

17404

15162

3 Hours / 100 Marks

Seat No.

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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.

Marks

1. Attempt any TEN of the following :

20

- (a) Define AC and DC current.
- (b) Name the three types of torques required for indicating meters.
- (c) Draw connection diagram of ammeter, voltmeter and wattmeter with AC supply.
- (d) State two applications of d.c. series motor.
- (e) Define regulation and efficiency of transformer.
- (f) State the types of losses in single phase transformer.
- (g) State the necessity of starter for 3 phase induction motor.
- (h) Draw symbol of earthing and fuse.
- (i) Write the full form of MCCB and ELCB.
- (j) Write the formula to determine synchronous speed and percentage slip of induction motor.
- (k) How the direction of 3 phase induction motor is reversed ?
- (l) Name the electrical machines used for electro-agro system.

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2. Attempt any FOUR of the following : 16

- (a) Write four advantages of polyphase supply systems over single phase systems.
- (b) Draw single line diagram showing electrical power supply scheme.
- (c) An alternating current is represented by
 $i = 50.5 \sin (314 t + \pi/2)$ calculate :
 - (i) Amplitude
 - (ii) Frequency
 - (iii) I_{rms}
 - (iv) Phase difference
- (d) A resistance of 10Ω and capacitance of $50 \mu\text{F}$ are connected in series across 200 V , 50 Hz AC supply. Calculate (i) Capacitive reactance (ii) Impedance (iii) Current (iv) Phase angle
- (e) Draw the circuit diagram and waveforms of voltage and current in RL series circuit.
- (f) Draw a neat labelled diagram of single phase energy meter showing all its important parts.

3. Attempt any FOUR of the following : 16

- (a) List the main parts of DC machine. Write the function of any two.
- (b) Explain auto-transformer with step-down and step-up diagrams.
- (c) Derive emf equation of single phase transformer.
- (d) Draw a circuit diagram of pure inductive circuit and phasor diagram.
- (e) An RL series circuit consists of 100Ω resistance and 0.22 H inductance connected across 220 V , 50 Hz AC supply. Calculate :
 - (i) Impedance
 - (ii) Current
 - (iii) Voltage across resistor
 - (iv) Voltage across inductor
- (f) A single phase $230 \text{ V}/150 \text{ V}$, 1 kVA , 50 Hz transformer is supplied by 230 V AC supply. Find the full load primary and secondary currents.

- 4. Attempt any FOUR of the following : 16**
- (a) Explain working principle of transformer and draw neat labelled diagram.
 - (b) Draw and explain neat labelled diagram of stator resistance starter for starting 3 phase induction motor.
 - (c) Explain in brief the working of universal motor and state its applications.
 - (d) Write factors for selection of motor for electric drives.
 - (e) Compare squirrel cage and slip-ring induction motor on any four points.
 - (f) Explain the working of a single phase capacitor start induction motor.
- 5. Attempt any FOUR of the following : 16**
- (a) Explain the construction and working of squirrel cage rotor 3 phase induction motor.
 - (b) Explain the construction of alternator with neat diagram.
 - (c) List any four types of electric motor enclosures and state one advantage of each.
 - (d) A 4 pole, 50 Hz squirrel cage induction motor runs on load at a speed of 1000 rpm. Calculate :
 - (i) The percentage slip
 - (ii) The frequency of induced current in the rotor
 - (e) Explain the process of electroplating used in electrometallurgical system.
 - (f) Draw the wiring diagram for control of one lamp using two switches.
- 6. Attempt any FOUR of the following : 16**
- (a) State any four advantages of electric heating.
 - (b) Explain working of MCCB.
 - (c) State the necessity of earthing. State types of earthing.
 - (d) Explain the various safety precautions to be taken while handling an electric equipment.
 - (e) Explain with neat diagram process of any one type of electric welding.
 - (f) State different types of lamps. Explain any one lamp used for domestic purpose.
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