23124

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.

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

Marks

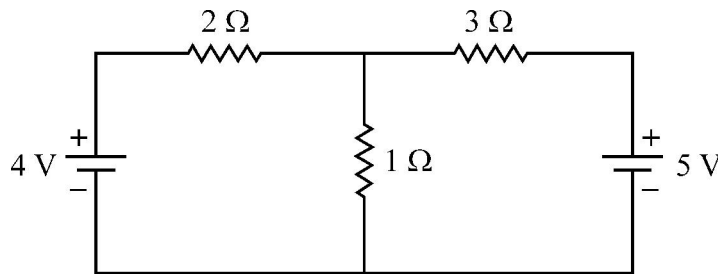**1.**   **Attempt any FIVE of the following :**   **10**

(a)   Define the term resistance and its unit.

(b)   State the concept of internal voltage drop.

(c)   Define breakdown voltage and dielectric strength of a capacitor.

(d)   An iron ring of mean circumference 80 cm is uniformly wound with 500 turns of wire and carries 0.8A. Find the magnetic field strength.

(e)   Define magnetic flux density. State its unit.

(f)   State Faraday's law of electromagnetic induction.

(g)   A coil of 500 turns is linked with a flux of 25 mWb, when carries a current of 12.5A. Calculate the value of self-inductance.

2. Attempt any THREE of the following : 12

(a) The rating of electric geyser is 250 V, 3 kW. How much current does it take and what is its hot resistance ? Also calculate the energy consumed by it in one hour.

(b) Find the current through 1 Ω resistance of Figure No. 1 using Kirchhoff's laws.

Fig. No. – 1

(c) Plot charging voltage and current curves of capacitor, also write expression for them.

(d) Distinguish between statically induced emf and dynamically induced emf.

3. Attempt any THREE of the following : 12

(a) A device stores 500 J and releases in the form of current of 40 A in the duration of 15 msec. Find the terminal voltage.

(b) Define electric work and electric power. Give their S.I. units.

(c) State and explain Ohm's law.

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

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

   (a) Define ideal voltage source and practical voltage source. Draw the symbol for each.

   (b) 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.

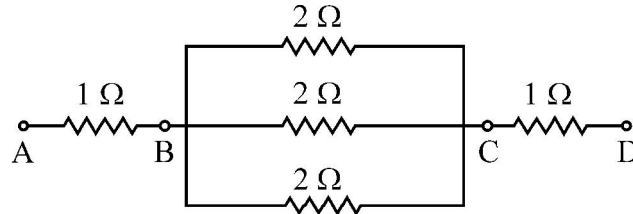   (c) Calculate the equivalent resistance between points A and D in the Figure No. 2.

   Fig. No. – 2

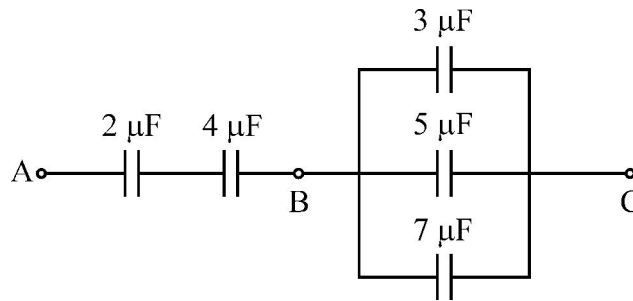   (d) Calculate the value of equivalent capacitance of the combination given in Figure No. 3.

   Fig. No. – 3

   (e) List any four types of capacitor and their application.

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

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

   (b) Draw B-H curve for magnetic material and state its nature. State significance of hysteresis loop. Also draw the hysteresis loop for hard steel and soft steel.

   (c) (i) State the various types of inductor.

      (ii) Derive the expression for energy stored in magnetic field.

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

    (a)   An iron ring of mean circumference 0.8 m is uniformly wound with 400 turns of wire. It carries 1.6 A and produces a flux density of 1.1 T. Find permeability of the material.

    (b)   Define self-inductance and prove that $L = N^2/S$ where N = number of turns, S = reluctance.

    (c)   Two coils A of 1000 turns and B of 1200 turns are such that 60% of flux produced by A links with B. A current of 4A 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

_____