



Physics

1. (a) What is radian? Express its value in degrees.
(b) Explain centripetal and centrifugal forces with examples.
(c) The period of a simple pendulum is doubled when its length is increased by 0.9 m. calculate its original length.

2. (a) What are cohesive and adhesive forces?
(b) State any four properties of stationary waves. What are nodes and antinodes?
(C) A disc revolves in a horizontal plane at a steady rate of 3 rev/sec. A coin will remain on the disc if kept at a distance of 2 cm from the axis of rotation. What is the coefficient of friction between the coin and the disc? ($g = 9.8 \text{ m/s}^2$)

3. (a) Explain the term thermodynamic state and isothermals.
(b) State the important characteristics of a perfect gas. Explain why there was a need to modify the perfect gas equation.
(C) The mean kinetic energy of a gas at 100°C is made three times by heating. Find its temperature.

4. (a) Distinguish between reversible and irreversible process.
(b) Define Kelvin's statement of second law of thermodynamics. What is (i) Entropy (ii) Emissive power and (iii) Absorptive power?
(C) The source temperature of a Carnot engine is 627°C . The temperature of the sink is 27°C . Find its efficiency.

5. (a) State Faraday's laws of electromagnetic induction.
(b) Deduce an expression for the energy of a charge condenser. What are the uses of a condenser?
(c) Calculate the magnetic potential at a point one metre away from the centre of magnetic dipole and inclined at 60° with the axis of the dipole when the magnetic moment of the dipole is 100 Am^2 .

6. (a) What is thermoelectricity? What are its uses?
(b) Describe the Wheatstone network and obtain the balancing condition using Kirchhoff's laws.
(c) The resistivity of nichrome is $10^{-6} \Omega\text{m}$. What length of a uniform nichrome wire and 0.2 mm diameter will have a resistance of 200Ω .

7. (a) What is meant by achromatic combination of prisms and lenses?

(b) Describe a spectrometer and how it is used to determine the refractive index of glass.

(c) The wavelength of green light in air is 500 nm. What is the wavelength in glass of Refractive index 1.5? If the speed of light in air is $3 \times 10^8 \text{ m/sec}$, find the frequency of Light.



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8. (a) What are coherent sources? How are they produced?
(b) Explain any one method with diagram to find the velocity of light.
(c) In Young's experiment, let lights of $\lambda = 5048 \times 10^{-7} \text{ m}$ and $6085 \times 10^{-8} \text{ m}$ be used in turn , keeping D and d constant. Compare the fringe widths in the two cases.
9. (a) Explain how diode can be used as a full wave rectifier.
(b) Explain the characteristics of photoelectric effect with the help of Einstein's Equation.
(c) The ionisation potential of hydrogen atom is 13.6 eV. Find Plank's constant
10. (a) State four advantages of semiconductor diodes over vacuum diodes.
(b) State and derive the law of radioactive decay. Hence obtain the expression for half life of a radioactive substance.
(c) Obtain the de Broglie wavelength of a neutron of kinetic energy 150 eV (mass of neutron = $10.657 \times 10^{-27} \text{ kg}$).