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**BF—103—2016**

**FACULTY OF SCIENCE**

**B.Sc. (First Year) (Second Semester) EXAMINATION**

**NOVEMBER/DECEMBER, 2016**

**PHYSICS**

**Paper IV**

**(Electricity and Magnetism)**

**(MCQ+Theory)**

**(Friday, 9-12-2016)**

**Time : 10.00 a.m. to 12.00 noon**

**Time—2 Hours**

**Maximum Marks—40**

**N.B. :— (i) All questions are compulsory.**

**(ii) Non-programmable calculator and log table is allowed.**

**(iii) Symbols have their usual meanings.**

**(MCQ)**

1. Choose the *correct* alternatives of the following : 10

(i) An inductance coil used to limit current in a circuit is called as .....

(a) Choke (b) Starter

(c) Transformer (d) Dimmer

(ii) The inductive reactance is directly proportional to .....

(a) Voltage (b) Capacitance

(c) Frequency (d) Both (a) and (b)

(iii) In step down transformer the primary and secondary turns are related as .....

(a)  $N_2 > N_1$  (b)  $N_2 = N_1$

(c)  $N_2 = 2N_1$  (d)  $N_2 < N_1$

(iv) The SI unit of magnetic flux is .....

(a) Farad (b) Henry

(c) Weber (d) Amp/sec

(v) The coefficient of mutual induction depends upon .....

(a) The number of turns of the coil

(b) Geometrical properties of coil

(c) Distance between the two coils

(d) All of the above

P.T.O.

(vi) The expression for mutual inductance of co-axial solenoid is .....

$$(a) \quad M = \frac{\mu N_1 N_2 A^2}{l} \qquad (b) \quad M = \frac{\mu N_1 N_2 A}{l}$$

$$(c) \quad M = \frac{\mu N_1 N_2 A^2}{l^2} \qquad (d) \quad M = \frac{\mu^2 N_1 N_2 A}{l}$$

(vii) In B.G. the coil is wound on non-conductive frame to .....

- (a) Increasing damping      (b) Reduce the current  
(c) Increase deflection      (d) Decrease deflection

(viii) The permeability 'μ' is given by :

$$(a) \quad \frac{\bar{B}}{\bar{H}} \qquad (b) \quad \frac{\bar{H}}{\bar{B}}$$

$$(c) \quad \frac{m}{A} \qquad (d) \quad \frac{\bar{I}}{\bar{H}}$$

(ix) Ampere's law in general form can be stated as .....

$$(a) \quad \int \bar{B} \cdot d\bar{l} = \mu_0 \qquad (b) \quad \int \bar{B} \cdot d\bar{l} = \mu_0 \pi^2$$

$$(c) \quad \int \bar{B} \cdot d\bar{l} = \mu_0 I \qquad (d) \quad \int \bar{H} \cdot d\bar{l} = \mu_0 \pi$$

(x) The Lorentz force is given by :

$$(a) \quad \bar{F} = q_0 [\bar{E} + \bar{V} \times \bar{B}] \qquad (b) \quad \bar{F} = q_0 [\bar{E} \times \bar{B}]$$

$$(c) \quad \bar{F} = q_0 [\bar{V} \times \bar{E} + \bar{B}] \qquad (d) \quad \text{All of these}$$

**(Theory)**

2. Attempt any *five* of the following :

10

- (a) Define choke and state its two uses.  
(b) What is a transformer ? State its principle.  
(c) Define self-inductance and state its unit.  
(d) State the Faraday's laws of electromagnetic induction.  
(e) Give the relation between permeability and susceptibility.  
(f) Define magnetic dipole moment.  
(g) Define magnetic induction and Lorentz force.

3. Attempt any *two* of the following : 10
- (a) Describe with neat diagram A.C. bridge to determine inductances and capacitances.
  - (b) Discuss on various power losses occurring in a transformer.
  - (c) What are hysteresis and hysteresis loop ?
  - (d) Derive an expression for mutual inductance of a pair of coil.
4. Attempt any *one* of the following : 10
- (a) Derive an expression for mutual inductance of a co-axial solenoids.
  - (b) Describe a moving coil B.G. and obtain expression for charge passing through it.