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MU-OET 2011 - MBBS, BDS, BE, BPHARM, PHARM D

The test papers in Physics, Chemistry, Biology, Mathematics and General English includes questions based on the 10+2 syllabus followed by major 10+2 Boards/Universities.

PHYSICS DYNAMICS

Newton's laws of motion: First law of motion - force and inertia with examples - momentum - second law of motion, derivation of $F=ma$, mention of spring force $F=kx$, mention of basic forces in nature - impulse and impulsive forces with examples - second law as applied to variable mass situation - third law of motion - Identifying action and reaction forces with examples - derivation of law of conservation of momentum with examples in daily life - principle of rocket propulsion - inertial and non-inertial frames - apparent weight in a lift and rocket/satellite - problems.

Fluid Dynamics: Explanation of streamline and turbulent motion - mention of equation of continuity - mention of expressions for PE, KE and pressure energy of an element of a liquid flowing through a pipe - statement and explanation of Bernoulli's theorem and its application to uplift of an aircraft sprayer.

Surface tension: Concept of adhesive and cohesive forces - definition of Surface energy and surface tension and angle of contact - explanation of capillary rise and mention of its expression - mention of application of surface tension to (i) formation of drops and bubbles (ii) capillary action in wick of a lamp (iii) action of detergents.

Work - power - energy: Work done by a force - $F.S$ - unit of work - graphical representation of work done by a constant and variable force - power - units of power - energy - derivation of expression for gravitation potential energy and kinetic energy of a moving body - statement of work - energy theorem - mention of expression for potential energy of a spring - statement and explanation of law of conservation of energy - illustration in the case of a body sliding down on an inclined plane - discussion of special case when $\theta = 90^\circ$ for a freely falling body - explanation of conservative and non conservative forces with examples - explanation of elastic and inelastic collisions with examples - coefficient of restitution - problems.

Gravitation: Statement and explanation of law of gravitation - definition of G - derivation of relation between g and G - mention of expression for variation of g with altitude, depth and latitude - statement and explanation of Kepler's laws of planetary motion - definition of orbital velocity and escape velocity and mention of their expressions - satellites - basic concepts of geo-stationary satellites, launching of satellites - IRS and communication satellites - brief explanation of Inertial mass and gravitational mass - weightlessness - remote sensing and essentials of space communication - problems.

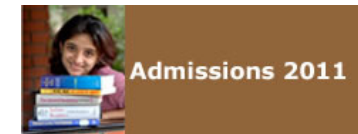
Concurrent Co-planar forces: Definition of resultant and equilibrant - statement of law of parallelogram of forces - derivation of expression for magnitude and direction of two concurrent coplanar forces - law of triangle of forces and its converse - Lami's theorem - problems.

HEAT

Gas laws: Statement and explanation of Boyle's law and Charles's law - definition of Pressure and Volume Coefficient of a gas - absolute zero - Kelvin scale of temperature - mention of perfect gas equation - explanation of isothermal and adiabatic changes -

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mention of Van-der-Waal's equation of state for real gases.

Mode of heat transfer: Conduction of heat - steady state - temperature gradient - definition of coefficient of thermal conductivity - basic concepts of convection of heat - radiation - properties of thermal radiation - radiant energy - definition of emissivity and absorptivity - perfect black body - statement and explanation of Kirchhoff's law. Newton's law of cooling - Stefan's law - Wien's displacement and Planck's law - qualitative explanation of solar constant and surface temperature of sun - principle and working of total radiation pyrometer - problems.

GEOMETRICAL OPTICS

Waves: Waves around us - brief note on light waves, sound waves, radio waves, micro waves, seismic waves - wave as a carrier of energy - classification of waves. (i) based on medium - mechanical and electromagnetic waves (ii) based on vibration of particles in the medium - Longitudinal & transverse waves - one, two & three dimensional waves with example - definition of wave amplitude, wave frequency, wave period, wavelength and wave velocity - concept of phase of a wave - derivation $v = f\lambda$ to establish the relation between path difference and phase difference - definition of a progressive wave - and its characteristics - derivation of equation of a progressive wave - different forms of a progressive wave equation - definition of wave intensity - mention of expression of wave intensity and its unit - statement and explanation of principles of superposition of waves with examples - problems.

