

17214

14115

3 Hours / 100 Marks

Seat No.

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- 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.

Marks

- 1. Attempt any TEN of the following:** **20**
- Define resistance. Also write the formula for the same in terms of physical constants.
 - State Ohm's law for electric circuits.
 - Write the names of any three types of resistors and write down one application of each.
 - What is terminal voltage? Explain in brief.
 - What is capacitance? What is its unit?
 - Define magnetic circuit. Also draw a simple series magnetic circuit.
 - Define M.M.F. and reluctance of a magnetic circuit.
 - What is self inductance? What is its unit?
 - Write any two examples for solid insulating materials. Also give one application for each material.

P.T.O.

- j) What is meant by co-efficient of coupling? Write an expression for the same.
- k) State any two electrical and any two mechanical properties of high - conductivity materials.
- l) Give any two applications of electro magnets.

2. Attempt any **FOUR** of the following:

16

- a) Convert the given voltage sources of Figure No. 1 and Figure No. 2 into equivalent current sources.

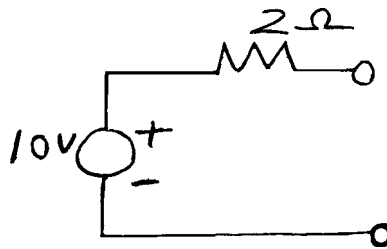


Fig. No. 1

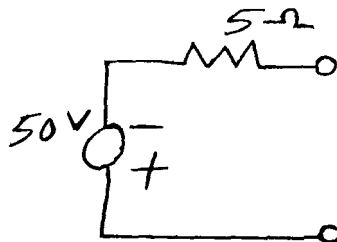


Fig. No. 2

- b) A copper coil has a resistance of 12.7 ohms at 18°C and 14.3 ohms at 50°C. Find:
 - (i) Temperature co-efficient of resistance at 0°C.
 - (ii) Resistance of coil at 0°C.
 - (iii) Temperature co-efficient of resistance at 18°C.
- c) State and explain Kirchoff's laws with suitable illustrations.

- d) Find the equivalent resistance of the circuit shown in Figure No. 3. If the total current taken by the circuit is 5 amperes, what is the current through 2 ohm resistance?

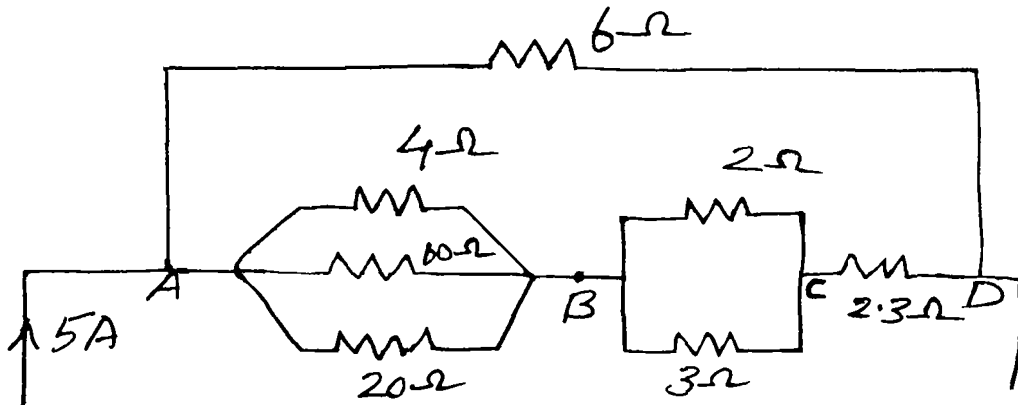


Fig. No. 3

- e) Find the current in each branch of the circuit shown in Figure No. 4 using Kirchoff's laws.

