2016

PHYSICS

(Major)

Paper : 3.2

(Current Electricity and Magnetostatics)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions : 1×5=5

(a) The coefficient of coupling between two coils is 0·6. What does it mean?

(b) State Ampere's circuital law for steady currents.

(c) How does a current loop behave as a magnetic dipole?

(d) When does a series *L-C-R* circuit have the maximum impedance and what is its value?

(e) A transformer cannot work on d.c. Explain why.

2. Answer the following questions : 2×5=10

(a) Why is Wheatstone bridge not suitable for measurement of very low resistance?

(b) What do you mean by *Q* factor of an a.c. series resonant circuit?

(c) In a region, the force $\vec{F} = q(\vec{v} \times \vec{B})$ on a charge q is zero. What conclusions can you draw from it?

(d) Explain the differences between a 'dead-beat' galvanometer and a 'ballistic' galvanometer.

(e) Establish that

$$i = \int_S \vec{J} \cdot \hat{n}\, dA$$

where $\hat{n}$ is a unit vector normal to the area dA.

Or

(a) "Divergence of magnetic field is zero whereas divergence of electric field is not zero."

What meaning will you derive about the two fields from the above statement? 3

(b) A rectangular current loop is suspended in a uniform magnetic field. Obtain an expression for the torque on the loop. 7

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