

17214

11920

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) Assume suitable data, if necessary.
  - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.

**Marks**

**1. Attempt any TEN of the following :**

**20**

- (a) Define resistance and electric current.
- (b) Draw the waveforms of direct current and alternating current.
- (c) Define electrical work and electrical energy. Give their units.
- (d) State Ohm's law of electrical circuit.
- (e) Calculate equivalent resistance of two resistor if they are connected in parallel.
- (f) Define :
  - (i) Active network
  - (ii) Bi-lateral circuit
- (g) Define capacitance and write its unit.
- (h) A capacitor of  $0.005 \mu\text{F}$  is connected to DC supply of 230 volts. Calculate the energy stored in the capacitor.
- (i) Write two applications of electrolytic capacitor.
- (j) State two application of permanent magnet and electromagnet.
- (k) State the factors affecting hysteresis loss.
- (l) State Lenz's law.
- (m) State Faraday's law of electromagnetic induction.
- (n) What is Amorphous metal ? Give one application of this metal.

[1 of 4]

**P.T.O.**

2. Attempt any FOUR of the following :

16

- (a) List any four types of resistor. Give one application of each.
- (b) Calculate current, resistance and energy consumed by an electric iron rated 230 V, 2kW when used for 12 hours.
- (c) A coil has a resistance of 200 Ω at 20 °C, find its resistance at 0 °C Take  $\alpha_0 = 0.004/^\circ\text{C}$ . Find its resistance at 50 °C.
- (d) Compare series and Parallel circuits on any four points.
- (e) Determine the equivalent resistance across AB in the circuit shown in Figure No. 1.

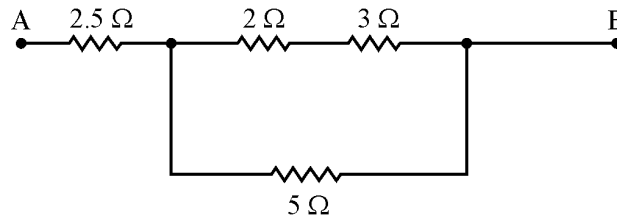


Fig. No. 1

- (f) Find the equivalent resistance between the terminal XY of the network shown in Fig. No. 2. (Use star delta transformation)

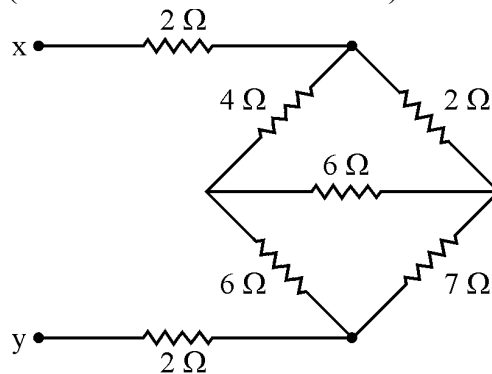


Fig. No. 2

3. Attempt any FOUR of the following :

16

- (a) State and explain KCL and KVL.
- (b) Find the current in 2 Ω using Kirchoff's laws in Figure No. 3.

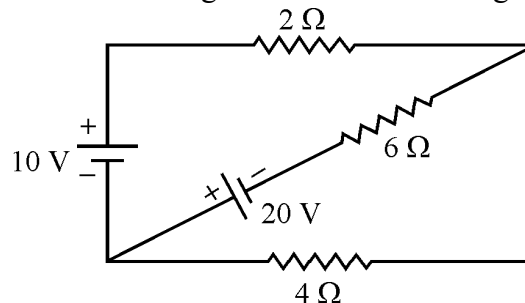


Figure No. 3

- (c) Define the terms –
- (i) Node
  - (ii) Branch
  - (iii) Loop
  - (iv) Mesh
- (d) Three capacitors have capacitances  $2 \mu\text{F}$ ,  $4 \mu\text{F}$  and  $8 \mu\text{F}$  respectively. What is the effective capacitance when they are connected ?
- (i) In Series
  - (ii) In parallel
- (e) Draw the voltage and current curves during charging and discharging of a capacitor.
- (f) Derive expression for energy stored in a capacitor.

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

**16**

- (a) Define the terms :
- (i) MMF
  - (ii) Reluctance
  - (iii) Permeance
  - (iv) Permeability
- (b) Give any four comparison between electric circuit and magnetic circuit.
- (c) Describe the concept of magnetic hysteresis and hysteresis loss.
- (d) Compare statically induced emf with dynamically induced emf on any four points.
- (e) (i) State Fleming's right hand rule.  
(ii) Define mutual inductance & state its unit.
- (f) A iron ring 15 cm in diameter and  $10 \text{ cm}^2$  in cross-sectional area is wound with 200 turns for a flux density of  $1 \text{ wb/m}^2$  and permeability of 500 find
- (i) Reluctance of the iron ring
  - (ii) Flux in the ring
  - (iii) MMF

**P.T.O.**

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

- (a) 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.
- (b) List four types of inductors along with their application.
- (c) List four application of storage batteries.
- (d) State necessity of series and parallel connection of batteries.
- (e) An iron ring with cross sectional area of  $100 \text{ mm}^2$  & mean circumference of 90 cm is uniformly wound with 1500 turns of wire. Determine the current required to setup flux density of  $1.2 \text{ wb/m}^2$  in the ring. Assume relative permeability = 1000 for iron.
- (f) Name two non conducting materials. Give one application each.

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

- (a) Distinguish between HRGO and CRGO.
  - (b) Write down any two electrical and two mechanical properties of high conductivity materials.
  - (c) Write any two precautions to be taken during battery charging. Also state the conditions of fully charged cells.
  - (d) Classify insulating materials on the basis of temperature. Write temperature range for each (any four types).
  - (e) Define following terms :
    - (i) Cycle
    - (ii) Frequency
    - (iii) Amplitude
    - (iv) Time period
  - (f) State meaning of coefficient of self induction and coefficient of mutual induction.
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