22221

21819

3 Hours / 70 Marks Seat No. | | | | | | | | |

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 FIVE of the following : **10**

(a) Define the term 'Magnetomotive force' and 'permeability' related to magnetic circuits.

(b) Draw sinusoidal AC waveform and show the Amplitude and Time period on it.

(c) An inductive coil takes 10 A when connected to 250 V; 50 Hz mains. The power consumed is 1 kilowatt. Find power factor and reactive power.

(d) Explain balanced load and unbalanced load in 3-phase system.

(e) Draw schematic diagram of D.C. shunt motor and D.C. series motor. State the meaning of terminal marking on it.

(f) State at least two applications of :

(i) Brushless D.C. motor

(ii) Servo motor

(g) State the function of MCB and ELCB in Electrical Installation System.

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

(a) Explain Faraday's laws of electromagnetic induction. Explain how can the direction of induced emf be found.

(b) Calculate the impedance; current; active power and power factor for a series circuit having a resistance of 10 Ω and capacitance of 100 μF fed from single phase, 200 V; 50 Hz A.C. supply.

(c) Describe an autotransformer. Explain the advantages and disadvantages of autotransformer as compared to a two winding transformer.

(d) Describe the principle of working of three phase induction motor. How the direction of rotation of 3-phase induction motor can be obtained ?

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

(a) Find the currents in each branch of circuit shown in Fig. 3(a) using mesh analysis.

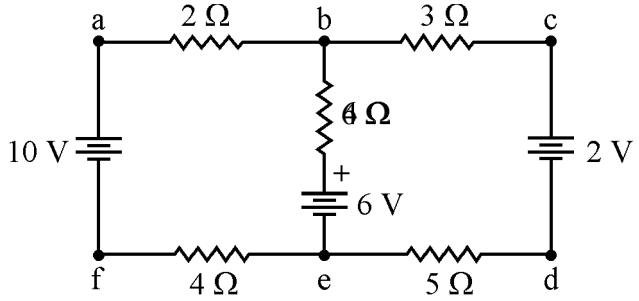

Fig. - 3(a)

(b) A load consisting of three identical impedances of $10\angle -45°\ \Omega$ connected in Delta is fed from a 220 V; 3-phase source. Find

(i) Magnitude of phase and line currents.

(ii) Total power supplied to the load.

(c) Compare squirrel cage 3-phase induction motor with slip ring 3-phase induction motor. (four points)

(d) State the various types of earthing and explain any one type with its neat sketch.

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

(a) Define Dynamically induced emf and statically induced emf. Differentiate between them.

(b) State the various speed control methods of D.C. shunt motor. Explain any one method with circuit diagram.

(c) Explain necessity of starter for three phase induction motor. State various types of starter used for 3-phase induction motor.

(d) Describe the maintenance procedure of the fractional Horse Power Motors.

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

(a) A metal-filament lamp rated at 750 watt; 100 V is to be used on a 230 V; 50 Hz supply; by connecting a capacitor of suitable value in series. Determine :

(i) The capacitance required in μF

(ii) The phase angle

(iii) The power factor and its nature

(iv) Apparent power

(v) Reactive power

(vi) Draw phasor diagram for the same

(b) Derive the emf equation of transformer. Write the equation for transformation ratio. State the value of transformation ratio for step down and step up transformer.

(c) Explain with neat sketch; the basic principle of operation; reversal of rotation and applications of universal motor.

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

(a) A coil is connected to a 250 V; 50 Hz A.C. supply. It is found that magnitude and phase angle of current are 10 A and 30° lagging. Find :

(i) Resistance of coil

(ii) Inductance of coil

(iii) Active power in the ckt

(iv) Reactive power in the ckt

(v) Draw impedance triangle of the ckt

(vi) Draw power triangle of the ckt.

(b) List the various types of single phase induction motor. Explain with schematic diagram, the principle of operation and applications of any one type of single phase induction motor.

(c) (i) State the function of fuses in Electrical circuit. **(2)**

(ii) What are the various types of fuses ? **(2)**

(iii) Compare fuse with MCB. **(2)**
