

17214

16117

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

Marks

1. **Attempt any TEN of the following:** **20**
- a) Define active circuit and passive circuit.
 - b) Define resistance. Also write down its formula.
 - c) A capacitor of $12\mu\text{F}$ is connected across a battery of 6 volt. Determine energy stored in this capacitor.
 - d) Draw simple magnetic circuit.
 - e) State Fleming's right hand rule with diagram.
 - f) Define:
 - (i) Self induced emf.
 - (ii) Mutually induced emf.
 - g) State any two properties of insulating materials.

P.T.O.

- h) State Ohm's law for electric circuit.
- i) Two resistance of 6Ω each are connected in parallel. Find equivalent resistance.
- j) Define:
 - (i) Dielectric strength
 - (ii) Breakdown voltage
- k) State the relation for energy stored in a capacitor.
- l) Define ampere hour efficiency and watt hour efficiency.
- m) State the relationship between permeability of free space and relative permeability of air.
- n) Compare dry cell and liquid cell (any two points).

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

16

- a) In a circuit containing resistance of 60Ω connected across a voltage sources of 20V and current is allowed to pass for 50 sec. Calculate :
 - (i) workdone in Joules
 - (ii) heat energy produced in kcal.
- b) Derive the expression for equivalent resistance when three resistances are connected in series.
- c) Find equivalent resistance between terminal A and B shown in Figure No. 1

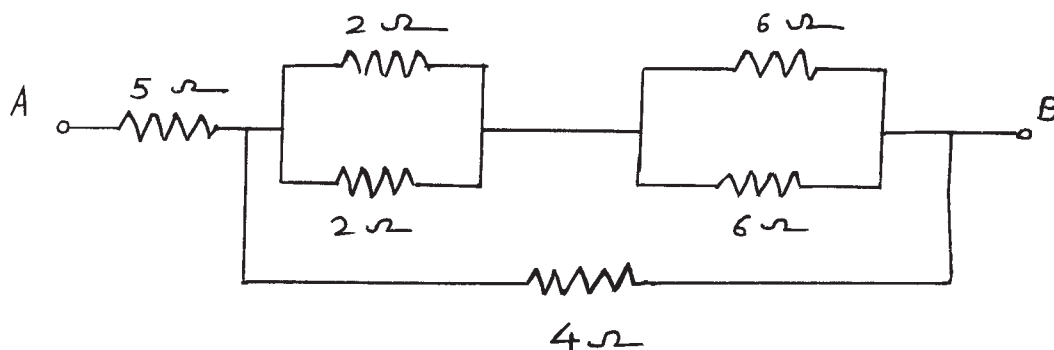


Fig. No. 1

- d) Derive an expression for the capacitance of parallel plate capacitor with medium partly air.
- e) A coil has resistance of 3.146Ω at a temperature of 40°C and 3.767Ω at 100°C . Find resistance of coil at 0°C and temperature coefficient of resistance at 40°C .
- f) Compare electric circuit and magnetic circuit on any four points.

3. Attempt any FOUR of the following:

16

- a) Find equivalent capacitance of series parallel combination of capacitance shown in Figure No.2.

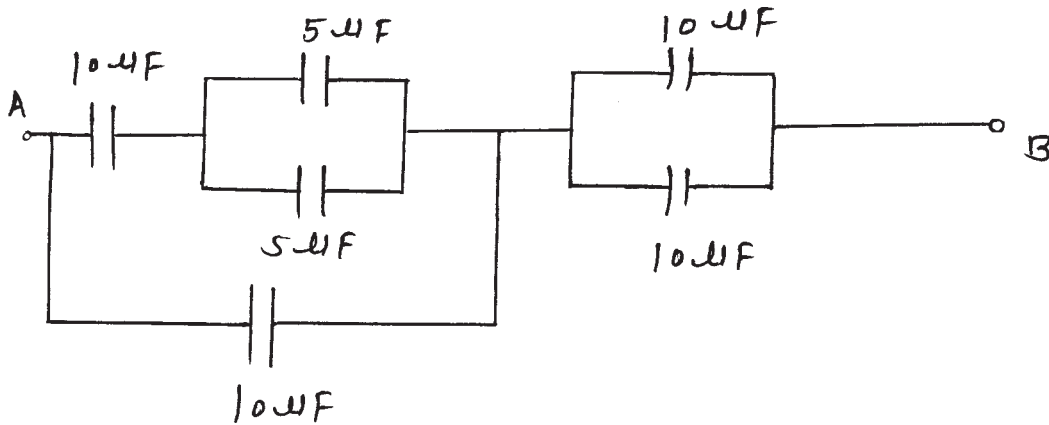


Fig. No. 2

- b) Convert given voltage source of Figure No. 3 into equivalent current source and given current source of Figure No. 4 into equivalent voltage source.

