Seyventh Semester B.Tech. Degree Examination, October 2018
(2013 Scheme)
13.703 : POWER SEMICONDUCTOR DRIVES (E)

Time : 3 Hours
Max. Marks : 100

PART – A

Answer all questions from Part – A.

1. Explain the block diagram of an electric drive system.

2. Explain basic principle of step-up and step-down choppers.

3. Calculate the stepping angle for a 3 phase, 24 pole permanent magnet stepper motor.

4. Give the schematic of a PWM drive. Give the advantages of PWM control.

5. Draw the torque speed characteristics of SRM. (5x4=20 Marks)

PART – B

Answer any one full question from each Module.

Module – 1

6. a) Explain the multi quadrant operation of a motor driving a hoist load. 10
   b) Explain the choice of selection of the motor for different loads. 10

   OR

7. Derive the output equation of a cycloconverter. With the help of circuit diagram and wave forms, explain the operation of a three phase to three phase cycloconvertors for variable frequency drive. 20

P.T.O.
Module – 2

8. Describe the steady state analysis of single phase fully controlled convertor fed separately excited DC motor drive in continuous and discontinuous mode of operation. 20

OR

9. a) A chopper controlled drive is used to control the speed of a separately excited DC motor with input voltage of 230 V, $T_{ON} = 15$ ms, $T_{OFF} = 5$ms. Assume continuous mode of operation, calculate the average load current when the speed is 3000 rpm. Assume voltage constant $K_v = 0.5$ V/rad/Sec and $R_a = 4$ Ohm. 10

b) Derive the equation for average value of output voltage for single phase semi converter and single phase fully controlled converter. 10

Module – 3

10. a) Explain the operation of a VSI fed three phase induction motor. 10

b) Compare the VSI and CSI fed closed loop control of an induction motor. 10

OR

11. a) Explain the open loop v/f control of induction motor drive with block diagrams. 16

b) What is field weakening mode control? 4

Module – 4

12. a) Explain in detail about the construction and working principle of PMBLDC motor. 16

b) State the advantages of PMBL DC motor over conventional DC motor. 4

OR

13. a) Discuss the construction and working principle of stepper motor with neat diagrams. 12

b) Discuss the modes of operation of a switched reluctance motor drive. 8

(20×4=80 Marks)