Sound: Properties of sound - speed of sound in a gas - explanation of Newton's formula for speed of sound - correction by Laplace - Newton - Laplace formula - discussion of factors affecting speed i.e. pressure, temperature, humidity and wind - definition of sound intensity - explanation of loudness and its unit - definition of intensity level and its unit - mention of relation between intensity and loudness - distinction between noise and musical note - characteristics of a musical note - phenomenon of beats and its theory - application of beats (i) to find the frequency of a note (ii) to tune the musical instruments - Doppler effect - derivation of expression for apparent frequency in general case and discussion to special cases - qualitative comparison of Doppler effect in sound and light - problems.

Refraction at a plane surface: Refraction through a parallel sided glass slab - derivation of expressions for lateral shift and normal shift (object in a denser medium) - total internal reflection and its applications - optical fibers and its application in communication - problems.

Refraction through a prism: Derivation of expression for the refractive index in terms of A and D - dispersion through a prism - experimental - arrangement for pure spectrum - deviation produced by a thin prism - dispersive power - mention of condition for dispersion without deviation - problems.

Refraction at a spherical surface: Derivation of the relation - connecting n, u, v and r for refraction at a spherical surface (concave towards a point object in a denser medium) derivation of lens maker's formula - power of a lens - magnification - derivation of expression for the equivalent focal length of combination of two thin lenses in contact - mention of expression for equivalent focal length of two thin lenses separated by a distance - problems.

PHYSICAL OPTICS

Introduction to Theories of Light: A brief explanation of Newton's corpuscular theory, Huygen's wave theory and Maxwell's electromagnetic theory - mention of expression for speed of light $C = 1/\sqrt{\mu_0 \epsilon_0}$, qualitative explanation of Hertz's experiment - brief explanation of Planck's quantum theory of radiation - dual nature of light.

Interference: Explanation of the phenomenon theory of interference - derivation of conditions for constructive and destructive interference.

Young's double slit experiment, derivation of expression for fringe width - qualitative explanation of interference at thin films and Newton's rings - problems.

Diffraction: Explanation of the phenomenon - distinction between Fresnel and Fraunhofer diffraction - qualitative explanation of diffraction at single slit and analysis of diffraction pattern (Fraunhofer type) - qualitative explanation of plane diffraction grating at normal incidence - limit of resolution - resolving power - Rayleigh's criterion - definition and mention of expression for resolving powers of microscope and telescope - problems.

Polarisation: Explanation of the phenomenon - representation of polarized and unpolarised light - explanation of plane of polarization and plane of vibration - methods of producing plane polarized light : by reflection - Brewster's law, refraction, double refraction, selective absorption - construction and application of polaroids - optical activity - specific rotatory power - construction and working of Laurent's half shade polarimeter - mention of circularly and elliptically polarized light - problems.

Speed of light: Michelson's rotating mirror experiment to determine of light - importance of speed of light.

ELECTROSTATICS

Electric charges: Concept of charge - Coulomb's law, absolute and relative permittivity - SI unit of charge.

Electrostatic Field: Concept of electric field - definition of field strength - derivation of expression for the field due to an isolated charge, concept of dipole - mention of

expression for the field due to a dipole - definition of dipole moment - mention of electric flux - statement and explanation of Gauss theorem and its applications to derive expressions for electric intensity (a) near the surface of a charged conductor (b) near a spherical conductor - concept of electric potential - derivation of the relation between electric field and potential - derivation of expression for potential due to an isolated charge - explanation of potential energy of a system of charges - problems.

Capacitors: Explanation of capacity of a conductor and factors on which it depends - definition of capacitance and its unit - derivation of expression for capacity of a spherical conductor - principle of a capacitor - derivation of expression for capacitance of parallel plate capacitor - mention of expression for capacitance of spherical and cylindrical capacitors - derivation of expression for energy stored in a capacitor - derivation of expression for equivalent capacitance of capacitors in series and parallel - mention of uses of capacitors - problems.

