

8E4110

B.Tech. (Sem. VIII) (Main/Back) Examination, 2013

Electrical Engineering

8EE2 ELECTRIC DRIVES AND THEIR CONTROL

(Common for 8EE2, 8EX2)

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

*Instructions of Candidates:*

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit-I

- Q.1 (a) Suggest the suitable convention about the signs of torque and speed for multi quadrant operations of drives.  
Explain the four quadrant operation of a motor, driving a hoist load. [10]  
(b) Write short note on steady state stability of drives. [6]

OR

- Q.1 (a) Explain the load equalisation in electric drives. How can the load equalisation be done for fluctuating loads? [8]  
(b) Differentiate between active and passive load torque with example. [8]

Unit-II

- Q.2 (a) Explain electric breaking for DC separately excited motor, with suitable connection diagrams and speed torque curves. [6]  
(b) Explain 1- $\phi$  full converter fed DC shunt motor drive, with suitable circuit diagram, related waveforms and also derive the equation of any o/p voltage of rectifier. Also obtain expression for speed and draw speed torque characteristics of drive under this control. [10]

OR

- Q.2 (a) Explain why a DC series motor is more suitable to with torque overloads than other DC motors. [6]  
(b) A 220V, 970 rpm, 100 A dc separately excited motor has an armature resistance of  $0.05\Omega$ . It is braked by plugging from an initial speed of 1000 rpm.

Calculate:

- (i) Resistance to be placed in armature circuit to limit braking current to twice the full load value.
- (ii) Braking torque
- (iii) Torque when speed has fallen to zero. [10]

Unit-III

- Q.3 (a) The useful full load torque of 3 phase 6 pole 50 Hz induction motor is 162.84 Nm. The rotor emf is observed to make 90 cycles per minutes. Calculate:
- (i) motor output
  - (ii) copper loss in motor
  - (iii) motor input
  - (iv) efficiency if mechanical torque lost in windage and friction is 20.36 Nm and stator losses are 830 w. [10]
- (b) What is the purpose of using a starter for induction motor? Describe different types of starter used.

OR

- Q.3 (a) What is electric braking? What are the advantages and disadvantages of electric braking Explain plugging for various motors. [8]
- (b) What are the advantages of variable frequency control of induction motor drive? Explain variable frequency control scheme. [8]

Unit-IV

- Q.4 (a) Write short note on cycloconverter fed induction motor drive. [8]
- (b) Write short note on static scherbius drives. [8]

OR

- Q.4 (a) Explain PWM principle for speed control of induction motors. [8]
- (b) Explain slip energy recovery scheme for 3- $\phi$  induction motor drives. [8]

Unit-V

- Q.5 (a) Write short note on closed loop control of synchronous motor. [8]
- (b) For synchronous motor drives explain the mode of variable frequency control. [8]

OR

- Q.5 (a) Distinguish between cylindrical rotor and salient pole type synchronous motor drive. [8]
- (b) Explain the braking of synchronous motor with VSI. Draw the speed torque characteristics for regenerative braking. [8]