

22215

23124

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) 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.

**Marks**

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

**10**

- (a) Define Faraday's first law of electromagnetic induction.
- (b) Define form factor & peak factor for a sinusoidal waveform.
- (c) Draw 3-phase voltage waveform of ac supply with respect to time.
- (d) State the emf equation of transformer.
- (e) Write any four main parts of dc motor.
- (f) Write any two applications of stepper motor.
- (g) List any two factors that affect earthing.

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

**12**

- (a) Compare electric & magnetic circuit on any four points.
- (b) Explain the concept of lagging & leading phase angle by waveform.



- (c) Write any four advantages of  $3\phi$  system over  $1\phi$  system.
- (d) Compare autotransformer and two winding transformer with respect to
  - (i) Number of winding
  - (ii) Symbol
  - (iii) Copper saving
  - (iv) Application

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

**12**

- (a) Define each term :
  - (i) Magnetic flux
  - (ii) Magnetic flux density
  - (iii) Reluctance
  - (iv) Permeability
- (b) Draw and label constructional diagram of dc motor.
- (c) Draw a neat schematic diagram of shaded pole  $1\phi$  induction motor. List any two application of it.
- (d) Write any four IE rules relevant to Earthing.

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

**12**

- (a) Draw & explain B-H curve for magnetic material.
- (b) 10 kVA, 2200/200 V, 50 HZ single phase transformer has 80 turns on secondary winding. Calculate number of primary winding turns, full load primary and secondary currents and maximum value of flux in the core.
- (c) Draw & explain in brief the working of universal motor.
- (d) Draw & explain capacitor split phase motor.
- (e) For a purely resistive circuit :
  - (i) Draw neat sketch
  - (ii) Draw waveform of voltage & current
  - (iii) Write equation of current
  - (iv) Draw phasor diagram

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

- (a) An alternating voltage is represented by  $V = 50.5 \sin (314 t + 90)$ . Calculate frequency, amplitude, RMS value & phase difference.
- (b) A 3 $\phi$  balanced load contains series  $R = 12 \Omega$  and  $X_C = 15 \Omega$  in each phase. It is connected in star across a 440 V, 50 HZ, 3 $\phi$  AC.

Calculate :

- |                  |                       |
|------------------|-----------------------|
| (i) $V_{ph}$     | (ii) $Z_{ph}$         |
| (iii) $I_{ph}$   | (iv) $I_L$            |
| (v) Power factor | (vi) Total line power |
- (c) State and explain the different losses occurred in single phase transformer. Define efficiency of transformer.

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

- (a) Draw schematic diagram of capacitor start, capacitor run induction motor. Give any two applications of the same.
- (b) With neat sketch explain principle of operation of ELCB. Write any two applications of it.
- (c) Write two applications of each of the following :
- |            |
|------------|
| (i) MCB    |
| (ii) MCCB  |
| (iii) Fuse |
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