



B.E/ B.Tech.(Full Time) DEGREE END SEMESTER EXAMINATIONS, MARCH 2011

ELECTRICAL & ELECTRONICS ENGINEERING

FIFTH SEMESTER-(REGULATIONS 2008)

EE 9301-POWER ELECTRONICS

Time : 3 hr

Max Marks: 100

Answer ALL Questions

Part -A( 10 X 2= 20 Mark)

1. What are the classifications of power diodes?
2. Compare PMOSFET with BJT.
3. Draw a single phase asymmetrical semi-converter.
4. Define Total Harmonic Distortion.
5. Why is PWM technique commonly chosen control strategy in chopper circuit?
6. For type-A chopper circuit, source voltage  $V_s = 220$  V, chopping period  $T = 2000 \mu s$ , on period  $= 600 \mu s$ , determine the duty cycle.
7. What is the purpose of connecting diodes in anti parallel with thyristors in inverter circuits?
8. What is the difference between line-commutated and force-commutated inverters?
9. Show that the input power factor of ac voltage controller when on for  $n$  cycles and off for  $m$  cycles is given by  $\sqrt{\frac{n}{n+m}}$ .
10. Derive the expression for r.m.s value of output voltage of single phase ac voltage controller.

Part - B (5 X 16 = 80 Mark)

11. i. Discuss the techniques by which a thyristor can be turned on along with the switching characteristics.  
ii. Compare GTO with thyristor with relative merits and demerits.
- 12.a. Derive the expressions for average and r.m.s value of output voltage for a single phase half wave circuit with R load, RL load (discontinuous conduction) and RL load with free wheeling diode.

{OR}

- b. With load assumed continuous and constant, derive the performance parameters for a single phase full converter.

- 13.a. Explain in brief, the principle of operation of type A chopper for continuous and discontinuous conduction. Explain the various control strategies for varying duty cycle of chopper.

(OR)

- b. Draw the circuit diagram of the boost regulator and explain its mode of operation with equivalent circuits. Sketch the voltage waveforms across each element and the current waveforms through it.

14. a. i) A three-phase bridge inverter delivers power to a resistive load from a 450V dc source. For a star-connected load of  $10\Omega$  per phase, determine for both (a)  $180^\circ$  mode and (b)  $120^\circ$  mode, (i) rms value of load current (ii) rms value of thyristor current (iii) load power. (10)

- ii) What is the drawback of single phase half bridge inverter? Explain how this drawback is overcome and also explain when the diodes connected in antiparallel with thyristors come into play. (6)

(OR)

- b. i) Draw and explain the operation of single phase capacitor commutated current source inverters with resistive load. Draw also the related voltage and current waveforms. (10)

- ii) What is the need for controlling the output at output terminals of an inverter? (6)

- 15 a. With neat waveforms, discuss the operation of single phase to single phase step down cyclo converter with RL Load?

(OR)

- b. Discuss the two-stage sequence control of ac regulator with RL Load.