

PhD Electronics Entrance Examination (2026) Detailed Syllabus

Duration: 3 Hrs

Max. Marks: 100

Min. Marks: 50

Energy bands, direct and indirect band semiconductors, density of states, derivation of intrinsic carrier concentration, extrinsic semiconductors, donors, acceptors, degenerate semiconductors, carrier drift, mobility, resistivity, Hall effect, carrier diffusion, diffusion process, Einstein relation, current density equations, generation & recombination processes, direct, indirect, surface and Auger recombination, continuity equation, high field effects, energy-momentum relationship, transferred electron effect, quantum mechanical tunneling, hot electron effect, emission in semiconductors, optical absorption, spontaneous and stimulated emission, Tunnel, Gunn, IMPATT, and BARITT diodes, LEDs, LASER, photoconductor, photodiodes, PV effect, and solar cell.

Working of BJT, FET, JFET, MOSFET, CMOS circuits, SCR, TRIAC, DIAC, power MOSFET, UJT, op-amps, active filters, 555 timer, power supplies, voltage regulators, differential amplifier, cascade, cascode and Darlington connections, bootstrapping principle, bootstrap emitter follower, microprocessors and microcontrollers (8086 and 8051): architecture and programming, CISC & RISC processors, peripheral devices: 8255, 8259, 8251. Canonical and Standard forms, Karnaugh Map: SOP & POS minimization, Combinational & sequential circuits, Memories: ROM, RAM, MRAM, PROM, EPROM, EEPROM, Flash Memory, programmable logic devices: PLDs, PAL, GAL and PLD.

Maxwell equations, transmission lines, waveguides, antennas, microwave tubes and circuits, random process and noise, information theory, analog and digital modulation, optical fibres, satellite communication, Radar, open and closed loop systems, Laplace Transforms, PID controller, stability of control systems, Routh & Nyquist criterion, root locus technique, introduction to optical fibers, crystal growth and epitaxy, impurity doping, oxidation and film deposition, lithography and etching, bio-potential amplifiers, blood pressure measurements, digital signals & processing.

Review of complex algebra, Cauchy-Riemann equations, Cauchy integral theorem, Cauchy residual theorem, Bisection, Newton-Raphson's and Secant numerical methods, Lagrange and Newton polynomials approximation, Gauss elimination, Gauss Jordan, Gauss Seidel and Jacobi methods, Eigen value concepts. Poles and zeros, Nodal and Mesh analysis: Thevenin's, Norton's, Superposition, Maximum Power transfer theorems. Duality and dual networks, Two port network parameters, BJT Biasing, Power amplifiers, CMOS Amplifiers.

The examination consists of **Section A**, comprising **50 compulsory multiple-choice questions carrying one mark each**, and **Section B**, consisting of **eight descriptive questions**, out of which candidates are required to attempt **any five**, each carrying **10 marks** with answers limited to approximately **300 words**.



HOD, Electronics

Department of Electronics

University of Jammu