R16

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year II Semester Regular Examinations May 2019
POWER SEMICONDUCTOR DRIVES
(Electrical & Electronics Engineering)

Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** Explain the operation of single phase fully controlled rectifier fed DC Series motor with relevant diagram.   8M

   b A Series motor is supplied from a full converter whose α=π/4, single phase supply of 230v rms, 50hz frequency. The armature and field resistance together equal 2 ohms. The torque constant is 0.23H and the load torque is 20 Nm. Neglect damping and find the average armature current and speed.   4M

OR

2 With relevant circuit diagram, explain the principle of operation of 3 phase full converter fed separately excited D.C. motor?   12M

UNIT-II

3 With necessary diagram, explain the four quadrant operation of a dc drive and mention the conditions to be satisfied in each quadrant.   12M

OR

4 Describe the three phase four quadrant operation of D.C. drive using dual converters.   12M

UNIT-III

5 A dc shunt motor fed from 400 V dc source through a chopper has the following parameters R_a=0.02 Ω, R_f =0.04 Ω, $k = 5 \times 10^{-3} Nm / Amp^2$. The average armature current of 300 Amps is ripple free of a chopper duty cycle of 50%. Determine: (i) Input power from the source (ii) Motor speed and (iii) Motor torque .   12M

OR

6 **a** What are the advantages of operating choppers at high frequency?   6M

   b Mention the applications of chopper fed DC drives?   6M

UNIT-IV

7 With relevant circuit and waveforms, explain the operation of current source inverter fed   induction motor drive.   12M

OR

8 A three phase star connected 60 Hz, 4 pole, induction motor has following parameters for equivalent circuit $R_s=R_r^{'}$ =0.024Ω and $X_s=X_r^{'}$ =0.12Ω. The motor is controlled by variable frequency control with constant (V/F) ratio for operating frequency of 12 Hz. Calculate, (i) The breakdown torque as a ratio of its value at the rated frequency for both motoring and braking. (ii) The starting torque and rotor current in terms of their values at the rated frequency.   12M

UNIT-V

9 Discuss self control and separate control of synchronous motor in detail.   12M

OR

10 Draw the circuit diagram and explain the operation of voltage source inverter fed synchronous motor drive.   12M

*** END ***