



শিক্ষক নিবন্ধন লিখিত পরীক্ষার সিলেবাস



হুমায়রা সিদ্দিকা হুমাসা-Humaira Siddika Humasha

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ড. সিদ্দিক পাবলিকেশন্স লেখক, গবেষক, শিক্ষক এবং শিক্ষার্থীদের জন্য-জ্ঞান ভান্ডার

কলেজ সিলেবাস

বিষয় : পদার্থবিদ্যা (Physics)

কোড : ৪১২

পূর্ণমান-১০০

1. **Vectors:** Scalar triple product: Vectors triple product, scalar and vector fields, gradient, divergence & curl and their physical significance.
2. **Mechanics:** Newton's laws of motion: Force, definition and units: Frictional force: Centripetal and centrifugal forces. Work, energy and power: Definitions, Work done by constant force. Work done by variable force, kinetic energy; potential energy and principle of conservation of energy, Mass-energy relation, Freely falling body
Collisions: Impulse and momentum. Conservation of linear momentum. Elastic and inelastic collisions. Rotation: Angular velocity. Angular acceleration. Uniformly accelerated angular motion, Torque, Kinetic energy of rotation, Moment of inertia. Gravitation. Newton's law of gravitation, Cavendish's and Boys experiment for determination of G, Variation in acceleration due to gravity, Gravitational field and Gravitational potential, Simple and compound pendulum.
3. **Properties of Matter:** Elasticity: Stress and strain, Hooke's Law, Determination of Young's modulus and rigidity modulus, Torsion of a cylinder, Bending moment and cantilever. Surface Tension: Molecular concept, Surface energy and surface tension, Angle of contact, Determination of surface tension by capillary method. Viscosity: Streamline and turbulent motion, Bernoulli's equation, Poiseuille's equation, Determination of coefficient of viscosity using capillary flow method.
4. **Wave and sound:** Transverse and longitudinal wave, Traveling and stationary wave, Resonance. Sources and propagation of sound - Velocity of sound, Beat, Doppler effect, Transverse vibration of a string, sonometer, Kundt's tube, Resonance air column, Ultrasonics.
5. **Heat, Thermodynamics and Kinetic Theory of Gases Thermometer,** Thermodynamics Resistance thermometers, Thermocouple Thermal expansion. Mechanical equivalent of heat, Quantity of heat, Specific heat and heat capacity. Transfer of heat: Conduction, Determination of conductivity by Searle's method, Convection, Radiation. Stefan-Boltzmann law. Thermodynamics: First law of thermodynamics. Difference between C_p and C_v for an ideal gas, Adiabatic process for an ideal gas, Second law of Thermodynamics Reversible and irreversible processes, Carnot cycle, Efficiency of an engine, Joule-Thompson effect. Kinetic theory of gases: Basic assumptions Equation of State of an ideal gas, Kinetic interpretation of temperature and pressure, Mean free path, Van der Waals equation.
6. **Electricity and Magnetism:** Charge and Matter, Electric field, Point charge in an electric field, Dipole in an electric field. Gauss's law and Coulomb's law: Application to a spherically symmetric charge distribution and charge sheet; Electric potential: Potential and field strength, Potential due to a point charge, Due to a dipole, Calculation of E from V. Capacitance and dielectric: Calculation of capacitance, Dielectric and Gauss's law, Energy storage in dielectric. Current and circuits: Ohm's law, Resistivity and atomic view. Electromotive force, Kirchhoff's law Wheatstone bridge, Potentiometer. Magnetic field: definition of B, Ampere's law, Biot-Savart law. Magnetic force on a current, Torque on a current loop, Electric meters. Faraday's law: Inductance, Energy density and the magnetic field Diamagnetism, Paramagnetism and Ferro-magnetism. Electromagnetic Oscillation: LC oscillation, Maxwell's field equations. Alternating current: Alternating emf, LCR Circuit, Effective or RMS value of alternating voltage and current.

7. **Optics:** Nature and propagation of light: Light and the electromagnetic spectrum, Velocity of light, Huygen's principle and the laws of reflection and refraction. Total internal reflection. Interference and Diffraction: Young's experiment, Coherence. Michelson's in- terferometer. Diffraction from single slit, double slit and grating, X-ray diffraction and Bragg's law. Polarisation: Plane polarisation, Circular Polarisation. Polarisation.
8. **Modern Physics:** Theory of relativity Postulates of special theory, Lorentz transformation. Quantum Physics: Radiation. Planck's radiation formula, Photoelectric effect, Compton effect, Bohr's theory and hydrogen atom De Broglie matter wave, Uncertainty principle.
9. **Nuclear Physics:** The atomic nucleus: Nuclear constituents. Force between nucleus and nuclear radius, Binding energy and mass defect radioactivity. Fusion and fission: Elementary idea, nucleus reactors. Elementary Particles: General idea, Particle accelerators.
10. **Solid State Physics:** Crystalline nature of solids: Band theory of solids. Semi-conductors, Diode and transistor.
11. **Quantum Mechanics:** Physical Basis: Failures of classical mechanics and emergence of quantum mechanics. Bohr atom model and Old quantum theory; Unitization of the phase integral, The particle in a box, Shortcomings of the old quantum theory, Wave particle duality, De Broglie wavelength. The Basic Concept of Quantum Mechanics: The uncertainty principle. Postulates of quantum mechanics: (a) Interpretive postulates and (b) Physical postulates (i) The correspondence principle and (ii) The complementary principle; Operators and its properties. Eigenfunctions and Eigenvalues, Scalar product of two functions and orthogonality relations of any function (x); The Heisenberg uncertainty relations for arbitrary observables, Momentum eigenfunctions, Completeness.
12. **Electronics:** History of electronics: Electronic vs. Electricity, Vacuum diode, triode- I Semiconductor Diode Semiconductor diode, P-n junction forward /reverse bias. I.V curve, Diode equation, Ge and Si diode, Breakdown: Avalanche and Zener mechanism. PIV rating, DC and AC resistance. Load line and Q-point, Diode equivalent, Circuit. Maximum current and power dissipation rating, Reverse recovery time, Ohmmeter, Testing of diode, Zener diode, Compound semi-conductors, LED (basic concepts), Photodiode & Solar Cell (basic characteristics).



নিশ্চয় সেরাদের সেরা
ড. সিদ্দিক পাবলিকেশন্স
লেখক



হুমায়রা সিদ্দিকা হুমাসা এবং ড. আবু বকর সিদ্দিক

সহায়ক গ্রন্থাবলী : ৪র্থ, ৫ম, ৬ষ্ঠ, ৭ম, ৮ম, ৯ম ও একাদশ শ্রেণী

পাঠ্য বই : HSC, B.Sc এবং M.Sc 01511 483701, 01979 483701

ভর্তি পরীক্ষা : বুয়েট, মেডিকেল, ঢাবি, জাবি, রাবি, চবি, গুচ্ছ, কৃষি, নার্সিং-মিডওয়াইফারি

চাকুরী : বিসিএস, শিক্ষক নিবন্ধন, সহকারী জজ নিয়োগ এবং প্রাথমিক শিক্ষক নিয়োগ

ড. সিদ্দিক পাবলিকেশন্স লেখক, গবেষক, শিক্ষক এবং শিক্ষার্থীদের জন্য-জ্ঞান ভান্ডার