



Physics

1. Show that the speed of any point in a body which rotates about fixed axis with an angular velocity ω is given by ωr where r is the distance of the point from the axis of a rotation.
A mass 20 kilograms is suspended from a vertical wire 600 cm long and 1 sq. mm in cross-section. When the load is removed the length of the wire is found to be 599.5 cm long. Find the Young's modulus for the material of the wire.
2. Explain the difference between longitudinal and transverse waves. Identify the nature of the light and sound waves.
A stone is dropped into a well 240 ft. deep and the sound's impact is heard 4.1 seconds later. Find the velocity of sound ($G = 32 \text{ ft/sec}^2$)
3. Explain the physical significance of the term Mechanical equivalent of heat.
Write what velocity a lead bullet at 500°C must strike against an obstacle in order that the heat produced by the arrest of motion, if all the heat produced within the bullet is utilized might be sufficient to melt it.
Specific heat of lead = 0.031
Melting point of lead = 335°C
Latent heat of fusion of lead = 5.37 cal/gm
 $J = 4018 \times 10^7 \text{ ergs/cal}$
4. Distinguish between a real and vertical image. Show with the aid of a diagram the formation of the image of an extended object in a plane mirror.
Rays of light strike a horizontal plane mirror at an angle of 45° . Show by a diagram how you would arrange a second mirror in order that the reflected ray may finally be reflected from the second mirror horizontally.
5. (a) What are the conditions to be satisfied for the interference of light to occur ? What information does it provide regarding the nature of light ?
(b) Can the constituent colours of the spectrum be recombined to form white light again ? Suggest an experiment.
6. (a) Explain Repulsion is a surer test of magnetic condition of body than attraction..
(b) Trace of lines of force surrounding a bar magnet when the magnet is placed along the magnetic meridian with its N pole pointing north. Indicate the position of neutral points in the diagram.
7. Derive capacity of a parallel plate condenser where A is the area of the plate and d is the distance between the plates.
A $1 \mu\text{f}$ condenser is charged to 100 volts and a $2 \mu\text{f}$ condenser is charged to 200 volts. They are then connected in parallel. Determine the initial and final energies and account for their difference.



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8. (a) Define the term specific resistance of a metal and show how it is related to conductivity.
(b) Explain the use of shunts.
(c) What is the resistance of a shunt which joined to a galvanometer of resistance g will cause $1/n$ of the total current to flow through the galvanometer ?

9. (a) State Joule's law for the development of heat in an electric circuit.
(b) Write a short note on the function of fuses in electric system.
(c) Calculate the resistance of the wire of a heater when glowing marked 220 volts, 500 watts.

10. (a) Explain how a diode can act as a rectifier of a.c voltage.
(b) What are the different types of radiation emitted from a radioactive substance ? State their nature and mention some of their properties.