W—110—2018

FACULTY OF SCIENCE

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

OCTOBER/NOVEMBER, 2018

(CBCS Pattern)

PHYSICS

Paper IV

(Electricity and Magnetism)

(MCQ & Theory)

(Wednesday, 24-10-2018)   **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 of the following :   10

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

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

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

   (ii)   Primary and secondary of transformer having the number of turns N_1 and N_2 respectively. If this transformer is step up transformer :

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

     (c) $N_1 = N_2$ (d) $\dfrac{N_1}{N_2} = 0$

   (iii) $\vec{B}$ is magnetic induction, its MKS unit is :

     (a)   tesla   (b)   Weber/m^2

     (c)   both (a) and (b)   (d)   None of these

(*iv*) S.I. unit of self-inductance is :

(*a*) Henry   (*b*) Ohm

(*c*) Farad   (*d*) Ampere

(*v*) The expression for periodic time of swing of coil of a B.G. is given by :

(*a*) $T = 2\pi\sqrt{\dfrac{I}{C}}$ (*b*) $T = 2\pi\sqrt{\dfrac{C}{I}}$

(*c*) $T = \dfrac{2\pi C}{I}$ (*d*) $T = \sqrt{\dfrac{2\pi I}{C}}$

(*vi*) An inductance coil used to limit the current in a circuit is called as :

(*a*) Resistance   (*b*) Choke

(*c*) Transformer   (*d*) Filter

(*vii*) The Ampere's circuital law is stated as :

(*a*) $\oint B.dl = \mu_0 B$ (*b*) $\oint B.dl = \mu_0 I$

(*c*) $\oint B.dl = \mu_0 H$ (*d*) None of these

(*viii*) In Biot-Savart's law $\vec{B}$ is inversely proportional to the :

(*a*) Cube of the distance   (*b*) Current in the coil

(*c*) Square of the distance   (*d*) All of these

(*ix*) The term $\cos\phi$ in $P = E_{rms} \times I_{rms}$, $\cos\phi$ is called as :

(*a*) True power   (*b*) Apparent power

(*c*) Power factor   (*d*) Applied power

(*x*) The coefficient of mutual inductance of a pair of circuit is :

(*a*) $M = \dfrac{-e}{dI/dt}$ (*b*) $M = \dfrac{e}{dq/dt}$

(*c*) $M = \dfrac{-e}{dq/dt}$ (*d*) None of these

Theory

2. Attempt any *five* of the following : 10

   (*a*) Define magnetic induction.

   (*b*) Explain self-induction.

   (*c*) Define intensity of magnetisation.

   (*d*) State Biot-Savart's law.

   (*e*) State Faraday's law of electromagnetic induction.

   (*f*) For a transformer if $N_1 = 100$ turns, $N_2 = 25$ turns, $E_1 = 60$ volts, then find E_2.

   (*g*) What is hysteresis loop ?

3. Attempt any *two* of the following : 10

   (*a*) Define permeability, susceptibility and hence obtain the relation between them.

   (*b*) Derive an expression for mutual inductance of a pair of coil.

   (*c*) Discuss various losses in Transformer.

   (*d*) Derive an expression for the force on a current carrying conductor.

4. Attempt any *one* of the following : 10

   (*a*) Describe a moving coil B.G. Obtain an expression for charge passing through it.

   (*b*) Using Biot-Savart's law, derive an expression for the magnetic induction at a point due to a straight conductor carrying current.