



# 17214

11819

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

**Marks**

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

**20**

- a) Define electric potential and state its unit.
- b) With neat circuit, state the current division in two parallel resistance  $R_1$  and  $R_2$  in terms of total current.
- c) Define the term active network and passive network.
- d) Give one example of each, series and parallel circuit in actual practice.
- e) Define capacitor. Give its unit.
- f) Define magnetic flux and flux density. State their units.
- g) Give any two applications of electromagnet.
- h) State formula for energy stored in magnetic field.
  - i) State Fleming's right hand rule.
  - j) Define frequency and state its unit.
  - k) Name any four insulating materials.
    - l) State the necessity of series and parallel connection of batteries.

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

**16**

- a) What is amorphous metal ? State any two properties and one application of this metal.
- b) Compare A.C. and D.C. supply (any four points).
- c) Describe constant voltage charging of a battery.

**P.T.O.**



- d) If a coil of 200 turns is linked with a flux of 0.02 wb when carrying current of 20A, calculate the inductance of the coil. If this current is uniformly reversed in 0.2 sec., calculate the self induced emf in the coil.
- e) Show the duality between series and parallel dc circuits.
- f) Compare magnetic and electric circuits on any four points.

3. Attempt **any four** of the following :

16

- a) The resistance of a coil of wire increases from  $80\Omega$  at  $10^\circ\text{C}$  to  $96.6\Omega$  at  $60^\circ\text{C}$ . Find the temperature co-efficient of the material at zero degree centigrade.
- b) Represent ideal and practical voltage source, also convert voltage source of figure 1 into an equivalent current source.

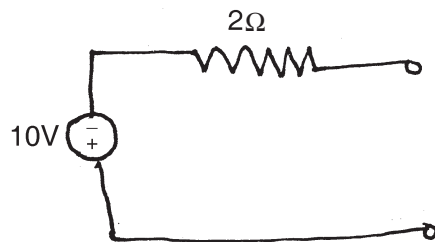


Figure 1

- c) Calculate currents  $I_1$ ,  $I_2$  and  $I_3$  of the circuit shown in figure 2 using loop analysis.

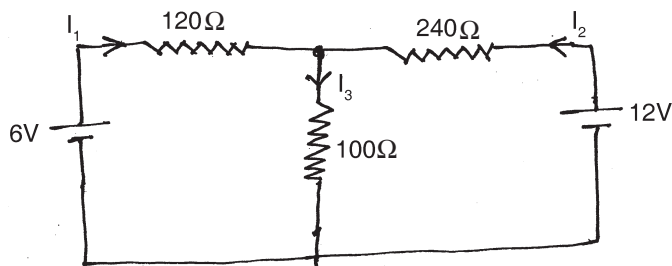


Figure 2

- d) Calculate resistance between terminals A and B using delta star conversion in figure 3.

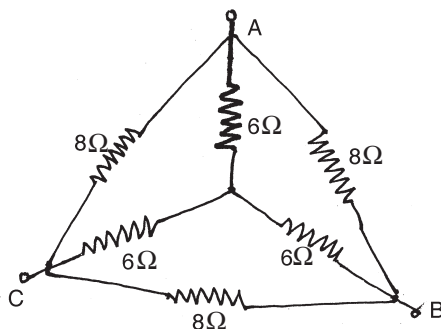


Figure 3



- e) Calculate the capacitance and energy stored in parallel plate capacitor which consist of two metal plates, each  $60 \text{ cm}^2$  separated by a dielectric of  $2.0 \text{ mm}$  thickness of  $\epsilon_r = 3.6$  if P.D. of  $150 \text{ V}$  is applied across it.
- f) Three capacitors have capacitances of  $2\mu\text{F}$ ,  $6\mu\text{F}$  and  $8\mu\text{F}$  respectively. What is the effective capacitance when they are connected in

I) Series      II) Parallel.

If  $120\text{V}$  is applied across the series combination, what is the charge on each capacitor ?

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

16

- a) Explain the electrolytic capacitor with neat diagram.
- b) Draw voltage and current curves during charging of capacitor through resistor. Write expressions for the same.
- c) State Kirchoff's voltage law. Write the sign convention used while writing loop equation.
- d) Find the resistance between terminals A and B of the network shown in Figure 4.

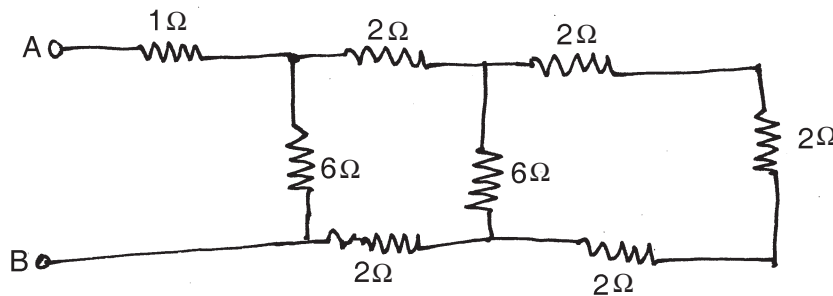


Figure 4

- e) State the effects of electric current and give applications of each (any four effects).
- f) State the different types of resistors. Explain any one of them with sketch.

5. Attempt **any four** of the following :

16

a) Define the following :

I) Node

II) Branch

III) Bilateral circuit

IV) Unilateral circuit.

b) Explain the B-H curve for magnetic and non-magnetic materials.



- c) An iron ring of cross sectional area  $7\text{cm}^2$  is wound with a wire of 110 turns and a saw cut of 2 mm, calculate the magnetising current required to produce a flux 0.2 mwb. Its mean length of magnetic path is 30 cm and relative permeability of iron is 500.
- d) State and explain Faraday's laws of electromagnetic induction.
- e) Compare air core inductor with ferrites core inductor. Give one application of each.
- f) Give eight steps to be followed while doing battery maintenance.

6. Attempt **any four** of the following :

**16**

- a) Distinguish between paramagnetic and ferromagnetic materials with any four points.
  - b) Classify insulating materials on the basis of temperature withstanding capacity. Specify limiting temperature of each class with one example each.
  - c) Compare dynamically induced emf with statically induced emf.
  - d) What is coefficient of coupling ? Explain in brief.
  - e) Explain the terms with neat diagram.
    - I) Leakage flux
    - II) Fringing.
  - f) What is permanent magnet and electromagnet ? State two applications of each type.
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