



17331

21415

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**.

MARKS

1. A) Attempt **any six** of the following :

12

- Define loop and node in a network.
- State Faraday's laws of electromagnetic induction.
- Define RMS value of AC quantity.
- Draw impedance triangle for series R-L circuit.
- State the types of transformer depending on their construction.
- Define voltage ratio for 1 ϕ transformer.
- Define statically induced emf.
- Give classification of fuses.
- State Lenz's law.

B) Attempt **any two** of the following :

8

- Write the equations of instantaneous values of voltage and current through a pure capacitor. Draw the waveforms of voltage and current.
- State KCL and KVL with the help of suitable example.
- Calculate the current flowing through each resistor by loop current method for the circuit.

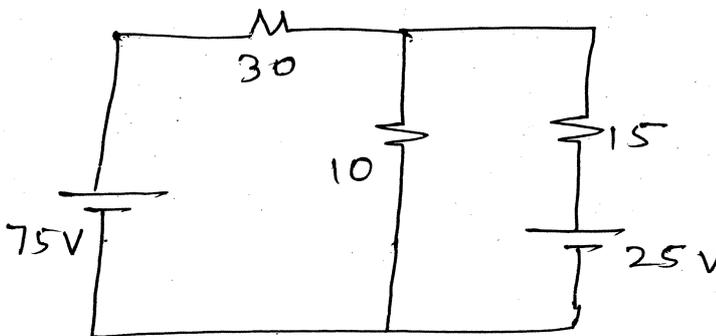


Fig. (i)

P.T.O.



2. Attempt **any four** of the following : **16**
- a) Define (i) RMS value and (ii) Average value of an a.c.
 - b) Draw waveform and phasor representation for lagging and leading ac quantities.
 - c) Calculate amplitude, RMS value, time period and phase angle for $e = 100\sin(314t + 30^\circ)$.
 - d) Draw the connection diagram for measurement of 1 ϕ power using Dynamometer type wattmeter.
 - e) Draw series RL circuit indicating all voltages and current and hence draw phasor diagram for the same.
 - f) State 4 advantages of 3 ϕ circuit over 1 ϕ circuit.
3. Attempt **any four** of the following : **16**
- a) Prove the relationship between line and phase voltage for balanced star connected load with the help of phasor diagram.
 - b) Draw neat sketch of plate earthing.
 - c) Draw connection diagram for step up and step down autotransformer.
 - d) Draw the impedance triangle for series RL and RC circuit.
 - e) A choke coil is connected across 230 V, 50 Hz supply. The power consumed by the coil is 960 W and current is 8 amp. Calculate circuit constants (R and L).
 - f) Three similar coils each having a resistance of 20Ω and inductance of 0.05 H are connected in star to a 3 ϕ , 400 V, 50 Hz supply. Calculate
 - i) Line currents
 - ii) Total power absorbed.
4. Attempt **any four** of the following : **16**
- a) Write the steps of Nodal voltage method with suitable example.
 - b) Define the following terms :
 - i) Magnetic flux
 - ii) Reluctance
 - iii) Inductance
 - iv) Capacitance.



c) Define the following :

- i) Power factor
- ii) Apparent power
- iii) Phasor diagram
- iv) Reactive power.

d) Calculate R_{AB} for the circuit of Fig. (ii) by Y/ Δ transformation.

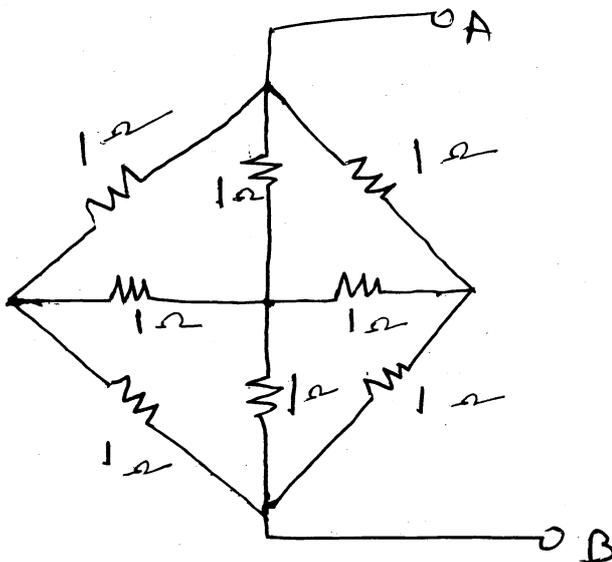


Fig. (ii)

e) Draw the waveform representation of three phase a.c.

f) Explain resonance in series RLC circuit.

5. Attempt **any four** of the following :

16

a) Draw the phasor diagram for an ideal transformer.

b) Define efficiency and regulation of transformer. Write the condition for maximum efficiency.

c) Write two applications of each motor :

- i) Shaded pole motor
- ii) Universal motor.

d) State 2 advantages and 2 disadvantages of 1 ϕ autotransformer.



- e) Compare fuse and MCB on the basis of
- Service
 - Operation
 - Safety
 - Cost
- f) Write 4 steps for handling shock victims.

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

16

a) Define the following for polyphase circuit :

- Balanced load
- Unbalanced load
- Balanced supply
- Unbalanced supply.

b) A resistance of 10Ω and inductance of 0.01 H are connected across a 230 V , 50 Hz ac supply. Find

- impedance
- current
- power
- p.f.

c) Explain why 1ϕ induction motor is not self starting ?

d) A resistance and capacitor is connected in series across a voltage $e = 282$

$$\sin 314 t \text{ and } i = 28.2 \sin \left(314t + \frac{\pi^\circ}{3} \right).$$

Calculate :

- RMS value of voltage and current.
 - Value of R and C.
- e) A 50 KVA , $6600/250 \text{ V}$, 1ϕ transformer has 52 secondary turns. Find
- No. of primary turns
 - Full load primary and secondary currents.
- f) Define the following related to a.c.
- Frequency
 - Cycle
 - Time period
 - Amplitude.
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