Roll No. .....

21273

B. Sc. (Physics) (Hons.) 2nd Semester Examination – May, 2019

ELECTRICITY

Paper : Phy-2001

Time : Three hours] *[Maximum Marks : 40*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : (i) Each Unit have ***four*** questions, student have to attempt at least ***two*** questions from each Unit. A student has to attempt at least ***five*** questions in all.

(ii) Use of scientific (Non-programmable) calculator is allowed.

UNIT – I

1. (a) Explain how the hysteresis curve shows that the matcrial is suitable for the purposes such as : 4

P. T. O.

(i) transformer

(ii) a permanent magnet

(b) Show that the area enclosed by B-H loop denotes the energy dissipated per unit volume of the material during each cycle of magnetization. 4

2. (a) State and prove ampere circuital law. 3

(b) Explain the curl and divergence of $\vec{B}$. 3

(c) What do you mean by scalar and vector potential ? 2

3. Find an expression for the magnetic field due to a solenoid of very large length at the middle and at the one end of the solenoid. 8

4. (a) Find an expression for the torque on a current carrying loop in a uniform magnetic field with all special cases. 6

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(b) A conductor of length 2m carrying curren amp is held parallel to an infinitely long con carrying current of 10 amp. at a distance mm. Find the force on the small conductor.

UNIT – II

5. Explain the following terms :

(a) Self induction

(b) Mutual induction

(c) Reciprocity theorem

(d) Show that the quantity $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$ have unit velocity.

6. Explain Faraday's law of electromagnetic induction a conducting loop moving in a uniform magnetic fiel

7. (a) Deduce an expression for the energy stored i magnetic field.

(b) A circular loop of wire with a diameter of 12 cm is in a 1.8 Tesla magnetic field. The loop is removed from the magnetic field over a time 0.25 sec. What is the induced emf in the loop. 3

(a) State and explain Faraday's law of electromagnetic induction and deduce the expression $\vec{\nabla} \times \vec{E} = \frac{-\partial \vec{B}}{\partial t}$. 5

(b) The Electric field component of a e. m. wave is given by $\vec{E}_x = \vec{E}_z = 0$ and $\vec{E}_y = E_0 \cos\left(\frac{2\pi x}{\lambda}\right)$ cos wt. Calculate the expression for magnetic field B. 3

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