

D 70579

(Pages : 2)



**FIRST SEMESTER M.TECH. DEGREE EXAMINATION
JANUARY 2015**

EPE/EPE 10 104 – ELECTRIC DRIVES

Time : Three Hours

Maximum : 100 Marks

Answer any five questions by choosing at least one question from each module.

Module 1

1. Explain about various components of an electric drive in detail
(20 marks)
2. A motor equipped with a flywheel is to supply a load torque 1000 N-m for 10 seconds 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 inertia of 10kg-m^2 . Its no load speed is 500 r.p.m. and the slip at a torque of 500 N-m is 5%. Assume speed-torque characteristic of motor to be a straight line in the region of interest.
(20 marks)

Module 2

3. (a) Draw the circuit diagram and explain the operation of a three-phase semi-converter drive. Also sketch and explain the waveforms for $\alpha = 60^\circ$ and $\alpha = 120^\circ$.
(b) Discuss how the speed of a given DC motor is controlled by a class C chopper. Present all the relevant waveforms for both continuous and discontinuous current modes of operations. Also derive the relations for armature current ripple.
(10 + 10 = 20 marks)
4. (a) Explain the operation of chopper fed DC drive with both time ratio control and current limit control.
(b) A separately excited DC motor is supplied from a DC chopper. Enumerate a relationship between motor parameters, range of motor speed and range of chopper duty cycle.
(10 + 10 = 20 marks)

Module 3

5. Explain the stator frequency (speed) control of induction motor for its entire working range. Derive the torque equation in terms of supply voltage for the different ranges of frequency and also draw the speed-torque characteristics for both motoring and braking.
(20 marks)

Turn over



6. Explain in detail why stator voltage controlled three-phase induction motor drive is suitable for fan and pump drive applications.

(20 marks)

Module 4

7. Write brief notes about :

- (a) Constant margin angle control.
- (b) Synchronous motor fed from cycloconverter.

(10 + 10 = 20 marks)

8. Explain in detail about the open loop v/f control and self controlled mode of the synchronous motor.

(20 marks)

[5 × 20 = 100 marks]