

Total number of printed pages-5.

**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

*Contd.*

(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

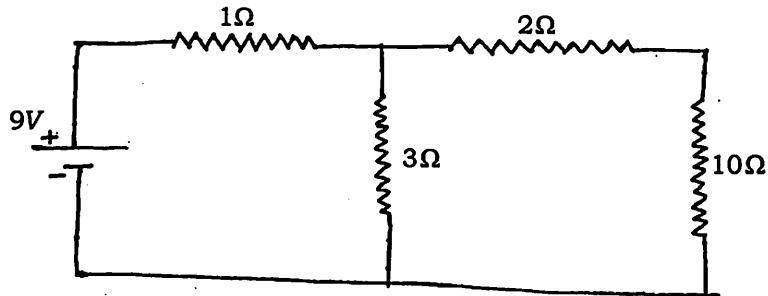
- (i)  $180^\circ$
- (ii)  $120^\circ$
- (iii)  $90^\circ$
- (iv)  $360^\circ$

2. Answer the following questions : **(any five)**  
2×5=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  $1\Omega$ ,  $2\Omega$  and  $3\Omega$  so as to get an equivalent resistance of  $3.66\Omega$  ? Draw the required circuit diagram.
- (f) State superposition theorem.
- (g) Define (i) Apparent power (ii) Power factor.

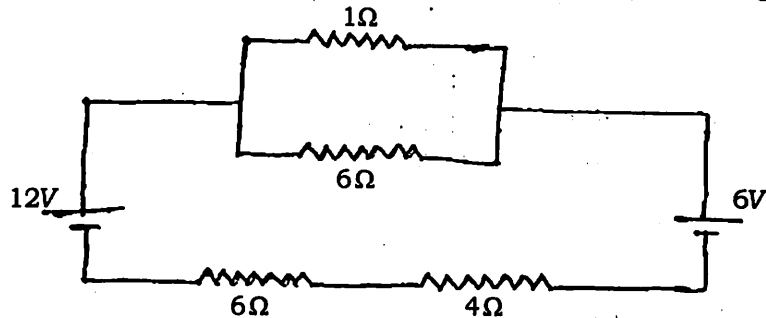
3. Answer the following questions : **(any three)**  
 $5 \times 3 = 15$

(a) Find the current through  $10\Omega$  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  $20\Omega$  resistor in the network shown below - 5+5=10

