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B—132—2019

FACULTY OF SCIENCE

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

MARCH/APRIL, 2019

(CBCS Pattern)

PHYSICS

Paper IV

(Electricity and Magnetism)

(MCQ+Theory)

(Wednesday, 3-4-2019)

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 is allowed.

(MCQ)

1. Choose the *correct* alternative : 10

(i) In a transformer, the ratio of secondary to primary voltage is :

(A) $\frac{V_2}{V_1} = \frac{N_1}{N_2}$

(B) $\frac{V_2}{V_1} = \frac{N_2}{N_1}$

(C) $\frac{V_2}{V_1} = \frac{2N_1}{N_2}$

(D) $\frac{V_1}{V_2} > \frac{N_1}{N_2}$

(ii) The total impedance of the LCR circuit is given by :

(A) $Z = R + j\omega L - \frac{j}{\omega C}$

(B) $Z = R + j\omega L + \frac{j}{\omega C}$

(C) $Z = R - j\omega L + \frac{j}{\omega C}$

(D) $Z = R + \frac{j}{\omega C} - j\omega L$

(iii) An inductance coil used to limit current in a circuit is called

(A) Resistance

(B) Transformer

(C) Solenoid

(D) Choke

P.T.O.

- (iv) The SI unit of inductance is
- (A) Faraday (B) Weber
(C) Henry (D) Tesla
- (v) The equation of electromagnetic induction is
- (A) $e = -\frac{dI}{dt}$ (B) $e = -\frac{dt}{d\phi}$
(C) $e = -\frac{d\phi}{dt}$ (D) $e = -\frac{dI}{d\phi}$
- (vi) The self inductance of a solenoid is given by
- (A) $L = \frac{\mu N^2 A}{l}$ (B) $L = \frac{\mu NA}{l^2}$
(C) $L = \frac{\mu N^2 B}{2l}$ (D) $L = \frac{\mu NA^2}{l}$
- (vii) The magnetic susceptibility of a specimen is given by :
- (A) $x = \frac{H}{I}$ (B) $x = \frac{I}{H}$
(C) $x = \frac{\mu}{H}$ (D) $\mu = xH$
- (viii) In the B.G., the work done in maximum swing θ is
- (A) $\frac{1}{2}c^2\theta$ (B) $\frac{1}{2}c\theta$
(C) $2c\theta^2$ (D) $\frac{1}{2}c\theta^2$
- (ix) The Lorentz force is given by :
- (A) $\vec{F} = q(\vec{E} + \vec{V} \times \vec{B})$ (B) $\vec{F} = \vec{E}(q + \vec{V} \times \vec{B})$
(C) $\vec{F} = (\vec{E} + \vec{V}\vec{B})$ (D) $\vec{F} = q\vec{E} + \vec{V} \times \vec{B}$
- (x) The differential form of Ampere's law is
- (A) $\text{curl } \vec{B} = \mu_0 \vec{I}$ (B) $\text{curl } \vec{B} = \mu_0 I$
(C) $\text{curl } \vec{B} = \mu_0 \vec{H}$ (D) $\text{curl } \vec{B} = \mu_0 \vec{d}s$

(Theory)

2. Attempt any *five* of the following : 10
- (a) What do you understand by step-up transformer ?
 - (b) Define coefficient of self inductance state its SI unit.
 - (c) Define magnetic induction.
 - (d) State Biot-Savart law.
 - (e) Define the term permeability and susceptibility.
 - (f) Explain mutual inductance.
 - (g) State various power losses in a transformer.
3. Attempt any *two* of the following : 10
- (a) What are hysteresis and hysteresis loop ?
 - (b) Describe AC bridge with neat diagram.
 - (c) Derive an expression for the energy stored in an inductance.
 - (d) Discuss on series resonance circuit containing LCR.
4. Attempt any *one* of the following : 10
- (a) Obtain an expression for the average power in an ac circuit and hence define power factor.
 - (b) Using Biot-Savart law, derive an expression for the magnetic induction at a point on the axis of a circular coil carrying current.