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Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(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.

Marks

1.   **Attempt any FIVE of the following:**   **10**

a) State Fleming's right hand rule.

b) State value of power factor for purely resistive and purely capacitive circuit.

c) Write meaning of the term "balanced load" in case of 3ϕ system.

d) State function of poles and brushes in DC motors. State material for each.

e) Write principle of operation for a DC motor.

f) Suggest suitable motor for following applications-

   (i)   Food Mixer

   (ii) Electric Fan

g) List any two factors that affect earthing.

2.　　**Attempt any THREE of the following:**　　　　**12**

a)　Compare electric and magnetic circuit on any four points.

b)　Find :

(i)　RMS value

(ii)　Average value

(iii)　Form factor and

(iv)　Frequency

of the waveform shown in Fig. No. 1
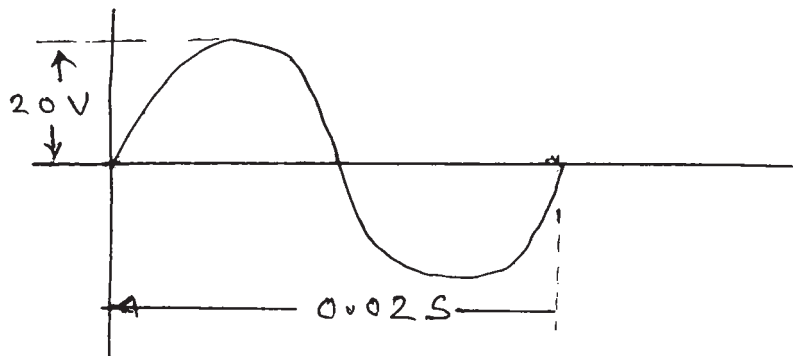
Fig. No. 1

c)　Write any four advantages of 3ϕ system over 1ϕ system.

d)　Draw schematic of following motors. Give two applications of each.

(i)　DC shunt

(ii)　DC series

3.　　**Attempt any THREE of the following:**　　　　**12**

a)　Define-

(i)　Flux density

(ii)　Field strength

(iii)　Permeability

(iv)　Reluctance

b) Compare auto transformer and two winding transformer on any four points.

c) Draw a neat schematic of shaded pole 1ϕ Induction motor. List any two applications of it.

d) Write any four major points related to rewirable fuse.

4. **Attempt any THREE of the following:** **12**

a) A coil of 500 turns wound uniformly on an iron ring of mean circumference 50 cm and cross sectional area of $4/\pi$ cm^2, carries a current of 1 A. find

   (i) MMF

   (ii) Field strength

   (iii) Reluctance

   (iv) Flux

   Take μ_r = 1000

b) For a transformer, give

   (i) Any two main parts

   (ii) Any two ratios

   (iii) Any two types and

   (iv) Any two losses

c) List any four applications of stepper motor.

d) Draw a neat sketch of permanent capacitor 1ϕ induction motor. Explain its working.

e) For a purley resistive circuit-

   (i) Draw neat sketch

   (ii) Draw waveforms of voltage and current

   (iii) Write equation of current and

   (iv) Draw phasor diagram.

Marks

5. **Attempt any TWO of the following:**   **12**

    a) Calculate-

        (i) Z

        (ii) I

        (iii) V_R

        (iv) V_L

        (v)   Phase angle

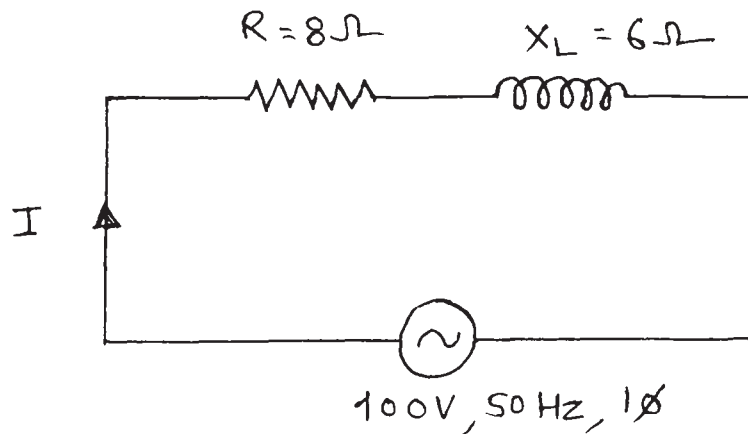   And draw voltage triangle for the circuit shown in Fig. No. 2

Fig. No. 2

    b) A 3ϕ balanced load contains $R = 12\Omega$ and $X_C = 15\Omega$ in each phase. It is connected in star across a 230V, 50Hz, 3ϕ AC. Calculate -

        (i) V_{ph}

        (ii) Z_{ph}

        (iii) I_{ph}

        (iv) I_L

        (v) p_f

        (vi) P

    c) Draw a practical set up to find voltage and current ratio on a 230/115 V, 1KVA, 1ϕ 50Hz transformer. Also write reading of each meter.

Marks

6. **Attempt any TWO of the following:** **12**

a) Draw a neat schematic of universal motor. State its principle of operations. Write the method for reversal of direction.

b) With neat sketch explain principle of operation of ELCB. Write any two applications of it.

c) (i) State any three methods of reducing earthing resistance.

(ii) Write any three major points related to IE rules relevant to earthing.

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