

Roll No.

Total Pages : 03

BT-4/M-20

34014

POWER APPARATUS AND MACHINES-II
EECT-204E

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *Five* questions in all, taking at least *one* question from each Unit.

Unit I

1. Give the construction, working principle and operation of a polyphase induction motor. Also explain how the rotating torque is produced with the help of suitable illustrations. **20**

2. (a) Describe in detail speed control techniques for a polyphaser induction machine with the help of suitable illustrations. **10**
- (b) Write short notes on the following :
 - (i) cogging
 - (ii) crawling in polyphaser induction machine. **10**

Unit II

3. (a) Derive expressions for the brush emfs produced by rotating field in case of ac commutator machines. How can the same emf expressions be obtained by resolving the rotating field into its two pulsating field components. **12**
- (b) A single-phase ac series motor has a resistance of 30 ohms and a total inductance of 0.5 H. When connected to 250 V dc supply and loaded to take 0.8 A, it runs at 2000 rpm. Estimate the speed and pf when connected to 250 V, 50 Hz ac supply and loaded to the same current. **8**
4. Write short notes on the following :
- (i) Doubly fed commutator motor
- (ii) Schrage motor. **20**

Unit III

5. Starting from the impedance matrix of a 3-phase salient pole synchronous machine without amortisseurs, derive the phasor voltage equation under balanced steady state operation. Hence draw the phasor diagrams for both motor and generator. **20**

6. (a) A 3-phase, 50 Hz, 6.6 kV, star connected salient pole synchronous motor is operating at 0.8 pf leading and taking 400 A from the mains. For this motor $X_d = 40$ ohms and $X_q = 2.5$ ohms. Calculate the maximum power that the motor can develop if its excitation is maintained constant. **10**
- (b) Define the short circuit ratio of a synchronous generator. Show that SCR is equal to the reciprocal of per unit value of direct axis synchronous reactance X_d . **10**

Unit IV

7. (a) What do you understand by the term idealized machine ? Explain how is it different from practical machines. **10**
- (b) Write the voltage equations for Kron's primitive machine in matrix form. What observations are made from the impedance matrix of this machine ? **10**
8. Draw the (i) basic two pole machine diagrams and (ii) primitive machine diagrams for the following machines (i) amplidyne (ii) Schrage motor. Describe briefly how these are obtained ? **20**