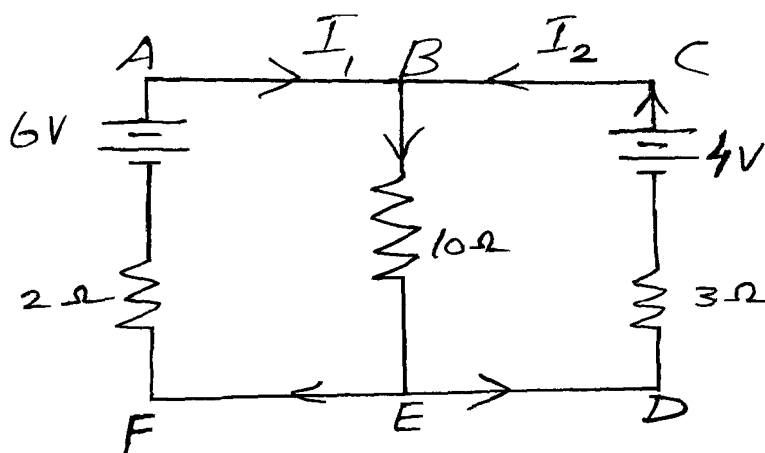


Fig. No. 4

- f) What are the factors affecting Hysteresis loss? How will you minimise this loss?

3. Attempt any FOUR of the following: 16

- a) Derive an expression for the capacitance of the parallel plate capacitor with medium partly air.
- b) What is dielectric strength? What is its unit? Also define breakdown voltage.
- c) A parallel plate capacitor has circular plates of 8 cm radius and 1.0 mm separation of air. What charge will appear on the plates if a potential difference of 100 V is applied?
- d) Two capacitors of 4 microfarad and 8 microfarad are connected in parallel and this combination is connected in series with a capacitor of 24 microfarad. Find:
 - (i) Total capacitance
 - (ii) Total charge
 - (iii) Charge on each capacitor if applied voltage is 32 volts.
- e) What is B-H curve? Draw the nature of graph and explain it in brief.
- f) Give any four important steps to be followed while doing battery maintenance.

4. Attempt any FOUR of the following: 16

- a) Compare electric circuit with magnetic circuit on any four important points.
- b) Draw Hysteresis loop for Hard steel and Cast steel. Also write one application of each material.
- c) A ring has a mean diameter of 20 cm and a cross sectional area of 10 cm^2 and is made up of semi-circular sections of cast steel and cast iron, each joint having a reluctance equal to an air gap of 0.2 mm. Find the ampere turns required to produce a flux of 6×10^{-4} weber in the magnetic circuit. The relative permeability of cast steel is 800 and of cast iron is 166.

- d) Connect the given three resistances 32Ω , 40Ω and 48Ω in star and determine its equivalent delta-circuit.
- e) What is magnetic fringing? What are the effects of magnetic fringing? How will you reduce its effects?
- f) Write down any four examples for Gaseous insulating materials with one application of each.

5. Attempt any FOUR of the following:

16

- a) State and explain Faraday's laws of electromagnetic induction.
- b) Define:
 - (i) Statically induced e.m.f.
 - (ii) Dynamically induced e.m.f.

Write the names of electrical equipments in which these two types of emfs are induced.
- c) Calculate the inductance and energy stored in the magnetic field of an air-cored solenoid 50 cm long, 5 cm in diameter and wound with 1000 turns, if it is carrying a current of 5 amperes. State Fleming's right hand rule. Where is it applicable?
- d) Write down any four advantages of A.C. over D.C.
- e) Give any three important properties of:
 - (i) Series circuit
 - (ii) Parallel circuit

6. Attempt any FOUR of the following:**16**

- a) Explain constant voltage charging of battery using a DC generator.
 - b) Explain the necessity of series connection of batteries.
 - c) Define the following terms as related to a.c. circuits:
 - (i) Cycle
 - (ii) Frequency
 - (iii) Time period
 - (iv) Amplitude
 - d) Write down the values of relative permeability for Dia, Para and Ferro magnetic materials. Also write one example for each type.
 - e) What is amorphous metal? Write down any two properties and any one application of this metal.
 - f) Define the following terms as related to electric circuits:
 - (i) Linear circuit
 - (ii) Active network
 - (iii) Mesh
 - (iv) Unilateral circuit.
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