

17331

21718

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 :

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- (a) Define the term loop and node.
- (b) State Kirchoff's voltage law. Also mention the conventions adopted.
- (c) Three resistances of 10Ω , 15Ω and 20Ω are connected in parallel across 100 V.
Find : (i) Total resistance
(ii) Current in each resistor.
- (d) State Lenz's law.
- (e) Define the following terms :
 - (i) Amplitude
 - (ii) Frequency of an AC

- (f) For star connected load, state numerical relationship between
- Line current & phase current
 - Line voltage and phase voltage
- (g) State necessity of fuse in the circuit.
- (h) State any two effects of electric shocks.

(B) Attempt any TWO of the following :

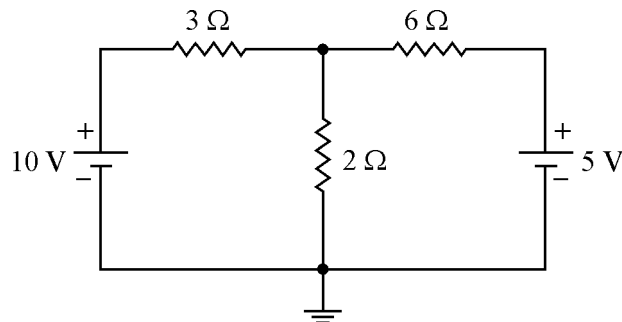
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- Draw a neat diagram of constructional details and state the principle of transformer.
- List any four types of 1-phase induction motor. State any one application of each.
- Mention types of earthing. Draw a neat labelled diagram of any one of it.

2. Attempt any FOUR of the following :

16

- Compare series and parallel circuit.
- Find the current in each branch by Nodal analysis.



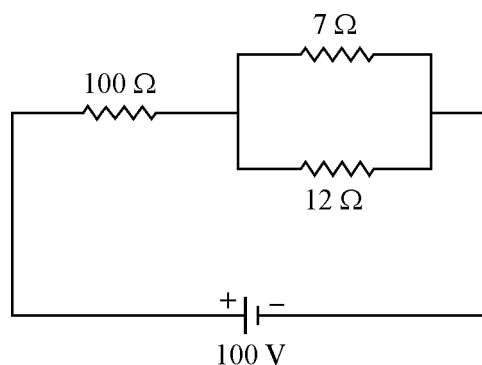
- In given Fig. 150 V are applied to the terminal AB. Determine
 - The resistance between the terminal A and B.

- (b) Draw the phasor diagram of following AC :
- (i) $I_1 = 10 \sin \omega t$
 - (ii) $I_2 = 15 \sin (\omega t + 20^\circ)$
 - (iii) $I_3 = 20 \sin (\omega t - 45^\circ)$
 - (iv) $I_4 = 15 \sin \omega t$
- (c) Distinguish between statically induced emf and dynamically induced emf with example.
- (d) Define :
- (i) Form factor
 - (ii) Peak factor
- (e) The voltage and current equations in an AC circuit are given by $V = 120 \sin \omega t$ and $I = 2.5 \sin \left(\omega t + \frac{\pi}{2} \right)$. Find the RMS value of current and voltage. Also state type of circuit.
- (f) State types of power. Give their expressions and show them on power triangle.

4. Attempt any FOUR of the following :

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- (a) In the circuit given in Fig. calculate the current in 7Ω resistance using Kirchoff's law.



- (b) Define the following terms with waveforms :
- (i) Phase difference
 - (ii) Lagging phase difference
 - (iii) Leading phase difference
 - (iv) Out of phase
- (c) For R–C circuit
- (i) Draw the circuit diagram.
 - (ii) Write the voltage and current equation.
 - (iii) Draw the vector diagram.
 - (iv) Draw the impedance triangle.
- (d) A coil having $10\ \Omega$ resistance and $0.1\ \text{H}$ inductance is connected across $230\ \text{V}$, $50\ \text{Hz}$ a.c. supply. Calculate impedance, current, power factor, power absorbed by the coil.
- (e) State the working principle of capacitor start single phase induction motor.
- (f) Explain voltage ratio, current ratio and transformer ratio of a transformer with a neat sketch of it, showing all voltages and currents.

5. Attempt any FOUR of the following :

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- (a) The equation of an alternating voltage $V = 282.8 \sin 314 t$. Determine
- (i) Peak voltage
 - (ii) RMS value
 - (iii) Frequency
 - (iv) Time period

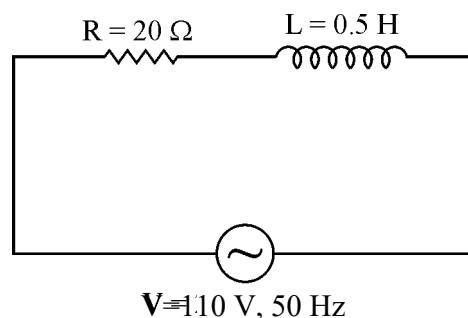
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- (b) For a delta connected balanced system, state
- (i) Relation between line and phase voltage.
 - (ii) Relation between line and phase current.
 - (iii) Power in terms of phase and line voltage.
 - (iv) Draw phasor diagram.
- (c) Explain the need of star or delta connection for three phase generator.
- (d) Three inductive coils, each with a resistance of 15Ω and inductance of 0.3 H are connected in star to a 3-phase, 400 V supply. Calculate the phase current, line current and total power absorbed.
- (e) Compare 3-phase star connection with 3-phase delta connection.
- (f) Explain construction & working of auto-transformer.

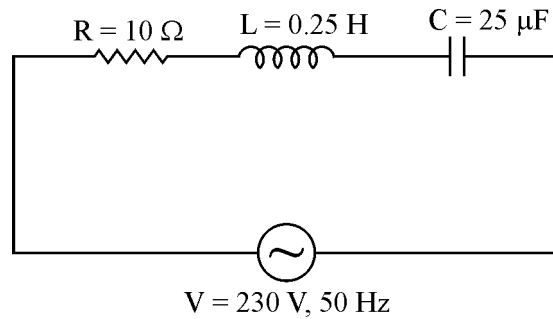
6. Attempt any FOUR of the following :

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- (a) For a circuit given in Fig. find Inductive reactance, Impedance, Current, Phase difference between V & I .



- (b) For the circuit given below in Fig., calculate
- Total impedance in the circuit
 - Current in the circuit.



- (c) Define the following for polyphase circuit :
- Balanced load
 - Unbalanced load
 - Balanced supply
 - Unbalanced supply
- (d) A single phase transformer of 50 Hz has maximum flux in the core as 0.21 Wb, the number of turns of primary being 460 and that on secondary is 52. Calculate emf induced in primary and secondary windings of a transformer.
- (e) Write down three different formulae for transformation ratio k of transformer. What do you understand if value of k
- $k < 1$
 - $k > 1$
- (f) State any four precautions to be taken against electric shock.
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