backward method, interpolation method.

References:

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.
3. H.K.Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication (2014).
4. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, Latest edition.