B.E END SEMESTER EXAMINATION APRIL/MAY 2014
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. For a single phase half wave rectifier feeding RL load explain triggering angle, conduction angle and extinction angle.
2. What is meant by displacement power factor in converter circuits?
3. What is the effect of overlap angle in converter circuit?
4. For 3 phase half wave rectifier feeding RL load draw the load voltage and load current waveforms for $\alpha = 70°$ for continuous current conduction.
5.

   Explain the operation of converter to be used in fig.1 and calculate duty cycle.
6. A Step down chopper has a resistive load of R= 10Ω. The input voltage is 220V. the chopping frequency is 1kHz. To have an average voltage of 90V, calculate the duty cycle.
7.
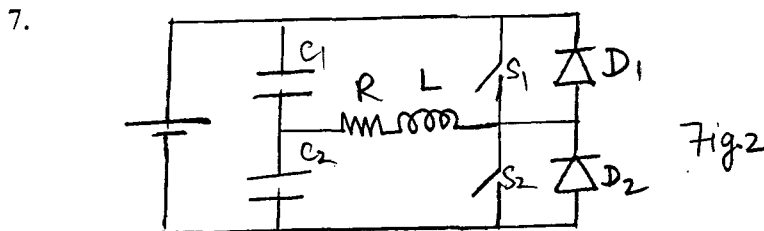
   Draw the load voltage and load current waveforms for inverter shown in fig.2. Mark the conduction of devices.
8. Differentiate between VSI and CSI.
9. Draw the load voltage waveform of single phase AC voltage controller feeding R load for on-off control with 2 cycles on and 3 cycles off.
10. Explain what is meant by step up and step down cycloconverters compared to step up and step down choppers.

PART B (5 X 16 = 80 MARKS)

11.(i)Explain the self latching property of SCR using 2 transistor analogy. (7)

(ii)A single phase half wave converters is operated from 120V, 50Hz. If the load is resistive load with R= 10 Ω and delay angle of $\alpha = \pi/3$ calculate the (i) average voltage (ii) rms voltage (iii) form factor (iv) peak inverse voltage of T_1 (v) efficiency. (9)

12.a.Draw the load voltage waveform of 3 phase full converter feeding RL load for $\alpha = \pi/6$. Derive the expression for average voltage. (16)

(OR)

12.b.A single phase semiconverter is operated from 120V,50Hz supply. The load current with an average value for I_a. For the delay angle $\alpha = \pi/3$ calculate the (i) harmonic factor of input current (ii) displacement factor (iii) input power factor. (16)

13.a. Explain the operation of 120° and 180° mode of conduction for 3 phase inverter with waveforms. (16)

(OR)

13.b.(i)Explain the operation of modified series inverter with waveforms. (8)
(ii) Explain output voltage control using sinusoidal PWM and multiple PWM. (8)

14.a. Explain the operation of 2 quadrant chopper with waveforms. (16)

(OR)

14.b.A boost converter has an input voltage of $V_s = 5V$. The average output voltage $V_a = 15V$ and average load current = 0.5A. The switching frequency is 25kHz. If L= 150μH and C=220μf. Determine (i) duty cycle (ii) ripple current of inductor (iii) ripple voltage of filter capacitor (iv) critical value of L.

15.a.Explain the operation of step up and step down cycloconverter with waveforms.

(OR)

15.b.Explain the operation fo 2 stage ac voltage controller feeding R load. Derive expression for V_{rms} in terms of α.