

17331

13141

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) 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
- i) Define current. State its unit.
 - ii) Give the formula to find equivalent resistance when three resistances are connected in parallel.
 - iii) State the values of
 - 1) Form factor
 - 2) Peak factor for sinusoidal alternating voltage.
 - iv) List the types of induced emf.
 - v) Three resistances of 3Ω each are connected in star find equivalent resistance when connected in delta.
 - vi) Define balanced load for 3-phase system.
 - vii) List the types of fuses.
 - viii) State any two effects of electric shocks.

P.T.O.

b) Attempt any **TWO** of the following:

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- i) Draw a neat labelled diagram of pipe earthing.
- ii) State the working principle of capacitor start single phase induction motor.
- iii) Classify transformer on the basis of construction and voltage ratio.

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

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- a) State KVL. Also mention sign conventions adopted for it.
- b) Find the equivalent resistance between terminal A and B for a circuit given in Figure No.1.

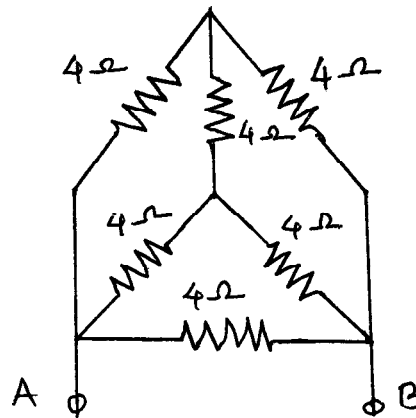


Fig. No. 1

- c) For the circuit given in Figure No.2. Find the current through $10\ \Omega$ by using Mesh analysis.

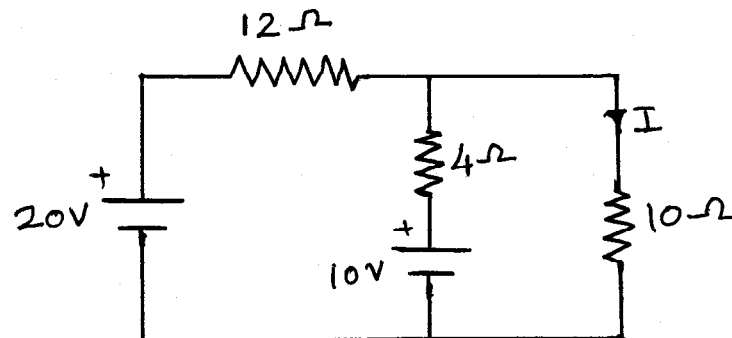


Fig. No. 2

- d) When sinusoidal voltage is applied to a circuit containing resistance only
- Draw circuit diagram
 - Write voltage equation and current equation.
 - Draw waveform of voltage and current
 - Draw phasor diagram.
- e) Define power factor. State the nature of power factor if $X_L > X_C$.
- f) Draw power triangle for inductive load and capacitive load.

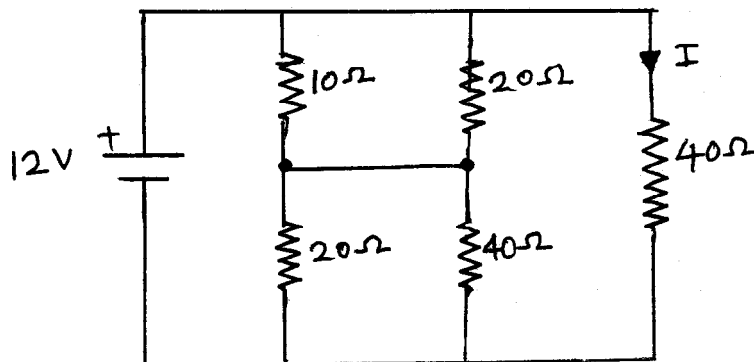
3. Attempt any FOUR of the following:

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- a) State Faraday's first and second law of electromagnetic induction.
- b) An alternating current is given by equation $i = 10 \sin 628 t$ find
- Average value
 - RMS value,
 - Frequency,
 - Time period
- c) What do you understand by terms lag and lead in relation to alternating quantities?
- d) State the relationship between
- Angular velocity and frequency,
 - Time period and frequency.
- e) Name and state the law used for finding the direction of statically induced emf.
- f) Draw the impedance triangle for series.R-L-C circuit for
- $X_L > X_C$,
 - $X_C > X_L$.

