24225

3 Hours / 70 Marks   Seat No. ☐☐☐☐☐☐☐☐

Instructions :   (1)   All Questions are *compulsory.*

     (2)   Answer each next main Question on a new page.

     (3)   Illustrate your answers with neat sketches wherever necessary.

     (4)   Figures to the right indicate full marks.

     (5)   Assume suitable data, if necessary.

     (6)   Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1.   **Attempt any FIVE of the following :**   **10**

     (a)   Define the potential difference. State its unit.

     (b)   Define linear and non-linear network.

     (c)   State types of battery.

     (d)   Define magnetic flux. State its unit.

     (e)   Give two types of capacitor and give one example of each.

     (f)   Define electromagnetic induction.

     (g)   Draw symbol of Alternating current and Direct current.

     (h)   Define Internal Voltage Drop.

2. **Attempt any THREE of the following :** 12

   (a) State the factors which effect temperature on resistance.

   (b) Three capacitors 1 µF, 2 µF & 4 µF respectively are connected in a circuit. Determine the equivalent capacitance when they are connected in (i) Series (ii) Parallel.

   (c) Draw B-H curve for magnetic and non-magnetic material. Draw Hysteresis loop for hard steel and soft steel.

   (d) State and explain in detail Faraday's laws of Electromagnetic Induction.

3. **Attempt any THREE of the following :** 12

   (a) Draw symbol and characteristics of Ideal and Practical voltage source.

   (b) Define :

       (i) Loop

       (ii) Mesh

       (iii) Node

       (iv) Branch

   (c) Differentiate series magnetic circuit and parallel magnetic circuit.

   (d) Write types of inductors and applications of each.

4. **Attempt any THREE of the following :** 12

   (a) A resistance of 50 ohm is connected in parallel with 25 ohm. If current through the combination is 10 Ampere. Calculate current through each resistance.

   (b) Draw a practical set up to plot charging and discharging curves of a capacitor through a resistor. Draw the curves.

(c)   Explain in detail (i) Statically induced emf. (ii) Dynamically induced emf.

(d)   Define the terms : (i) MMF (ii) Ampere-Turns (AT) (iii) Reluctance (iv) Permeance.

(e)   Calculate the inductance and energy stored in magnetic field of air cored coil of 300 cm long, 60 cm diameter and wound with 5000 turns and carrying 8 A current.

5.   **Attempt any TWO of the following :**   12

(a)   Discuss in detail the heating effect, magnetic effect and chemical effect of electric current.

(b)   Give any six points of comparison between electric circuit and magnetic circuit.

(c)   Two coils A of 1000 turns and B of 1200 turns are such that 60% flux produced by A links with B. A current of 4 A in coil A produces a flux of 0.05 Wb and in coil B of 0.075 Wb. Find (i) L_1 (ii) L_2 (iii) M (iv) K.

6.   **Attempt any TWO of the following :**   12

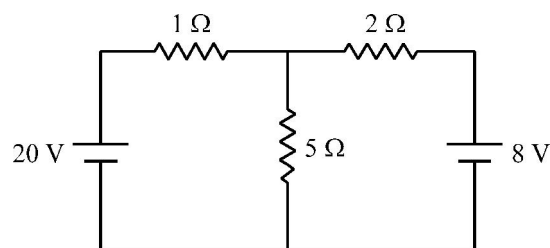(a)   Find the current through 5 Ω resistor using Kirchhoff's law, (Figure No. 01).

Fig. No. – 1

(b) Derive the expression for energy stored in capacitor with the help of diagram.

(c) Define self-inductance and prove that $L = N^2/S$ where N = Number of turns & S = reluctance & L = self-inductance.

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