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)   Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

                                                                                                    Marks

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

(a)   Define power and energy.

(b)   State the meaning of active and passive network.

(c)   Define capacitance and state its unit.

(d)   Define the term Magneto Motive Force and give its unit.

(e)   Define reluctance and permeance with respect to magnetic circuit.

(f)   State the types of induced emf.

(g)   List the factors affecting the inductance of a coil.

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

(a)   Draw the symbol and characteristics of ideal voltage source and practical voltage source.

(b) State and explain Kirchhoff's current law.

(c) Explain the working of capacitor with a neat sketch.

(d) State and explain Faraday's law of electromagnetic induction.

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

(a) List any two effects of electric current. Give two applications of each.

(b) Calculate current, resistance and energy consumed by an electric iron rated 230 V, 2 kW when used for 12 hours.

(c) State and explain Ohm's law.

(d) Explain charging of a capacitor with a neat circuit diagram.

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

(a) Distinguish between direct current and alternating current (any four points).

(b) Determine the current through 6 Ω resistor shown in Fig. 1 using KVL.
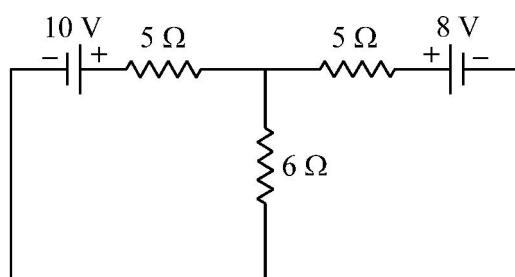
Fig. 1

(c) A resistance of 10 Ω is connected in parallel with 15 Ω. If current through the combination is 10 A, calculate current through each resistance.

(d) Derive the equation for energy stored in a capacitor.

(e) Three capacitors 15 μF, 18 μF and 12 μF are connected in a circuit. Find equivalent capacitance when they are connected in :

(i) Series

(ii) Parallel

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

   (a) Draw a neat sketch of series magnetic circuit. State value of reluctance for both series and parallel magnetic circuit. Name each term used in them.

   (b) Compare electric circuit and magnetic circuit on any six points.

   (c) Two coils A and B of 500 and 750 turns respectively are connected in series on the same magnetic circuit of reluctance 1.55×10^6 AT/Wb. Assuming that no leakage flux.

   Calculate :

   (i)   Self inductance of each coil

   (ii) Mutual inductance between coils.

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

   (a) Explain hysteresis loop of magnetic material with neat labelled diagram.

   (b) List any two types of inductors. Derive the expression for the energy stored in magnetic field. **(2+4)**

   (c) A coil consisting of 100 turns is placed in the magnetic field of 0.3 mWb. Calculate the average emf induced in the coil when it is moved in 0.06 seconds from the given field of 0.1 mWb. If the resistance of coil is 200 Ω, find the induced current in the coil.

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