

17404

15116

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.
 - (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 TEN of the following: **20****
- a) List the stages of electrical power system.
 - b) State working principle of PMMC type meters.
 - c) State the applications of wattmeter and state the unit of power.
 - d) List the main parts of dc machines.
 - e) Define the terms:
 - (i) Transformation ratio
 - (ii) Voltage ratio
 - f) State the emf equation of a transformer.
 - g) Define slip and write the formula to determine percentage slip.
 - h) What is the function of MCCB and fuse?

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- i) State the purpose of earthing in electrical installation.
- j) State how you will reverse the direction of rotation of 3-phase I.M.
- k) Why the starters are required in case of 3-phase I.M.?
- l) Name two electrical machines used in electro-agro system.

2. Attempt any FOUR of the following:

16

- a) Draw delta connected three phase supply-system. Mark line voltage, phase voltage, line current and phase current. Write power equation.
- b) Define RMS value of an AC quantity. Explain its practical significance.
- c) An alternating voltage is mathematically expressed as

$$v = 141.42 \sin\left(157.08t + \frac{\pi}{12}\right) \text{ volt.}$$

Find maximum value, RMS value, frequency and periodic time.

- d) A coil having resistance 10 ohm and an inductance 0.2 H is connected across 100 volt, 50 Hz, supply. Calculate:
 - (i) Reactance
 - (ii) Impedance
 - (iii) Current
 - (iv) Power consumed
- e) A balanced three-phase star connected load is supplied from a three phase, 400 V, 50 Hz supply. The resistance per phase is 10 ohm. Find the value of phase current, line current, power factor and total power consumed.
- 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) Draw schematic diagram of dc compound (long shunt) motor.
 - b) A single-phase transformer has 350 primary and 1050 secondary turns. The primary is connected to a 400 volt, 50 Hz supply. If the net cross - sectional area of core is 50 cm^2 . Find:
 - (i) The maximum value of flux density in the core
 - (ii) The voltage induced in the secondary winding.
 - c) Compare auto transformer with a two winding transformer on the basis of construction, efficiency, size, applications.
 - d) Draw and explain circuit diagram of R-C circuit.
 - e) Draw a single line diagram of electrical power system and label it.
 - f) Explain the working principle of transformer and draw a neat labelled diagram of the same.
- 4. Attempt any FOUR of the following:** **16**
- a) Derive an E.M.F. equation of single phase transformer by the first principle.
 - b) Explain in brief the working principle of universal motor and state its two applications.
 - c) Draw a neat diagram and explain working of capacitor start capacitor run single phase I.M.
 - d) Explain any four factors to be considered while selecting a motor for a particular application.
 - e) A 3-phase, 4-pole, 50 Hz I.M. works with a full load slip of 3%. Find:
 - (i) Synchronous speed
 - (ii) Actual speed of motor.
 - f) State the types of an alternator. Which type of rotor is suitable for slow speed diesel engines? State reasons.

- 5. Attempt any FOUR of the following:** **16**
- a) Draw a neat labelled diagram of direct on line starter used up to 5 H.P. 3-phase I.M.
 - b) Explain the working principle of permanent magnet type stepper motor.
 - c) Explain the principle of induction heating with neat diagram.
 - d) Explain how speed control of 3-phase I.M. is done by VFD.
 - e) “Electrical drives are preferred over mechanical drives”. Justify the statement.
 - f) What is electroplating? State its purpose. State various operations involved in electroplating.
- 6. Attempt any FOUR of the following:** **16**
- a) Explain the working principle of electric welding.
 - b) Why safety precautions must be followed while dealing with electrical equipments?
 - c) Distinguish between incandescent lamp and fluorescent lamp. (any four points)
 - d) Which type of connection is generally preferred for domestic wiring? Why?
 - e) Explain any four types of enclosures used for electric drives in chemical industries.
 - f) State the importance of power factor improvement. State any four methods of power factor improvement.
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