

I.D. No. 24421

B. Tech. 7th Semester (EEE/EE) F. Scheme Examination,
May-2014

ELECTRIC DRIVES AND CONTROL

Paper-EE-403-F

Time allowed : 3 hours} [Maximum marks : 100

- Note :** (i) **Section-A (Q. No. 1) is compulsory.**
(ii) **Attempt any four questions from Section-B, C, D and E by selecting at least one question from each section.**
(iii) **Students have to attempt total five questions and use of non programmable calculator is allowed.**

Section-A

1. (a) Write a brief note on the motors employed in variable speed drives. 5
(b) Explain what do you understand by steady state stability ? What is the main assumption ? 5
(c) Explain the regenerative braking characteristics of a separately excited motor. 5
(d) What are the drawbacks associated with the operation of induction motor with unbalanced rotor impedances ? 5

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Section-B

2. What are the advantages of electrical drives ? State the essential parts of electric drives. What are the functions of a modulator ? 20
3. (a) What do you understand by constant torque drive and constant power drive ? 10
- (b) Explain the operations of a closed loop speed control schemes with inner current control loop. What are various functions of inner current control loop ? 10

Section-C

4. (a) How do you define passive and active load torques ? What are the differences between the two ? 10
- (b) A horizontal conveyer belt moving at a uniform speed of 1.2 M/S transports material at the rate of 100 tonnes/hr. Belt is 200 meter long and driven by a motor at 1200 rpm.
- Determine the load inertia referred to motor shaft and calculate the torque that motor should develop to accelerate the belt from standstill to full speed in 8 sec. Moment of inertia of the motor is 0.1 kg-m². 10

5. Why a motor of small rating can be selected for a short time duty ? A motor operates on a periodic duty cycle consisting of a loaded period of 20 min and a no load period of 10 min. The maximum temperature rise is 60°C . Heating and cooling time constants are 50 and 70 min respectively. When operating continuously on no load the temperature rise is 10°C . Determine
- (a) Minimum temperature during the duty cycle
 - (b) Temperature when the motor is loaded continuously. 20

Section-D

6. Explain why a dc series motor is more suited to deal with torque overloads than other dc motors. A 220 V dc series motor runs at 1000 rpm clockwise and takes an armature current of 100 A when driven at a load with constant torque. Resistances of the armature and field winding are 0.06 ohms each. Find the magnitude and direction of motor speed armature current if the motor terminal voltage is reversed and the number of turns in the field winding is reduced to 75%. Assume linear magnetic circuit. 20

7. Explain the construction and working principle of Permanent Magnet Brushless DC drives. 20

Section-E

8. A 3 phase delta connected squirrel cage induction motor takes 1.2 times full load current and develops 0.8 times the full load torque at standstill when started by star-delta starter. An autotransformer is to be selected for the same motor for some other application. What should be secondary to primary turns ratio so that the starting current will not exceed 1.2 times full load current ? What will be the starting torque ? 20
9. Why 1 phase ac dynamic braking of a star connected induction motor with lead connections is able to produce only a small braking torque ? Why is it necessary to guard against loose contact in three lead braking connections ? 20