COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

(ET-501) Power Electronics and Drives

Course: M.Tech Branch: Mechatronics

Semester: Sem I

Year: 2014-2015 Max.Marks:60

Duration: 3 Hours Time:- ---2.00pm To 5.00 pm **Date:--24/11/14**

Instructions: **MIS No.** | | | | | | | | | |

1. Solve any 6 questions
2. Figures to the right indicate the full marks.
3. Mobile phones and programmable calculators are strictly prohibited.
4. Writing anything on question paper is not allowed.
5. Exchange/Sharing of anything like stationery, calculator is not allowed.
6. Assume suitable data if necessary.
7. Write your MIS Number on Question Paper

Q.1	a)	Describe different modes of operation of thyrister with help of V-I characteristics Explain turn on and turn off characteristics of SCR in detail with relevant waveforms of anode voltage, anode current , power loss	6
	b)	Differentiate BJT and IGBT	4
Q.2	a)	Draw schematic of 1 phase full converter bridge with RLE load. Explain its working with relevant waveforms of input voltage output voltage and output current	5
	b)	Compare circulating and non circulating mode dual converter	5
Q.3)	a)	Draw circuit schematic of a bridge type cyclo converter and explain how one circuit can be used as step up and step down frequency converter along with wave forms	8
	b)	Enlist the types of DC drives	2
Q.4)	a)	Explain working of AC voltage controller with RL load	5
	b)	Explain construction of Power Mosfet and the switching performance with relevant waveforms. Indicate clearly turn on and turn of components	5

Q.5) Discuss the principle of working of three phase bridge inverter with an appropriate circuit diagram. Draw phase and line voltage waveforms on assumption that each thyristor conducts for 180^0 and resistive load star connected . The sequence of firing of various SCRs should also indicated in the diagram 10

Q.6) a) Explain working of 1phase full converter DC drive with circuit schematic and waveforms of input output voltages and output current and source current 5

b) Explain any one method of chopper control Dc drive. Derive the necessary equations What is the condition to use copper control for regenerative control 5

Q.7 a) A 220 V,1500 rpm 10A separately excited dc motor has an armature resistance of 1 ohm. It is fed from a single phase fully controlled bridge rectifier with an ac source voltage of 230V,50 Hz. Assuming continuous load current , compute 6

1) Motor speed at the firing angle of 40 and torque of 7 Nm
2) Developed torque at the firing angle of 45^0 and speed 1000 rpm

b) A DC chopper is used for used for regenerative braking of separately excited dc motor. The dc supply voltage is 380 V. The motor has R_a= 0.2Ω, K_m=1.2V-s/rad. The average armature current during regenerative braking is kept constant at 300A with negligible ripple 4

For duty cycle of 60% for a chopper, Determine

1) minimum and maximum permissible braking speed
2) speed during regenerative braking