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63 (FY)SEM-3/SEC/PHYSEC2013

2024

PHYSICS

Paper : PHYSEC2013

(Electrical Network and Loads)

Full Marks : 40

Pass Marks : 16

Time : Two hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer : $1 \times 5 = 5$
- (a) Which of the following is passive element ?
- (i) Diode
 - (ii) Transistor
 - (iii) Both (i) and (ii)
 - (iv) Capacitor

(b) Superposition theorem is applied only to circuits having _____ elements.

- (i) Resistive
- (ii) Passive
- (iii) Non-linear
- (iv) Linear bilateral

(c) For maximum transfer of power, internal resistance of the source should be

- (i) Equal to load resistance
- (ii) Less than the load resistance
- (iii) Greater than the load resistance
- (iv) Equal to half of the load resistance

(d) A circuit of unity power factor behaves as

- (i) inductive circuit
- (ii) Capacitive circuit
- (iii) resistive circuit
- (iv) R-C circuit

(e) In a three phase system, phase voltage differ by

- (i) 180°
- (ii) 120°
- (iii) 90°
- (iv) 360°

2. Answer the following questions : **(any five)**
 $2 \times 5 = 10$

(a) What are active and passive elements? Give examples.

(b) State Ohm's law. Write the limitations of Ohm's law.

(c) Write down the basic differences between single and three phase alternating voltage source.

(d) State and explain Kirchhoff's law.

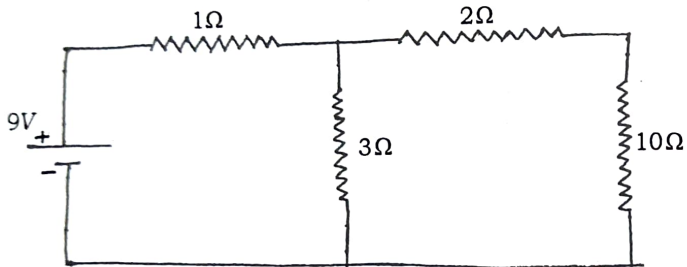
(e) How would you connect resistances 1Ω , 2Ω and 3Ω so as to get an equivalent resistance of 3.66Ω ? Draw the required circuit diagram.

(f) State superposition theorem.

(g) Define (i) Apparent power (ii) Power factor.

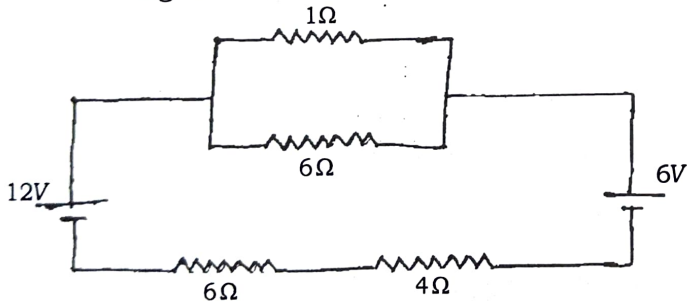
3. Answer the following questions : **(any three)**
 $5 \times 3 = 15$

(a) Find the current through 10Ω resistor using Thevenin's theorem. 5



(b) What are the advantages of three phase voltage system over single phase voltage system ? 5

(c) Determine the electric current that flows in the circuit as shown in the figure below. 5



(d) Discuss different types of loads present in distribution system and explain their characteristics. 5

(e) State and explain Thevenin's theorem with suitable diagram. How does it differ from Norton's theorem ? $4+1=5$

4. Answer the following questions : **(any one)**
 $10 \times 1 = 10$

(a) State and explain maximum power transfer theorem and derive an expression for maximum power. 5+5=10

(b) State and explain Norton's theorem. Using this theorem, determine the current in 20Ω resistor in the network shown below - 5+5=10

