

17404

**21819**

**3 Hours / 100 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.

**Marks**

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

**20**

- (a) Define :
  - (i) Time period
  - (ii) Frequency
- (b) Define AC and DC supply.
- (c) Name the meter used for measurement of D.C. voltage.
- (d) State one application of clip on meter.
- (e) State two applications of dc series motor.
- (f) Define efficiency and regulation of transformer.
- (g) State the transformation ratio.
- (h) Write the emf equations of transformer.
- (i) State the types of losses in single phase transformer.
- (j) Define slip of induction motor.

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**P.T.O.**

- (k) State the way of changing direction of 3 phase induction motor.
- (l) State any two methods of power factor improvement.
- (m) List any four safety tools.
- (n) State relation between rms and average value.

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

**16**

- (a) Draw a neat single line diagram of electrical power system.
- (b) State any four advantages of 3-phase system over single phase system.
- (c) Draw the circuit diagram and waveforms of voltage and current in R-C series circuit.
- (d) A resistance of  $10 \Omega$  and inductance of  $0.1 \text{ H}$  are connected in series across  $200 \text{ V}$ ,  $50 \text{ Hz}$  AC supply. Calculate (i) Inductive reactance (ii) Impedance (iii) Current (iv) Phase angle.
- (e) Draw a neat labelled diagram of PMMC meter.
- (f) Draw speed torque curve of d.c. series motor and d.c. shunt motor.

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

**16**

- (a) If  $V_L = 440 \text{ V}$  and  $I_L = 12 \text{ A}$ . Calculate the respective phase values for a delta connection and star connection.
- (b) A voltage equation is expressed as  $V = 75.5 \sin 314 t$ . Determine :
  - (i) Maximum value of voltage,
  - (ii) rms value of voltage and
  - (iii) Frequency and time period of waveform

- (c) Draw a labelled circuit diagram to determine percentage efficiency and regulation of a single phase transformer by direct loading test and write the rating of meter for 230 /115 V, 1 kVA transformer.
- (d) Explain the working of autotransformer with diagram.
- (e) Draw a neat labelled diagram of star-delta starter and write any one advantage of this starter.
- (f) State any four advantages of electric drives over any other types of drives.

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

**16**

- (a) Derive the emf equation of transformer.
- (b) A 6 pole, 3-phase, 50 Hz induction motor runs at 950 rpm at full load. Calculate :
  - (i) Synchronous speed
  - (ii) Full load slip of motor
- (c) Explain the speed control of induction motor by VFD method with diagram.
- (d) Draw and explain capacitor start and run single phase induction motor.
- (e) Draw and label the various parts which shows constructional details of an alternator.
- (f) State any two applications of following motors :
  - (i) Servomotor
  - (ii) Universal motor

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

**16**

- (a) State different types of electric welding methods. State working principle of any one method.
- (b) State advantages of electric heating over other types of heating method (any four).

**P.T.O.**

- (c) Explain the process of electroplating used in electrometallurgical system.
- (d) State any two applications of following :
  - (i) Electric heating
  - (ii) Electric welding
- (e) Describe any one fire extinguishing method.
- (f) State different types of lamps. Explain any one lamp used for domestic purpose.

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

**16**

- (a) Draw and explain torque slip characteristics of 3-phase induction motor.
  - (b) State and explain working principle of 3-phase induction motor.
  - (c) Write factors for selection of motor for electric drives.
  - (d) State which electric motors are generally used in electro-agro system with reasons.
  - (e) Draw the wiring diagram for control of one lamp using two switches.
  - (f) State and explain the energy conservation & energy audit.
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