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23242

3 Hours / 70 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.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) 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 Faraday's first law of electromagnetic induction.
- (b) Define :
  - (i) Time period
  - (ii) Frequency
- (c) Draw three phase voltage waveform of a.c. supply w.r.t. time.
- (d) State emf equation of transformer.
- (e) List any two applications of DC shunt motor.
- (f) Suggest suitable motor for following application :
  - (i) Food mixer
  - (ii) Electric fan
- (g) List out types of earthing.



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

- (a) Compare electric circuit and magnetic circuit (any four points).
- (b) Draw neat waveform and vector diagram for pure resistance and pure inductance.
- (c) Draw star connected load and state relation between (i)  $V_L$  and  $V_{ph}$  (ii)  $I_L$  and  $I_{ph}$ .
- (d) Draw the constructional diagram of D.C. motor and give name of each of the parts.

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

- (a) Explain the concept of dynamically emf and statically emf with neat diagram.
- (b) Compare auto transformer with two winding transformer (any four points).
- (c) Draw neat sketch of capacitor start induction motor and explain its working principle.
- (d) Describe working principle of ELCB with neat diagram.

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

- (a) A coil of 500 turns and resistance of  $20 \Omega$  is wound uniformly on an iron ring of mean circumference 50 cm and cross sectional area  $4 \text{ cm}^2$ . It is connected to 24 V d.c. supply, relative permeability of the material is 800. Find (i) MMF (ii) Field strength (iii) Flux (iv) Reluctance.
- (b) Draw schematic diagram of transformer and explain its working principle.
- (c) Explain the working principle of universal motor with neat diagram.
- (d) With neat sketch write the working principle of stepper motor.

- (e) For pure capacitive circuit (i) Draw neat sketch (ii) Draw waveform of voltage and current (iii) Write equation for voltage and current (iv) Draw phasor diagram.

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

**12**

- (a) An alternating voltage represented by  $V = 200 \sin[314 t - 60^\circ]$  voltage is applied to a load. Calculate :
- (i) Maximum voltage
  - (ii) RMS voltage
  - (iii) Average voltage
  - (iv) Phase angle
  - (v) Time period
  - (vi) Frequency
- (b) If a three phase 415, 50 Hz, supply is connected to a balanced three phase star connected load of impedance  $(4 + j 5.6)\Omega$  per phase. Calculate :
- (i)  $I_{ph}$
  - (ii)  $V_{ph}$
  - (iii) p.f.
  - (iv) Active Power
  - (v) Reactive power
  - (vi)  $I_L$
- (c) Describe construction and working principle of :
- (i) Isolation transformer
  - (ii) Pulse transformer

**P.T.O.**

6. Attempt any TWO of the following :

12

- (a) Draw schematic diagram of split phase induction motor and explain its working principle. List any two applications of same.
  - (b) State necessity of earthing. Explain any one with neat diagram.
  - (c) List any two applications of the following :
    - (i) Fuse
    - (ii) MCB
    - (iii) MCCB
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