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B.E END SEMESTER EXAMINATION MAY 2012
ELECTRICAL AND ELECTRONICS ENGINEERING BRANCH
V SEMESTER -REG 2008
EE 9301 POWER ELECTRONICS

TIME:3 HRS
MARKS:100

PART A (10 X 2 =20MARKS)

1. What are the different commutation techniques available for turn off of SCR?
2. Compare the switching frequencies of SCR, MOSFET, IGBT and Power transistor
3. A three phase half wave rectifier feeding R load draw the load voltage waveform for $\alpha = 60$.
4. Explain the 2 quadrant operation of 1 phase full converter.
5. Explain TRC and current limit control of chopper circuit.
6. What are the advantages of switched mode power supplies over linear regulators?
7. What is the necessity of feedback diodes in inverter circuits?
8. Explain the operation of single phase series resonant inverter.
9. For single phase ac voltage controller draw the load voltage and load current waveform for $\alpha = 75$ for resistive load.
10. List 2 applications for cycloconverter, a.c voltage controllers and inverters.

PART B (5 X 16 = 80 MARKS)

- 11.(i) A 230 V, 50 Hz single pulse SCR controlled converter is triggered at a firing angle $\alpha = 40$ and the load current extinguishes at an angle of 210 . Find the circuit turn off time, average output voltage and average load current for $R = 5$ ohm and $L = 2$ mH. (9)
- (ii) Draw the load voltage and current waveforms for 1 phase full converter and 1 phase semi converter feeding RL load for $\alpha = 45$ and prove that average voltage is more in semi converter for the same value of firing angle. Give reasons. (7)
- 12.a.(i) Explain the working of MOSFET with switching characteristics. Draw the output and transfer characteristics. (10)
- (ii) Compare power MOSFET with BJT (6)
- (OR)
- 12.b.(i) What is the effect of source inductance in converter operation? (4)
- (ii) For single phase full converter delivering constant current I_o express the source current in terms of Fourier series and derive expressions for powerfactor, active and reactive power inputs. (12)
- 13.a. Explain the different modes of operation of buck converter with waveforms. Derive expressions for minimum and maximum inductor currents and output voltage ripple.
- (OR)
- 13.b. For class A chopper feeding RLE load derive expression for armature current ripple. Show that current ripple is maximum for $\delta = 0.5$.

14.a. Explain the principle of operation of step up and step down cycloconverters with waveforms.

(or)

14.b. A single phase ac voltage controller is employed for controlling the power flow from 230 V 50 Hz source into a load of $3+j4$ ohm. Calculate

i) control range of firing angle

ii) maximum value of rms load current

iii) extinction angle

15.a. Explain 120 and 180 degree mode of conduction of 3 phase inverter with phase and line to line voltage waveforms.

(or)

15.b. What is pulse width modulation? List various PWM techniques? Explain the voltage control of inverter using PWM techniques.