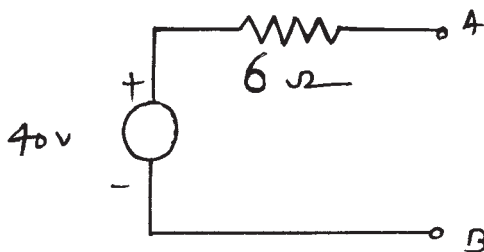


Fig. No. 3

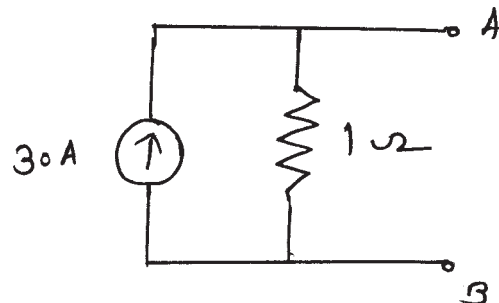
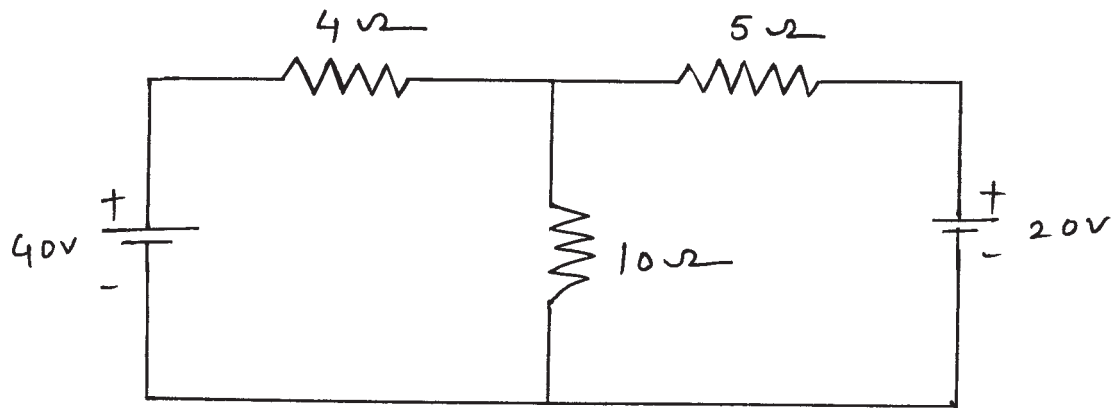


Fig. No. 4

- c) Define following terms related to circuit
- (i) Bilateral Network
 - (ii) Node
 - (iii) Loop
 - (iv) Branch
- d) Find current flowing through 10Ω resistance shown in Figure No. 5 Using Kirchhoff's law.

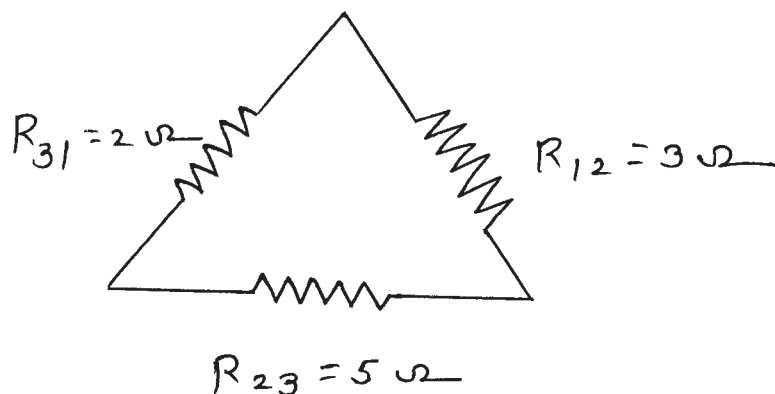
Fig. No. 5

- e) Explain B-H curve for magnetic material. With the help of diagram. Explain the concept of leakage flux, useful flux and fringing.

4. Attempt any FOUR of the following:

16

- a) Convert delta connected network shown in Figure No. 6 into equivalent star.

Fig. No. 6

- b) Compare alternating current and direct current.
- c) Define the following terms:
 - (i) Magnetic flux density
 - (ii) Reluctance
 - (iii) Magneto motive force
 - (iv) Permeance
- d) State Kirchhoff's current law and explain with neat diagram.
- e) The capacitance of capacitor formed by two parallel plates each of 200 cm^2 area separated by dielectric of thickness 4 mm is $0.0004 \mu\text{F}$. voltage of 20,000 volt is applied to the capacitor Calculate:
 - (i) Total charge on plates
 - (ii) Electric flux density
- f) A mild steel ring of 30 cm circumference has cross sectional area of 6 cm^2 and winding of 500 turns. Air gap is cut of 1 mm in magnetic circuit. A current of 4A produces a flux density of 1 Tesla in air gap. Find
 - (i) total ampere turns
 - (ii) relative permeability of steel

5. Attempt any FOUR of the following:

16

- a) Derive expression for energy stored in magnetic field of a coil.
- b) Calculate the inductance and energy stored in magnetic field of air cored coil of 250 cm long 50 cm. diameter and bound with 4000 turns and carrying current of 10A.
- c) Air core coil has 500 turns and diameter of 30 cm and cross sectional area 3 cm^2 Calculate:
 - (i) inductance of coil
 - (ii) emf induced in coil if current of 2A is reversed in 0.04 sec.

- d) What is amorphous metal material? Give any three properties of amorphous metal.
- e) State and explain Faradays law of electromagnetic induction.
- f) Define following terms:
 - (i) Cycle
 - (ii) Frequency
 - (iii) Amplitude
 - (iv) Time period

6. Attempt any FOUR of the following:

16

- a) Describe the laws for finding direction of induced emf.
 - b) List the number of steps to be carried out for maintenance of lead acid batteries.
 - c) Distinguish between HRGO and CRGO on any four points.
 - d) State necessity of series connection and parallel connection of batteries.
 - e) List four examples of insulating material and explain any two.
 - f) Based on temperature withstand ability. Classify insulating material.
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