

Code: EE5T4

**III B.Tech - I Semester – Regular Examinations - November 2014**

**POWER ELECTRONICS  
( ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Explain types of power diodes in detail. 7 M  
b) Explain the characteristics of BJT. 7 M
2. a) Discuss about switching characteristics of a SCR during Turn ON and OFF. 6 M  
b) With a neat circuit diagram and waveforms explain about R and RC firing circuits. 8 M
3. a) Explain about snubber circuit and derive the condition for  $R_s$  8 M  
b) It is required to operate 250 A SCR in parallel with 350 A SCR with their respective on state voltage drops of 1.6 V and 1.2V. Calculate the value of resistance to be inserted in series with each SCR so that they share total load of 600 A in proportions to their current ratings. 6 M
4. a) A single phase full converter, connected to 230 V, 50 Hz source, is feeding a load  $R= 10$  ohms in series with a large inductance that makes the load current ripple free. For a

- firing angle of 45 degrees, calculate
- i) Voltage Ripple Factor
  - ii) Total Harmonic Distortion 6 M
- b) Explain the operation of a single phase, full wave Bridge type converter for  $\alpha=130$  degrees with RLE-load. Derive the average output voltage 8 M
5. Explain the operation of a three phase fully controlled bridge converter with RL load. Draw the voltage and current waveforms for  $\alpha=45$  degrees. List the firing sequence of SCRs 14 M
6. a) With a neat diagram and waveforms explain the principle of operation of single phase mid point type step down cycloconverter. 7 M
- b) A single phase voltage controller feeds power to a resistive load of 3 ohms from 230V, 50 Hz source. Calculate
- i) The maximum values of average and rms thyristor currents for any firing angle
  - ii) The maximum circuit turn off time for any firing angle. 7 M
7. a) With a neat circuit diagram and waveforms explain the operation of Jones chopper. 8 M
- b) A battery is charged from a constant dc source of 220V through a chopper. The dc battery is to be charged from its internal emf of 90 V to 122V. The battery has internal resistance of 1 ohm. For a constant charging current of 10 A, compute the range of duty cycle. 6 M

8. a) What is pulse width modulation? List the various PWM techniques. How do these differentiate from each other?

7 M

b) Explain sinusoidal pulse width modulation.

7 M