



S.O.S. IN ELECTRONICS AND PHOTONICS

PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR

M.TECH IN OPTOELECTRONICS & LASER TECHNOLOGY

Eligibility

Candidate should have completed Master's Degree in Physics/ Electronics/ Photonics/ Material Science/ Applied Physics/ Nanotechnology or allied subject or B.Tech/ B.E./ B.Sc. Engg. Degree in Electronics & Communication Engineering/ Electronics Engineering/ Electrical Engineering/ Electrical and Electronics or Telecom Engineering/ Instrumentation/ IT/ Computer Engg. with a 55% from any recognized University or Institution.

Selection

Eligible candidates will be selected for the Masters of Technology course based on a rank list created from GATE scores. Candidates without valid GATE scores will be considered for admission only if seats remain in the respective course. Those applying without a valid GATE score will be required to appear for a Department Admission Test (DAT) for the desired course.

Syllabus/Course Contents for M.Tech Entrance Test, 2019

Engineering Mathematics (10%)

Linear Algebra, Calculus: vector algebra and vector calculus, linear differential Equations, Elementary complex analysis, Fourier Analysis.

Electromagnetics (10%)

Electrostatics, Magnetostatics, Electromagnetic interference, coherence, diffraction, polarization. dispersion relations.

Thermodynamics and Statistical Physics (10%)

Laws of Thermodynamics, Thermodynamic potentials and Maxwell's relations. Phase space, Microstates and Macrostates. Black Body radiation & Plank's distribution law, Bose-Einstein condensation.

Optoelectronics (10%)

Maxwell's Equations, The planar slab waveguide, Dispersion in waveguides, Graded index waveguides, Dispersion and Graded Index fibers, Attenuation, Nonlinear effects in waveguides, Rectangular Dielectric waveguides, The beam propagation Method for analyzing optical waveguides, Coupling and Numeric analysis, Coupled Mode Theory and Application, Coupling between optical sources and waveguides, Noise in optical detectors, Optical radiation.



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Optics and Lasers (20%)

Fermat's Principle and its applications, Refraction and reflection by Spherical Surfaces, Matrix Method in Paraxial Optics, Aberrations, General concepts of Interference, Diffraction, Polarization, Holography, Lasers : Optical resonators, spontaneous and stimulated emission, Optical pumping, population inversion, Coherence, Simple description of Ruby Laser and He-Ne Laser. Defects and color center lasers, Elementary idea of Nano optics, Magnetic Resonance Imaging (MRI), Computer Tomography.

Electronics (10%)

Physics of p-n junction, Diode as a circuit element, clipping, clamping, Rectification, Zener regulated power supply; Transistor as a circuit element: CC, CB and CE configuration. Transistor as a switch, OR, AND, NOT gates. Feedback in Amplifiers. Operational amplifier and its applications: inverting, non-inverting amplifier, adder, integrator, differentiator, wave form generator, comparator & Schmitt trigger. Digital integrated circuits NAND & NOR gates as building blocks, X-OR Gate, simple combinational circuits. Half & Full adder, Flip-flop, shift register, counters. Basic principles of A/D & D/A converters; Simple applications of A/D & D/A converters.

Electronics Devices (10%)

Energy bands in silicon, intrinsic and extrinsic silicon, Carrier transport in silicon: diffusion current, drift current, mobility and resistivity. Generation and recombination of carriers, p-n junction diode, Zener diode, Tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-i-n and avalanche photo diode. Device technology: integrated circuits fabrication process, oxidation, diffusion, Ion implantation, photolithography, n-tub, p-tub and twin-tub CMOS process.

Applied Optics (20%)

Applied Optics, Holography, Fourier-Transform Optics, Spatial Filtering, Speckle Interferometry, Birefringence, Electro-optics, Magneto-optics and Acousto-optics, Kerr Effect, Optical Integrated Circuits. Fiber Optics, The optical fiber, comparison of optical fiber with other interconnectors, concept of an optical waveguide, rays and modes, principle of light guidance in optical waveguides, Application of fiber optics. nonlinear optics, nonlinear optical susceptibility, second and third order optical susceptibilities, harmonic generation, phase matching, optical mixing,



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parametric generation of light, self-focusing of light, optical bistability, optical phase conjugation.

References Books:

1. Optical Electronics: A. Ghatak & K. Thyagaruian
2. Quantum Electronics: A. Yariv


24/5/19
HEAD
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