22431

11920

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) 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) State working principle of D.C. Motor.

(b) List various types of starters used for 3-phase induction motor.

(c) Name the different methods of synchronization of the alternators.

(d) State any two applications of stepper motor.

(e) Draw labelled schematic circuit diagram of long shunt DC compound motor, showing clearly the directions of all the currents.

(f) Define slip and write the formula to determine percentage slip.

(g) State any two applications of universal motor.

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

(a) Draw and explain the following characteristics of D.C. shunt motor :

(i) Torque Vs. Armature current characteristics

(ii) Speed Vs. Torque characteristics.

(b) Compare squirrel cage and slip-ring induction motor on the basis of

(i) Starting Torque

(ii) Power factor

(iii) Speed control

(iv) Applications

(c) State the effect of hunting and role of damper winding in the operation of synchronous motor and how it is minimised.

(d) Explain construction and working of A.C. servomotor.

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

(a) Explain the working principle of 3-phase induction motor.

(b) "D.C. series motor cannot operate on no-load." – Justify the statement.

(c) Explain with neat diagram V-curves and inverted V-curves related to synchronous motor.

(d) Explain construction and working of permanent magnet stepper motor.

(e) Compare salient pole rotor and smooth cylindrical rotor alternator on the basis of :

(i) Operating speed

(ii) Rotor construction

(iii) Ratio of core length to bore diameter

(iv) Application of induction motor using rotors

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

(a) Explain with suitable diagrams flux control method and armature control method for speed control of D.C. series motor.

(b) Draw a block diagram showing power stages of a 3-phase induction motor.

(c) Compare synchronous and induction motor on any four points.

(d) Derive the emf equation of a single phase transformer.

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

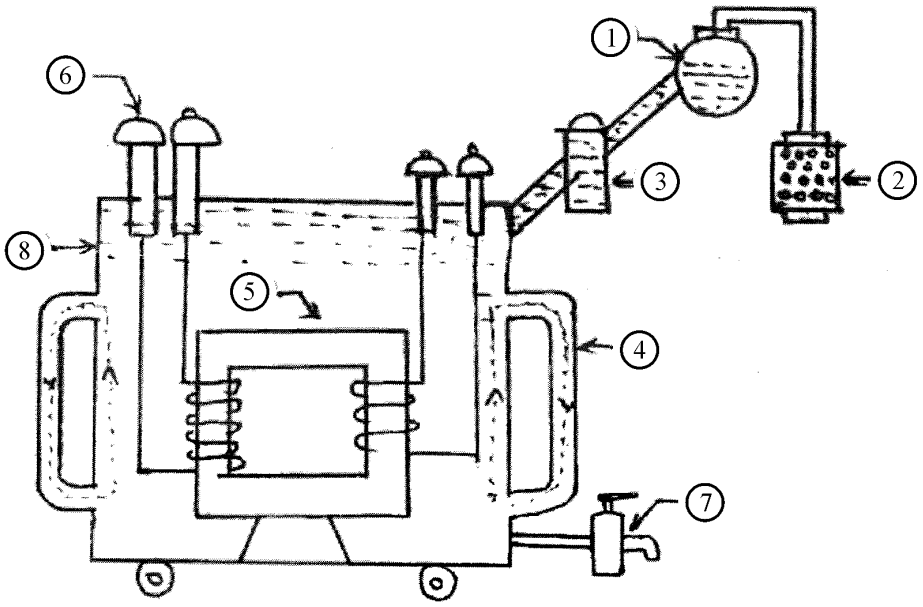
(a) Explain speed control method of 3-phase induction motor by the following methods :

(i) Frequency control

(ii) Stator voltage control

(iii) Rotor resistance control

(b) Identify and state function of any six parts shown in the diagram of a transformer in Fig.



(c) A 3-phase star connected alternator is rated at 1600 kVA, 13500 V. The armature resistance and synchronous reactance are 1.5 ohms and 30 ohms respectively per phase. Calculate percentage voltage regulation for a load of 1280 kW at a power factor 0.85 leading.

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

(a) Why the starters are required in case of 3-phase induction motor ? Explain with neat diagram how star-delta starters are used for reducing the starting current of 3-phase induction motor.

(b) (i) Derive the emf equation of an alternator.

(ii) State any four conditions necessary for connecting alternators in parallel.

(c) A 20 kVA, 1000/250 V, 50 Hz, 1-phase transformer gave the following test results :

D.C. Test (with L.V. Open) : 1000 V, 2 A, 250 W

S.C. Test (with H.V. Shorted) : 5 V, 50 A, 200 W

Calculate the efficiency of this transformer at half full load 0.8 p.f. lagging.
