

17331

21314

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. a) Attempt any **SIX** of the following: **12**
- i) State Ohm's law with its expression.
 - ii) A resistance of 10Ω is connected in parallel with 5Ω . If current through the combination is 10A. Calculate current through each resistance.
 - iii) Define:
 - 1) E.M.F.
 - 2) Potential difference.
 - iv) Write formula for inductive reactance and capacitive reactance.

P.T.O.

- v) Define:
- 1) R.M.S. value
 - 2) Form factor
- vi) Draw waveform representation of three phase supply with neat labels.
- vii) State any two advantages of earthing.
- viii) Give classification of fuses.
- ix) State Lenz's law.
- b) Attempt any **TWO** of the following: **8**
- i) State the type of single phase I.M. motor used in following applications:
 - 1) Fan
 - 2) Refrigerator
 - 3) Food mixer
 - 4) Hair dryers
 - ii) Give comparison of Auto-transformer with two winding transformer (any four points)
 - iii) Explain with neat labelled diagram pipe earthing.

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

16

- With the help of simple circuit state and explain Kirchoff's voltage law.
- Determine the current in 2Ω resistance in Figure No. 1 using Mesh analysis.

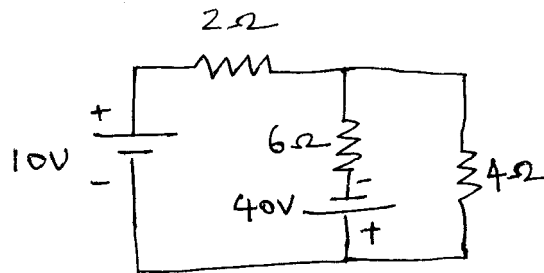


Fig. No. 1

- Find equivalent resistance between A and B using star - delta conversion from Figure No. 2.

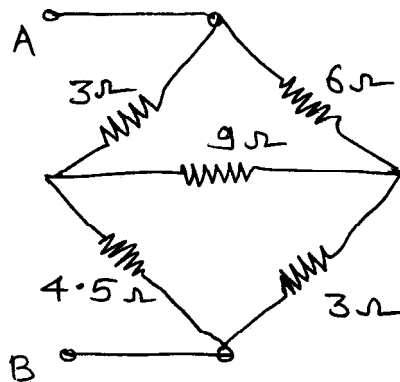


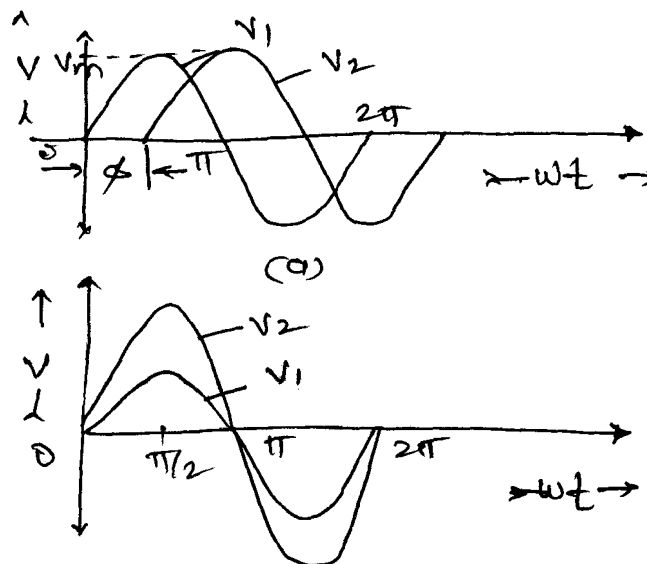
Fig. No. 2

- Show that power consumed in purely inductive circuit is zero. When ac is applied.
- Draw circuit diagram for measurement of single phase power using dynamometer type wattmeter.
- Draw series R-L circuit. Write its expression for impedance and show it on impedance triangle.

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

16

- State Faraday's laws of electromagnetic induction.
- Draw waveform, write voltage and current equation and draw phasor diagram for a.c. circuit containing capacitance only.
- Find the form factor and peak factor of the sinusoidal alternating current.
- Write voltage equations and phasor relationship for the waveform shown in Figure No. 3.

**Fig. No. 3**

- Explain statically and dynamically induced emf with its one application each.
- State types of power. Give their expressions and show them on power triangle.

4. Attempt any FOUR of the following:**16**

- a) Calculate the rms value, average, value peak factor and form factor of a sinusoidal voltage given by $E = 170 \sin 314t$.
- b) The voltage applied to a circuit is $V = 100 \sin (\omega t + 30^\circ)$ and current flowing in the circuit is $i = 15 \sin (\omega t + 60^\circ)$
Determine:
 - i) Impedance
 - ii) Phase angle between V and I
 - iii) Active power
 - iv) Power factor.
- c) Define power factor and state its significance.
- d) A coil having a resistance of 12Ω and an inductance of 0.1H is connected across a 100V , 50Hz supply. Calculate:
 - i) Impedance of coil
 - ii) The current
 - iii) Active power
 - iv) Apparent power
- e) Define:
 - i) Efficiency
 - ii) Voltage regulation of transformer
- f) Explain with suitable diagram working of resistance split phase induction motor.

5. Attempt any FOUR of the following:**16**

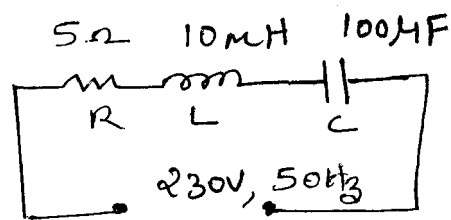
- a) The equation of an alternating current is $i = 62.35 \sin 628 t$. Determine:
- Frequency
 - Time period
 - Maximum value
 - Angular velocity
- b) State any four advantages of three phase circuit over single phase circuit.
- c) State relation between phase and line current and voltages in balanced star and delta connections.
- d) Give expression for e.m.f. equation, voltage ratio and transformation ratio of transformer.
- e) A balanced star connected load with impedance $(12 + j16)$ ohm/phase is connected to a 400V, 3 ϕ supply Determine:
- Line current
 - Phase voltage
 - Phase current
 - Total power.
- f) Define the term:
- Phase sequence
 - Balanced load.

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

16

a) For the circuit given below in Figure No. 4. Calculate:

- i) X_L
- ii) X_C
- iii) Z
- iv) Current

**Fig. No. 4**

- b) Explain resonance in a series RLC circuit.
 - c) Draw a neat sketch of three phase balanced star connected and delta connected systems mark line and phase voltages.
 - d) Give classification of transformer on the basis of:
 - i) Construction
 - ii) Supply system
 - iii) Power rating
 - iv) Applications.
 - e) Explain construction and working of autotransformer.
 - f) State any four precautions to be taken against electric shock.
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