CURRENT ELECTRICITY

Electric current: Microscopic view of current through conductors (random motion of electrons) - explanation of drift velocity and mobility - derivation of expression for current $I = neA\bar{v}_d$ - deduction of Ohm's law - origin of resistance - definition of resistivity - temperature coefficient of resistance - concept of super conductivity - explanation of critical temperature, critical field and high temperature superconductors - mention of uses of superconductors - thermistors and mention of their uses - colour code for resistors - derivation of expression for effective resistance of resistances in series and parallel - derivation of expression for branch currents - definition of emf and internal resistance of a cell - Ohm's law applied to a circuit - problems.

Kirchoff's laws: Statement and explanation of Kirchoff's laws for electrical network - explanation of Wheatstone's network - derivation of the condition for its balance by applying Kirchoff's laws - principle of metre bridge - problems.

Magnetic effect of electric current: Magnetic field produced by electric current - statement and explanation of Biot - Savart's (Laplace's) law - derivation of expression for magnetic field at any point on the axis of a circular coil carrying current and hence expression for magnetic field at the centre - current in a circular coil as a magnetic dipole - explanation of magnetic moment of the current loop - mention of expression for the magnetic field due to (i) a straight current carrying conductor (ii) at a point on the axis of a solenoid - basic concepts of terrestrial magnetism - statement and explanation of Tangent law - construction and theory of tangent galvanometer - problems.

Mechanical effect of electric current: Mention of expression for force on a charge moving in magnetic field - mention of expression for force on a conductor carrying current kept in a magnetic field - statement of Fleming's left hand rule - explanation of magnetic field strength in terms of flux density - derivation of expression for the force between two parallel conductors carrying currents and hence definition of ampere - mention of expression for torque on a current loop kept in a uniform magnetic field - construction and theory of moving coil galvanometer - conversion of a pointer galvanometer into an ammeter and voltmeter - problems.

Electromagnetic Induction: Statement explanation of Faraday's laws of electromagnetic induction and Lenz's law - derivation of expression for emf induced in a rod moving in a uniform magnetic field - explanation of self induction and mutual induction - mention of expression for energy stored in a coil - explanation of eddy currents - alternating currents - derivation of expression for sinusoidal emf - definition of phase and frequency of ac - mention of the expression for instantaneous, peak, rms, and average values - derivation of expression for current in case of ac applied to a circuit containing (i) pure resistor (ii) inductor (iii) capacitor - derivation of expression for impedance and current in LCR series circuit by phasor diagram method - explanation of resonance - derivation of expression for resonant frequency - brief account of sharpness of resonance and Q-factor - mention of expression for power in ac circuits - power factor and wattless current - qualitative description of choke - basic ideas of magnetic hysteresis - construction and working of transformers - mention of sources of power loss in transformers - ac meters - principle and working of moving iron meter - qualitative explanation of transmission of electrical power - advantages of ac and dc - problems.

ATOMIC PHYSICS

Introduction to atomic physics: Mention of the types of electron emission - description and theory of Dunnington's method of finding e/m of an electron - explanation of types of spectra: emission and absorption spectra - brief account of Fraunhofer lines - qualitative explanation of electromagnetic spectrum with emphasis on frequency.

Photo electric effect: Explanation of photo electric effect - experiment to study photo electric effect - experimental observations - Einstein's photo electric equation and its explanation - principle and uses of photo cells: (i) photo emissive (ii) photo voltaic (iii) photo conductive cells - problems.

Dual nature of matter: Concept of matter waves - arriving at the expression for de Broglie Wave length - principle and working of G.P. Thomson's experiment - principle of Electron Microscope - Scanning Electron Microscope Transmission Electron Microscope and Atomic - Force Microscope.

Bohr's Atom model: Bohr's atomic model for Hydrogen like atoms - Bohr's postulates - arriving at the expressions for radius, velocity, energy and wave number - explanation of spectral series of Hydrogen - energy level diagram - explanation of

