



## Physics

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1. ( a ) State the various conditions, under which a motion stated to be Simple Harmonic Motion.  
( b ) A stone tied at one end of string is whirled in a vertical plane. At which two positions, the tension in the string will be maximum and minimum. If the difference between the maximum and minimum tension is 2 kg what is the mass of the stone?  
( c ) A solid disc of mass 1 kg is rolling with a linear velocity of  $2\text{ms}^{-1}$  without slipping on a horizontal plane. Calculate the total kinetic energy of disc.
2. ( a ) What is the difference between progressive and stationary waves? Obtain mathematically the positions of nodes and antinodes in the stationary wave.  
( b ) Two wires A and B of some material having certain length, have resistance R and 2R respectively. If equal force is applied to two wires what will be the ratio of increase in length?  
( c ) Calculate the refractive index for sound waves for air-glass boundary. Given Young's modulus of glass  $6.9 \times 10^{11} \text{ dyne/cm}^2$ , density of glass  $2.3\text{gm/cm}^3$  and temperature of air  $20^\circ\text{C}$ , velocity of sound in air at  $0^\circ\text{C}$ .
3. ( a ) What do you understand by the term entropy? Calculate the change in entropy when 5 gm of pure ice melts to form water at  $0^\circ\text{C}$ . Given latent heat of ice is 80 cal/gm at  $0^\circ\text{C}$ .  
( b ) Discuss Wien's displacement law and discuss various laws giving distribution of energy in black-body spectrum.  
( c ) Explain the importance of the thermo dynamical scale of temperature.
4. ( a ) Define angle of dip and total intensity of earth's magnetic field and how they are related.  
( b ) At eight corners of an imaginary cube of side 1m.  $1 \times 10^{-9}\text{C}$  amount of charges are placed at each corner. Calculate the electric potential at the centre of cube.  
( c ) Calculate the steady state current is 5 ohm resistor of the given circuit. The internal resistance of the battery is 0.5 ohm and the capacitance of the condenser ( c ) is 1 microfarad. The emf of the battery is 6 volts.
5. ( a ) What is the difference between primary and secondary cell?  
( b ) Certain length of a uniform wire of resistance ohms is bent into a circle. Two points situated at one-eighth of the circumference apart are connected with a battery of internal resistance 1.5 ohm and e.m.f volts. Calculate current flowing in different parts of the circuit and heat produced in 1 minute in two parts of the circle.  
( c ) What is Faraday Number?
6. ( a ) What do you understand by Seebeck and Peltier effect in thermoelectric effect?



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- ( b ) What is a moving coil galvanometer? Deduce a relation between the current passing and the deflection produced in the galvanometer. What modifications are done to measure potential difference with it?
- ( c ) Define Self and Mutual Inductance.
7. ( a ) What do you understand by Total Internal Reflection? How was it explained on the basis of Huygen's wave theory?
- ( b ) Obtain a relation between image distance and object distance for refraction at a spherical convex surface of radius of curvature  $r$  and refractive index?
- ( c ) What do you understand by Achromatic Combination of Lenses?
8. ( a ) Describe Foucault's method of measuring velocity of light and discuss its importance over other methods.
- ( b ) The focal lengths of objective and eye lenses of an astronomical telescope are 200 cm and 5 cm. Calculate its magnifying power and length when the final image is formed at least distance of distinct vision.
9. ( a ) State Bohr's postulates for his model hydrogen atom. Deduce an expression for the radius of first Bohr orbit.
- ( b ) Discuss the property of triode valve as an amplifier and obtain an expression for its voltage amplification.
10. ( a ) Discuss wave particle quality.
- ( b ) The potential difference between the cathode and anti-cathode of a X-ray tube is 12 kilovolts. Calculate the velocity with which the electrons strike the anti-cathode. [ Given mass of electron  $9 \times 10^{-31}$  kg and charge of an electron  $1.6 \times 10^{-19}$  C ]
- ( c ) Define work function threshold effects frequency and stopping potential in photo-electric. Discuss the Einstein's explanation of photo-electric effect.