



17331

14115

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.**
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MARKS

1. A) Attempt **any six** of the following : **12**
- a) Define electromotive force and state its unit.
 - b) Define branch and mesh of an electric network.
 - c) Draw a (i) Series electric circuit (ii) Parallel electric circuit.
 - d) Define crest factor for a sine wave. State its value.
 - e) Draw the waveforms of voltage and current of a pure capacitive circuit.
 - f) For a delta connected balanced load, state the numerical relationship between (i) line current (ii) phase current.
 - g) What is earthing ? What is its importance ?
 - h) State the function of the terms : (i) MCB (ii) Fuse.
- B) Attempt **any two** of the following : **8**
- a) Compare auto transformer with two winding transformer (any four).
 - b) Draw a neat diagram of capacitor start induction motor. State any two applications.
 - c) Write any four safety precautions to be taken while working with any electrical system.

P.T.O.



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

- a) Find the current through 12Ω resistance using Kirchoff's current law. Ref. Fig. no. 1.

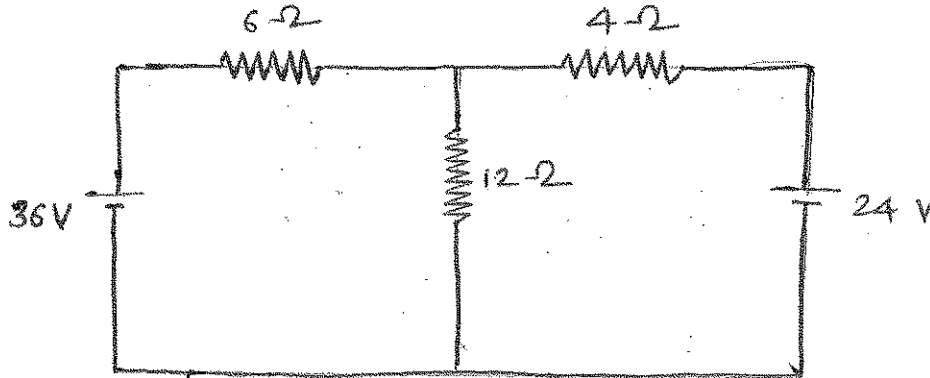


Fig. 1

- b) In a circuit shown Fig. 2 calculate (i) equivalent resistance (ii) current I , I_1 , I_2 (iii) voltage drop across each resistance.

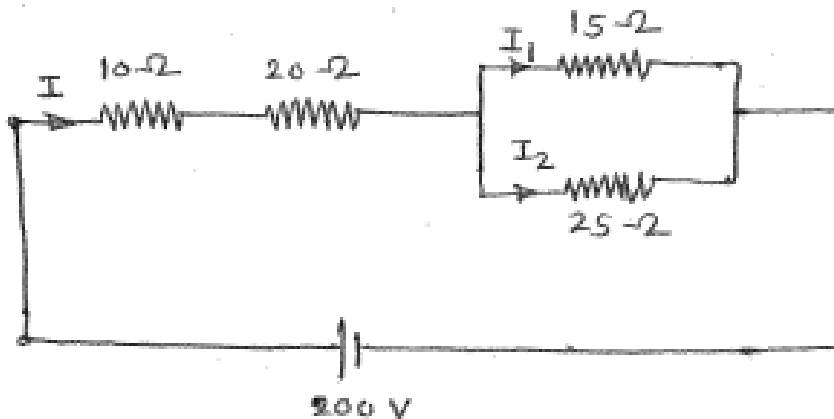


Fig. 2

- c) State and explain KVL and KCL.
 d) Define the following terms : (i) Induced emf (ii) Dynamically induced emf (iii) Statically induced emf.
 e) State the meaning of impedance and impedance triangle.
 f) Explain the phenomenon of resonance in R-L-C series circuit.
3. Attempt **any four** of the following :

