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**Y—132—2019**

**FACULTY OF SCIENCE**

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

**OCTOBER/NOVEMBER, 2019**

**PHYSICS**

**Paper IV**

**(Electricity and Magnetism)**

**(MCQ & Theory)**

**(Wednesday, 20-11-2019)**

**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 and log table is allowed.
  - (iii) Symbols have their usual meanings.

**MCQ**

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

(i) 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)  $z = R - j\omega L - j\omega C$

(d)  $z = R + j\omega L + j\omega C$

(ii) The series resonance frequency of LCR circuit is :

(a)  $f_0 = 2\pi\sqrt{\frac{1}{LC}}$

(b)  $f_0 = \frac{1}{2\pi LC}$

(c)  $f_0 = \frac{1}{2\pi} \sqrt{\frac{1}{LC}}$

(d)  $f_0 = \frac{1}{\sqrt{2\pi}} \frac{1}{LC}$

P.T.O.

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

$$(a) \quad \frac{V_1}{V_2} = N_1 \cdot N_2$$

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

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

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

(iv) The energy stored in the inductance, when a current I is passing through it is :

$$(a) \quad \frac{1}{2} LI^2$$

$$(b) \quad 2LI^2$$

$$(c) \quad \frac{1}{2} L^2 I$$

$$(d) \quad LI^2$$

(v) The SI unit of magnetic flux is :

(a) Henry

(b) Farad

(c) Amp/sec

(d) Weber

(vi) The intensity of Magnetization at a given point inside the material is given by :

$$(a) \quad \frac{V}{M}$$

$$(b) \quad \frac{M}{V}$$

$$(c) \quad M + V$$

$$(d) \quad M - V$$

(vii) The permeability of magnetic material is :

$$(a) \quad \mu = \frac{H}{B}$$

$$(b) \quad \mu = \frac{I}{H}$$

$$(c) \quad \mu = \frac{M}{H}$$

$$(d) \quad \mu = \frac{B}{H}$$

(viii) The self-inductance of the coil is given by :

$$(a) \quad L = \frac{dI}{dt}$$

$$(b) \quad L = - \frac{dI/dt}{e}$$

$$(c) \quad L = - \frac{e}{dI/dt}$$

$$(d) \quad L = \frac{edI}{dt}$$

- (ix) The differential form of Ampere's law is :
- (a)  $\text{curl } \vec{B} = \mu_0 \mathbf{I}$  (b)  $\text{curl } \vec{B} = \mu_0 \vec{J}$
- (c)  $\text{curl } \vec{B} = \mu_0 \vec{H}$  (d)  $\text{curl } \vec{B} = \mu_0 \vec{ds}$
- (x) The magnetic induction at a point due to a straight conductor carrying a current I is :
- (a)  $\vec{B} = \frac{\mu_0 I}{2\pi a}$  (b)  $\vec{B} = \frac{2\mu_0 I}{\pi a}$
- (c)  $\vec{B} = \frac{\mu_0 I}{4\pi a}$  (d)  $\vec{B} = \frac{\mu_0 I}{2\pi}$

### Theory

2. Attempt any *five* of the following : 10
- (a) Define power factor in an a.c. circuit.
- (b) State the Ampere's circuital law.
- (c) Define mutual inductance.
- (d) Define Faraday's laws of electromagnetic induction.
- (e) State the relation between permeability and susceptibility.
- (f) State the various power losses in a transformer.
- (g) Give the principle of Moving Coil Ballistic Galvanometer.
3. Attempt any *two* of the following : 10
- (a) Obtain an expression for self inductance of a solenoid.
- (b) Write a note on Logarithmic decrement.
- (c) Derive an expression for the forces on a current carrying conductor.
- (d) State and explain Biot and Savart's law.
4. Attempt any *one* of the following : 10
- (a) Describe the construction and working of a transformer and obtain turns ratio.
- (b) Describe moving coil B.G. and obtain an expression for charge passing through it.