This question paper contains **3** printed pages]

R—104—2017

FACULTY OF SCIENCE

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

MARCH/APRIL, 2017

(CBCS Pattern)

PHYSICS

Paper IV

(Electricity and Magnetism)

(MCQ & Theory)

(Saturday, 8-4-2017) **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*) The frequency of LCR series resonance circuit is :

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

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

(*ii*) For an ideal transformer :

(*a*) $V_1I_1 = V_2I_2$ (*b*) $N_1I_1 = N_2I_2$

(*c*) $N_1V_1 = N_2V_2$ (*d*) $V_1I_2 = V_2I_1$

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

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

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

P.T.O.

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

(*a*) $\frac{1}{2}LI^2$ (*b*) $\frac{1}{2}L^2I$

(*c*) $2LI^2$ (*d*) L^2I^2

(*v*) The unit of magnetic flux in SI system is :

(*a*) Henry (*b*) Weber

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

(*vi*) The equation of electromagnetic induction is :

(*a*) $e = -\frac{dI}{dt}$ (*b*) $e = -\frac{dt}{d\phi}$

(*c*) $e = -\frac{d\phi}{dt}$ (*d*) $e = -\frac{dt}{dI}$

(*vii*) The intensity of magnetisation, I = ...

(*a*) MV (*b*) V/A

(*c*) V/M (*d*) M/V

(*viii*) The permeability of magnetic material is :

(*a*) $\mu = \frac{H}{B}$ (*b*) $\mu = \frac{I}{H}$

(*c*) $\mu = BH$ (*d*) $\mu = \frac{B}{H}$

(*ix*) The Amperes circuital law is started as :

(*a*) $\bar{B} = \int \mu_0 I$ (*b*) $\oint \bar{B}\, dl = \mu_0 I$

(*c*) $\oint \bar{B}\, dl = 2I_0$ (*d*) $\oint \bar{B}\, dl = \mu_0 H$

(*x*) The magnetic induction at a point due to a straight conductor carrying a current I is :

(*a*) $\bar{B} = \frac{\mu_0 I}{2\pi a}$ (*b*) $\bar{B} = \frac{\mu_0 I}{2\pi a^2}$

(*c*) $\bar{B} = \frac{\mu_0 I}{\pi a}$ (*d*) $\bar{B} = \frac{\mu_0 I}{2\pi}$

Theory

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

(*a*) Define power factor in an a.c. circuit.

(*b*) State Faradays laws of electromagnetic induction.

(*c*) Define intensity of magnetisation.

(*d*) State Biot-Savart law.

(*e*) Define coefficient of self inductance. State its unit.

(*f*) What is hysteresis loop ?

(*g*) What is a transformer ?

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

(*a*) Discuss on various power losses in a transformer.

(*b*) Obtain an expression for self inductance of a solenoid.

(*c*) Write a note on Logarithmic decrement.

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

4. Attempt the following : 10

(*a*) Describe the A.C. bridge with neat diagram.

(*b*) Derive an expression for the energy stored in an inductance.

Or

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