4. Attempt any FOUR of the following:

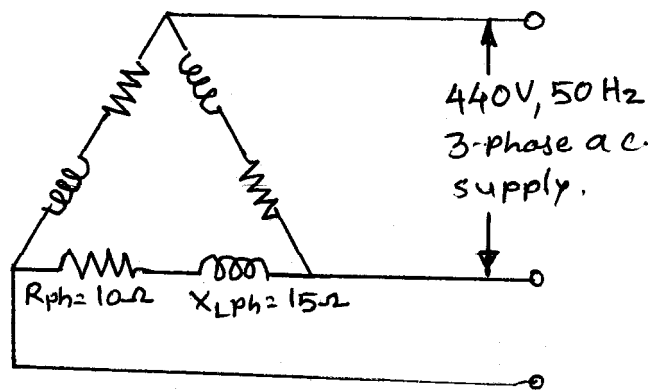
- a) Define following related to a.c.
- Instantaneous value,
 - Amplitude
 - Cycle,
 - Frequency
- b) In the circuit given in Figure No.3. Calculate current I using series parallel combination.

**Fig. No. 3**

- c) Draw the circuit diagram for measurement of single phase power using dynamometer type wattmeter.
- d) Define impedance. What is its unit? State the factors on which it depends.
- e) Draw neat labelled diagram for :
- core type
 - shell type single phase transformer.
- f) Define efficiency and voltage regulation of single phase transformer.

5. Attempt any FOUR of the following:

- a) For a star connected balanced system state
- Relation between phase and line current
 - Relation between phase and line voltage
 - Equation of three phase power
 - Draw phasor diagram.
- b) State any four advantages of three phase circuits over single phase circuits.
- c) Define phase sequence of 3-phase system. State its importance and standard colour used to represent phase sequence.
- d) Calculate :
- Line current,
 - Phase current,
 - Power factor,
 - Total power
- for delta connected balanced system given in Figure No.4.

**Fig. No. 4**

- e) i) Find maximum value and RMS value of sinusoidal voltage if $V_{av} = 60$ V.
- ii) Represent the following equations using phasor diagram
- $$\vartheta = 50 \sin \omega t$$
- $$i = 2 \sin (\omega t \pi/6)$$
- f) State any two applications of following single phase motors
- i) Shaded pole motor
- ii) Universal motor

6. Attempt any FOUR of the following:

16

- a) Write the emf equation of transformer; and state the meaning of each term in it also state their units.
- b) Write down three different formulae for transformation ratio K of transformer. What do you understand if value of K
- i) $K < 1$
- ii) $K > 1$
- c) Three identical coils, each of $R = 4\Omega$ and $C = 100$ microfarad connected in star across 415V, 3-phase, 50Hz supply. Calculate
- i) V_{ph} ,
- ii) I_{ph} ,
- iii) Power factor
- iv) Total power absorbed

- d) For a series circuit given in Figure No.5. Find
- Total voltage
 - Value of R
 - Value of L
 - Impedance

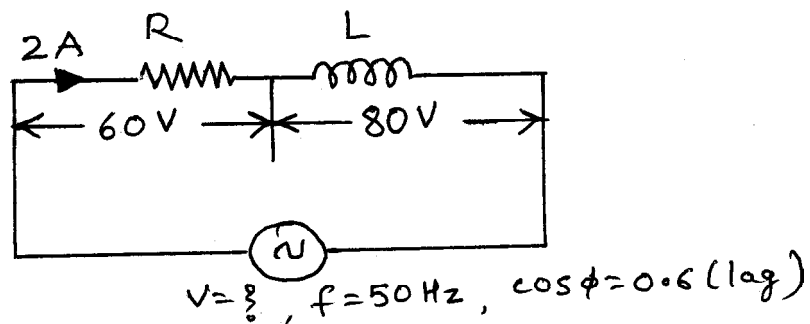


Fig. No. 5

- e) A R-L-C. series circuit having $R = 10\Omega$ $L = 0.1\text{H}$
 $C = 150\mu\text{F}$ is supplied by 1-phase 200V, 50Hz supply find
- Impedance
 - Current
 - Power factor
 - Power absorbed.
- f) Suggest various safety precautions which should be taken while working with electricity.

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