

XII PHYSICS IMPORTANT PROBLEMS QUESTIONS -2023

STD : XII SUB: PHYSICS

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1. When two objects are rubbed with each other, approximately a charge of 50 nC can be produced in each object. Calculate the number of electrons that must be transferred to produce this charge. Two cells each of 5V are connected
2. in series with a 8 Ω resistor and three parallel resistors of 4 Ω , 6 Ω and 12 Ω . Draw a circuit diagram for the above arrangement. Calculate i) the current drawn from the cells (ii) current through each resistor
3. A potentiometer wire has a length of 4 m and resistance of 20 Ω . It is connected in series with resistance of 2980 Ω and a cell of emf 4 V. Calculate the potential gradient along the wire.
4. The resistance of a nichrome wire at 20⁰C is 10 Ω . If its temperature coefficient of resistivity of nichrom is 0.004/⁰C, find the resistance of the wire at boiling point of water. Comment on the result
5. A copper wire of 10⁻⁶ m² area of cross section, carries a current of 2 A. If the number of free electrons per cubic meter in the wire is 8×10^{28} , calculate the drift velocity of electrons.
6. A radio which requires 150 Ω in her circuit. But she has only 220 Ω , 79 Ω and 92 Ω resistors available. How can she connect the available resistors



to get the desired value of resistance? current density and average drift velocity of electrons.

7. A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is 25×10^{-6}

Then, calculate the current which gives a deflection of 60°

8. Compute the magnitude of the magnetic field of a long, straight wire carrying a current of 1 A at a distance of 1 m from it. Compare it with Earth's magnetic field.

9. Calculate the magnetic field inside a solenoid, when (a) the length of the solenoid becomes twice with a fixed number of turns (b) both the length of the solenoid and number of turns are doubled (c) the number of turns becomes twice for the fixed length of the solenoid. Compare the results

10. Suppose a cyclotron is operated to accelerate protons with a magnetic field of strength 1 T. Calculate the frequency in which the electric field between two Dees could be reversed.

11. The coil of a moving coil galvanometer has 5 turns and each turn has an effective area of $2 \times 10^{-2} \text{ m}^2$. It is suspended in a magnetic field whose strength is $4 \times 10^{-2} \text{ Wb m}^{-2}$. If the torsional constant K of the suspension fibre is $4 \times 10^{-9} \text{ N m deg}^{-1}$. (a) Find its current sensitivity in division per micro-ampere. (b) Calculate the voltage sensitivity of the galvanometer for it to have full scale deflection of 50 divisions for 25 mV. (c) Compute the resistance of the galvanometer.

12. A bar magnet having a magnetic moment p_m is cut into four pieces i.e., first cut into two pieces along the axis of the magnet and each piece is further cut along the axis into two pieces. Compute the magnetic moment of each piece

13. Write down the equation for a sinusoidal voltage of 50 Hz and its peak value is 20 V. Draw the corresponding voltage versus time graph.



14.The equation for an alternating current is given by $i = 77 \sin 314t$. Find the peak current, frequency, time period and instantaneous value of current at $t = 2 \text{ ms}$.

15.A long solenoid having 400 turns per cm carries a current 2A. A 100 turn coil of cross-sectional area 4 cm^2 is placed co-axially inside the solenoid so that the coil is in the field produced by the solenoid. Find the emf induced in the coil if the current through the solenoid reverses its direction in 0.04 sec.

16.A step-down transformer connected to main supply of 220 V is used to operate 11V,88W lamp. Calculate (i) Voltage transformation ratio and (ii) Current in the primary.

17.A 200V/120V step-down transformer of 90% efficiency is connected to an induction stove of resistance 40Ω . Find the current drawn by the primary of the transformer.

18.The 300 turn primary of a transformer has resistance 0.82Ω and the resistance of its secondary of 1200 turns is 6.2Ω . Find the voltage across the primary if the power output from the secondary at 1600V is 32 kW. Calculate the power losses in both coils when the transformer efficiency is 80%.

19.A rectangular coil of area 6 cm^2 having 3500 turns is kept in a uniform magnetic field of 0.4 T. Initially, the plane of the coil is perpendicular to the field and is then rotated through an angle of 180° . If the resistance of the coil is 35Ω , find the amount of charge flowing through the coil.

20.If the relative permeability and relative permittivity of a medium are 1.0 and 2.25 respectively, find the speed of the electromagnetic wave in this medium.

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