

20. M.Sc. (Physics / Engg. Physics & Instrumentation)

Vectors: Grad, div and curl operations with examples - Strokes and Gauss theorems.
Mechanics: Motion of Variable mass systems - Centre of mass and related kinematics - Collisions in one and two dimensions - Rutherford scattering - Work energy theorem.
Moment of Inertia: Inertia tensor, Euler's equations, symmetric top, Gyroscope.
Relativity: Michelson - Morley experiment - Lorentz transformations - Time dilation - length contraction - Einstein's mass - energy relation.
Simple Harmonic motion: Characteristics of simple harmonic motion - Analysis of complex vibrations - Damped and forced oscillations - Coupled oscillations - normal modes.
Kinetic Theory and Thermodynamics: Maxwell's Velocity distribution - Laws of thermodynamics - Carnot's Engine - Entropy - Thermodynamic scale of temperature - Thermodynamic potentials - Maxwell's equations - Specific heats - Clausius - Clapeyron equation - Joule - Kelvin effect - Stefan Boltzmann's law - Thermoelectric effect (seebeck, Thomson and Peltier effects) - Thermoelectric diagrams - Methods of production of low temperatures - Adiabatic demagnetization - Black body radiation - Rayleigh - Jean's Wien's and Planck's laws of radiation.
Interference: Coherence - Interference phenomenon - division of amplitude and wave fronts - Young's experiment - Lloyd's mirror - Newton's rings - Thin films - Michelson Interferometer - Fabry - Perot interferometer.
Diffraction: Fresnel and Fraunhofer diffraction-Fresnel Kirchoff's integral theorem-Single and Double slits-Grating-Circular aperture-Half period zones-Diffraction at straight edge -Cornu's spiral.
Polarization: Double refraction - Nicol prism - quarter wave plate - Babinet's compensator - Optical activity.

PART 'A'

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50-Marks

Electrostatics: Gauss law and its applications - Electric potential - Potential due to a dipole - Spherical conductor and infinite line of charge - Dielectrics - Polarization - Gauss's law for dielectrics - susceptibility and dielectric constant.
Capacitance: Concentric spheres, cylindrical and parallel plate condensers.
Magnetostatics: Magnetic shell - Magnetic induction and field - Hysteresis loop - Hall effect - Cyclotron - principles of synchrocyclotron - Synchrotron - Force on current carrying conductor - Torque on a current loop - Ampere's law - Biot - Savart's law.
Digital Principles: Binary arithmetic, logic gates, Half and full address - De-Morgan's theorems.
A.C.Circuits:Electrical characteristics of LC, LR and LCR (series and parallel circuits) power factor-QFactor.
Electromagnetic Induction: Faraday's laws - Lenz's law - Ballistic galvanometer - damping correction - Self and mutual inductance - inductance of a solenoid and to roid principles of transformers.
Electromagnetic waves: Maxwell's Equations - displacement current - transverse nature of electromagnetic waves - Poynting's theorem.
Semiconductors: Continuity equation - junction diode - Zener diode. Transistor - CE, CB and CC configurations, h-parameters, concept of feedback.
Spectroscopy and Quantum mechanics: Vector Atom Model - LS and jj coupling schemes - spectra of alkali elements and alkaline earths, X-ray spectra, Rotational spectra & Vibrational spectra of dielectric molecules, Raman Effect, deBroglie hypothesis - Heisenberg's uncertainty Principle - Schrodinger wave equation - Solutions for infinite square well, potential step and potential barrier.
Nuclear Physics: Mass defect, packing fraction and binding energy - Liquid drop model - Semiempirical mass formula - Gammow's theory of alpha-decay - Nuclear reaction - Conservation laws - elementary particles.
Solid State Physics: Crystal systems, Bravais lattices, Miller indices - Bragg's law - NaCl, CsCl and diamond structures - Bonding in solids - Lattice energy of ionic crystals - Madelung's constant - Magnetic materials - dia, para and ferro magnetic materials - Langevin's theory of paramagnetism - Weiss model for ferromagenetism. Superconductivity, Meissner Effect.

PART 'B'

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MODEL QUESTION PAPER

Time : 90 Minutes

Max. Marks : 100

The question paper consists of 100 questions in multiple choice covering the entire syllabus. Choose the correct answer.

- 1) The force (F) on a current carrying conductor of length (l), placed in a magnetic field (B) is given by
a) $F = il/B$ b) $F = ilB$ c) $F = iB/l$ d) i/lB

ELIGIBILITY CRITERIA

M.Sc. (Physics / Engg. Physics & Instrumentation): Candidates must have passed B.Sc. Degree Examination conducted by the Kakatiya University or an examination recognized as equivalent by Kakatiya University with Physics subject and they must have secured at least 45% marks in subject concerned (40% for SC/ST).

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