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B.Tech. VIII Semester (Main/Back) Examination, 2014

Electrical Engineering

8E X2: Electric Drives and Their Control

(Common with 8E X2)

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to 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) Explain load equalization in drives with necessary diagrams and derivations. **[8]**

(b) A motor equipped with a flywheel is to supply a load torque of 1000 N-m for 10 sec. followed by a light load period of 200 N-m long enough for the flywheel to regain its steady state speed. It is desired to limit the motor torque to 700 N-m. What should be the moment of inertia of flywheel? Motor has an inertia of 10 Kg - m^2. Its no load speed is 500 rpm and the slip at a torque of 500 N-m is 5%. Assume speed - torque characteristics of motor to be a straight line in the region of interest. **[8]**

OR

Q.1 (a) Enumerate the various nature and classification of load torques. **[8]**

(b) Explain what do you understand by the steady state stability? What is the main assumption? **[8]**

Unit-II

Q.2 (a) State and explain the important features of various braking methods of d.c. motors. **[8]**

(b) A 220 V, 200A, 800 rpm dc separately excited motor has an armature resistance of 0.06Ω. The motor armature is fed from a variable voltage source with an internal resistance of 0.04Ω. Calculate internal voltage of the variable voltage when the motor is operating in regenerative braking at 80% of the rated motor torque and 600 rpm. **[8]**

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OR

Q.2 (a) Explain the various methods of speed control for d.c. motors. **[8]**

(b) A200. V, 10.5 A, 2000 rpm shunt motor has the armature and field resistances of 0.5 and 400Ω respectively. It drives a load whose torque is constant at rated motor torque. Calculate speed if source voltage drops to 175 V. **[8]**

Unit-III

Q.3 (a) Explain the various starting methods for three phase induction motors. **[8]**

(b) A 400 V, star connected, 3 phase, 6 pole, 50 Hz induction motor has following parameters referred to stater : $R_s = R_r^I = 1\Omega$ $X_s = X_r^I = 2\Omega$. For regenerative braking operation of this motor determine over hauling torque it can hold and range of speed for safe operation. **[8]**

OR

Q.3 (a) Discuss the voltage source inverter fed induction motor drive operated in stepped wave inverter mode. **[8]**

(b) Discuss the A.C. dynamic braking with two lead connection for Induction motor drives. **[8]**

Unit-IV

Q.4 (a) Explain the slip power recovery scheme with static scherbius drive. **[8]**

(b) Explain the static rotor resistance control for I.M. drives. **[8]**

OR

Q.4 (a) Explain static Kramer drive for I.M. drives with necessary derivation and sketches. **[8]**

(b) Discuss the current source inverter control for I.M. drives. **[8]**

Unit-V

Q.5 (a) Discuss the operation of VSI fed self controlled synchronous motor drives. **[8]**

(b) Explain the braking of synchronous motor with VSI. Draw the speed torque characteristics for regenerative braking. **[8]**

OR

Q.5 (a) Explain the control of synchronous motor with CSI. **[8]**

(b) Explain the dynamic braking of synchronous motar with VSI. **[8]**

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