

17331

11718

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. (A) Attempt any SIX of the following : 12
- (a) Define node and loop in a network.
 - (b) State Ohm's Law.
 - (c) State the formula to find equivalent resistance of three resistances connected in parallel.
 - (d) State Faraday's Laws of Electromagnetic induction.
 - (e) Draw the waveform representation of three phase supply with neat labels.
 - (f) What is the meaning of phase sequence in a 3-phase system ? Give the 3-phase sequence used in practice.
 - (g) State the importance of earthing.
 - (h) Classify transformer on the basis of (i) Construction (ii) Supply system.

(B) Attempt any TWO of the following :

8

(a) State the function of following part of a transformer :

- (i) Conservator
- (ii) Transformer oil
- (iii) Laminated steel core
- (iv) Windings

(b) Determine current through 5 ohm resistance in the circuit shown in fig. no. 1 using node voltage method.

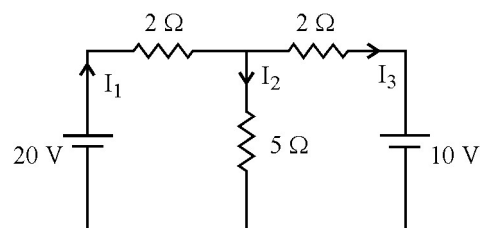


Fig. – 1

(c) Three identical coils each of $(4.2 + j 5.6)$ ohms are connected in star across 415 volt, 3-phase, 50 Hz AC supply.

Determine : (i) Phase voltage (ii) Phase current (iii) Power factor (iv) Power absorbed by the load.

2. Attempt any FOUR of the following :

16

- (a) Three resistances 50Ω , 40Ω and 25Ω are connected in parallel. Determine its equivalent resistance. If the current in 25Ω resistance is 8 Amp, find currents in the other two resistances and total power consumed in the circuit.
- (b) Using mesh loop method find the current in 6Ω and hence power consumed by 6Ω resistance for the network shown in fig. no. 2.

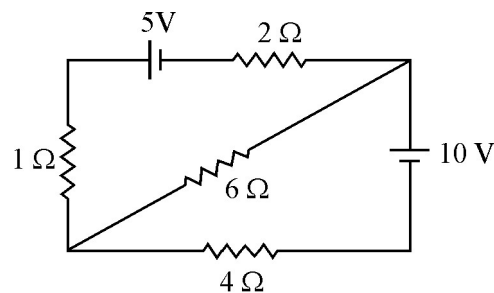


Fig. - 2

- (c) Define the following terms w.r. to A.C. system :
- Phase difference
 - Phase angle
 - Leading
 - Lagging
- (d) An alternating voltage is mathematically expressed as

$V = 141.42 \sin \left(157.08 t + \frac{\pi}{12} \right)$ volt. Find its maximum value, RMS value frequency and time period.

- (e) Draw phaser diagram for R-C series circuit. Write the voltage and current equations for it.

P.T.O.

- (f) A coil of resistance 10Ω and an inductance 0.1 H is connected in series with a capacitor of $150 \mu\text{F}$ across, 200 volts , 50 Hz supply. Find
- (i) Inductive reactance
 - (ii) Capacitive reactance
 - (iii) Impedance
 - (iv) Current

3. Attempt any FOUR of the following :

16

- (a) Define fuse. Explain the construction and working of HRC fuse.
- (b) Distinguish between statically induced emf and dynamically induced emf with examples.
- (c) Draw the labelled diagram for balanced three phase delta connected system.
State the relationship between :
 - (i) Line voltage and phase voltage
 - (ii) Line current and phase current
 - (iii) Power in terms of phase voltage and phase current
- (d) Define the following terms :
 - (i) Power factor
 - (ii) Active power
 - (iii) Apparent power
 - (iv) Reactive power

- (e) Write any four safety precautions to be taken while working with an electrical system.
- (f) Explain the construction and operation of shaded pole single phase induction motor.

4. Attempt any FOUR of the following :

16

- (a) Draw the waveforms for current, voltage and phasor diagram of a simple resistive circuit when an A.C. voltage is applied across it.
- (b) Explain the construction and working of dynamometer type wattmeter.
- (c) State any four advantages of three phase system over single phase system.
- (d) State any four merits of MCB over fuse.
- (e) Define efficiency and voltage regulation of single phase transformer.
- (f) Compare a two winding transformer with auto transformer (any four points).

5. Attempt any FOUR of the following :

16

- (a) State and explain Lenz's law.
- (b) Define inductive reactance of a coil. Write its unit. State the factors on which it depends.

P.T.O.

- (c) Draw a series R-L circuit. Write its expression for impedance. Draw the impedance triangle.
- (d) Explain the concept of power factor and its significance.
- (e) Draw a neat labelled diagram for
 - (i) Core type
 - (ii) Shell type single phase transformer.
- (f) Draw waveforms, write voltage, current equations and draw phasor diagram for an ac circuit containing capacitance only.

6. Attempt any FOUR of the following :

16

- (a) Define the following terms :
 - (i) RMS value
 - (ii) Peak factor
 - (iii) Form factor
 - (iv) Angular velocity
- (b) The equation of an alternating current is represented as, $i = 62.35 \sin 628 t$. Determine (i) Frequency (ii) Time period (iii) Maximum value (iv) Angular velocity.
- (c) Draw a neat circuit diagram for the measurement of single phase power using dynamometer type wattmeter.

- (d) Three identical coils, each of $R = 4 \Omega$ and $C = 100$ microfarad are connected in star across 415 volt, 3-phase, 50 Hz supply.

Find (i) V_{ph} (ii) I_{ph} (iii) Power factor (iv) Total power absorbed.

- (e) Explain why single phase induction motors are not self starting.
- (f) State the working principle of capacitor start single phase I.M. with necessary diagrams.
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