

## Electrical Technology

Time: 3 Hrs.]

Prelim Question Paper

[Marks : 100

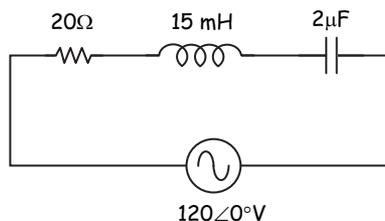
- Instructions :**
- (1) All questions are **compulsory**.
  - (2) Illustrate your answers with **neat** sketches wherever necessary.
  - (3) Figures to the **right** indicate **full** marks.
  - (4) Assume suitable data, if **necessary**.
  - (5) Mobile Phone, Pager and any other Electronic Communication devices are **not** permissible in Examination Hall.

1. (a) Attempt any **SIX** of the following : [12]

- (i) State two factors affecting severity of electric shock.
- (ii) Define loop and node in a network.
- (iii) Define the voltage regulation of single phase transformer.
- (iv) State the concept of balance load.
- (v) Give expression for the following.
  - (i) Delta to star conversion of resistances.
  - (ii) Star to delta conversion of resistances.
- (vi) What do you understand by the terms lag and lead in relation to alternating quantities?
- (vii) Draw the waveform of 3-phase AC supply.
- (viii) Define statically induced emf.
- (ix) Why transformer rating is given in KVA?
- (x) State importance of Lenz's law.

(b) Attempt any **TWO** of the following : [8]

- (i) Define impedance. Also draw the impedance triangle for a R-L series circuit.
- (ii) State KCL and KVL with the help of suitable example.
- (iii) For the given circuit as shown in figure, find the current flowing and the magnitude of p.f.

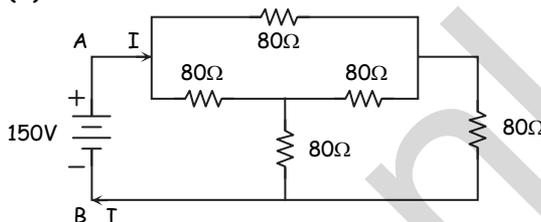


2. Attempt any **FOUR** of the following :

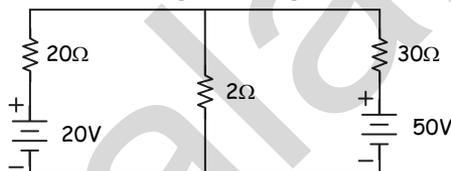
[16]

- If  $R = 25\Omega$ ,  $L = 10\text{mH}$  and  $C = 50\mu\text{F}$ , find active power, reactive power when they are connected in series across a.c. source of  $220\angle 0^\circ$  volt.
- Explain series and parallel circuits with diagram and necessary equations.
- Draw the connection diagram for measurement of  $1\phi$  power using Dynamometer type wattmeter.
- Draw waveform and phasor diagram of a simple resistive circuit when AC is applied across it.
- In Figure 150 volts are applied to the terminal AB.

Determine : (i) the resistance between the terminal A and B  
(ii) the current I



(f) Write voltage equations for Figure using Kirchhoff's voltage law.



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

[16]

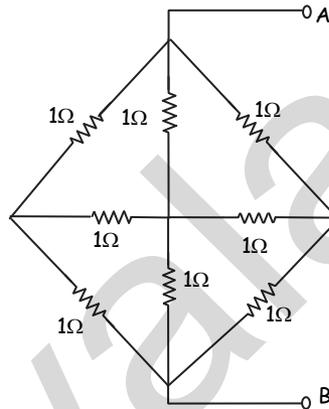
- Prove that average power consumption in pure inductor is zero when a.c. voltage is applied.
- Draw the labelled diagram of a 3 phase balanced delta connected system; and state the following relationships
  - Between line voltage and phase voltage.
  - Between line current and phase current.
  - Power in terms of phase voltage and line voltage.
- Draw connection diagram for step up and step down autotransformer.
- Draw neat sketch of plate earthing.
- An alternating voltage is represented by the following equation  $v = 25 \sin 200 \pi t$

Find the following :

- Amplitude value
  - Time period
  - Angular velocity
  - Form factor
- (f) State the concept of lagging and leading quantity. State its nature for capacitive circuit only.

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

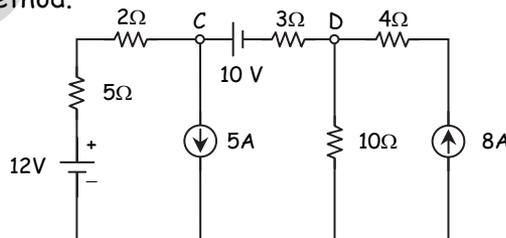
- (a) State the differences between statically and dynamically induced emf for each type. State one example.
- (b) A 3-phase 440 V, 50 Hz supply is connected to a balanced 3-phase delta connected load of impedance  $(6 - j8) \Omega$ /phase. Calculate :
  - (i) phase current
  - (ii) line current
  - (iii) power factor and
  - (iv) total reactive power
- (c) Define : (i) Voltage ratio, (ii) Current ratio, (iii) Turns ratio, (iv) KVA rating of a transformer.
- (d) Three impedance each of 4 ohm resistance and 10 ohm inductive reactance in series are connected in delta across 3-phase 400 V, 50 Hz ac supply. Find (i) Phase current, (ii) Line current, (iii) Power factor, (iv) Total power.
- (e) Calculate  $R_{AB}$  for the circuit of Fig. (ii) by Y/ $\Delta$  transformation.



(f) Draw the waveform representation of three phase a.c.

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

- (a) Refer figure and find the current flowing through  $10\Omega$  branch using node voltage method.



- (b) For a delta connected balanced system prove  $I_L = \sqrt{3} I_{ph}$  where  $I_L$  = line current and  $I_{ph}$  = phase current.
- (c) Explain RLC series circuit with phasor diagram.

- (d) Draw and explain delta connected balanced system.
- (e) Write 4 steps for handling shock victims.
- (f) Write two applications of each motor:
  - (i) Shaded pole motor
  - (ii) Universal motor.

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

[16]

- (a) Justify the name "Universal motor". State its applications.
- (b) State the comparison between resistance split phase and capacitor start single phase I.M.
- (c) Draw and explain star connected balanced load.
- (d) Define phase and phase difference of alternating quantity.
- (e) A 50 KVA, 6600/250 V, 1  $\phi$  transformer has 52 secondary turns. Find:
  - (i) No. of primary turns
  - (ii) Full load primary and secondary currents.
- (f) A three-phase 400 V, 50Hz, a.c. supply is feeding a three phase delta connected load with each phase having a resistance of 25 ohms, an inductance of 0.15 H and a capacitance of 120 microfarads in series. Determine the line current and total three phase power absorbed.

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