- a) Draw the waveforms and vector diagram for current and voltage when ac current flows through a pure inductance circuit. Also give equation for voltage and current.
- b) Define :
- | | |
|------------------------|--------------------------|
| i) Inductive reactance | ii) Capacitive reactance |
| iii) Impedance | iv) Power factor. |



- c) State Faraday's laws of electromagnetic induction and state its any two applications in electrical engineering.
- d) A 50 Hz ac voltage of $V_{rms} = 115$ volt is applied across a 70 ohm resistor. Write the equation for the voltage and resulting current. Draw voltage and current waveforms.
- e) An alternating current is represented by $i = 28.28 \sin (2\pi 50 \times t)$. Find frequency, rms value of current, average value of current.
- f) What is power factor ? State its significance. What is the condition for unity power factor ?

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

16

- a) Calculate the resistance between terminal A and B using delta-star conversion as shown in Fig. 3.

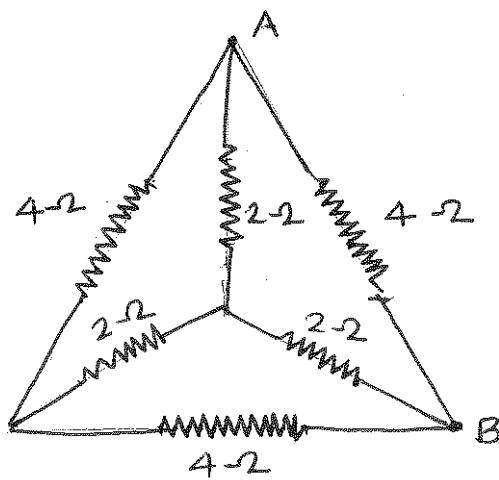


Fig. 3

- b) What is meant by lag and leads as regards to voltage and current vector ? Explain.
- c) What are the different types of power in AC circuit ? Explain.
- d) For R-C circuit :
 - 1) Draw the circuit diagram
 - 2) Write the voltage and current equation
 - 3) Draw the vector diagram
 - 4) Draw the impedance triangle.



- e) Explain voltage ratio, current ratio and transformation ratio of a transformer with a neat sketch.
- f) State the principle of operation of an universal motor. Give any two applications.
5. Attempt **any four** of the following : 16
- a) A 50 Hz voltage of 230 volt rms value is applied across a capacitor of $26.5 \mu\text{F}$. Calculate
- The capacitive reactance
 - Write the time equation for voltage and the resulting current. Let the zero axis of the voltage be at $t = 0$.
- b) Compare star and delta connection (4 points).
- c) Define phase sequence of 3 phase voltage. What is the normal phase sequence? What are the 3 colours used to denote the phase sequence?
- d) State the advantages of three phase system over single phase system.
- e) If a 3 phase 400 V, 50Hz, supply is connected to a balanced, 3 phase star connected load of impedance $(3 + j6)$ ohm per phase. Calculate (1) phase current (2) phase voltage (3) power factor (4) total active power.
- f) List any 4 major parts of transformer and state the material used for construction. Why the transformer rating is given in KVA?
6. Attempt **any four** of the following : 16
- a) A coil consist of 0.08 H inductance with resistance 40 ohm connected to 230 volt, 50 Hz supply. Find impedance, reactance, current and power factor of coil.
- b) Find the impedance per phase for 3 phase delta connected balanced load connected across 500 V, 50 Hz, 3-phase supply carries the current 12.5 A with power factor 0.8 lagging.
- c) A coil of resistance of 10Ω and inductance of 0.1 Henry is connected in series with a capacitance of $150 \mu\text{F}$ across 230V, 50 Hz, ac supply. Calculate impedance, current, power factor and power consumed by circuit.
- d) Compare resistance split phase I.M. with capacitor start motor.
- e) Define voltage regulation of transformer. Two transformers A and B have a voltage regulation of 5% and 10% respectively. Which transformer is better and why?
- f) Define fuse. What is need of fuse? Write rating of fuses used in labs and mention the classification of fuses.
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