



**B.E DEGREE END SEMESTER EXAMINATION NOV/DEC 2011
ELECTRICAL AND ELECTRONICS ENGINEERING BRANCH
V SEMESTER – REG 2008
EE 9301 POWER ELECTRONICS**

TIME: 3HRS

MARKS:100

PART-A

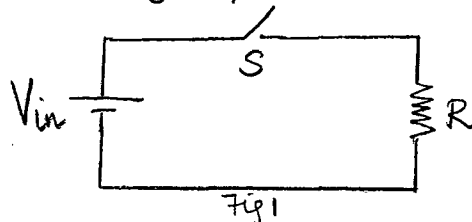
(10X2 = 20 MARKS)

1. With a 1ϕ HWR feeding RL load explain the regenerative period and circuit turn off time.
2. For an inverter feeding RLC load with leading power factor show that there is no commutation circuitry required if SCRS are used as switch.
3. What is margin angle? What is its significance in inverter operation?
4. Explain CLC for chopper circuit.
5. What is the difference between feedback diodes and freewheeling diodes?
6. What are switched mode Power supplies? What are its advantages over linear regulators?
7. Explain the self latching property of SCR.
8. For 1ϕ AC voltage controller for feeding R load using integral cycle control with 3 cycles on and 2 cycles off, calculate the RMS voltage for input voltage of 230v, 50Hz.
9. Compare the advantages and disadvantages of VSI and CSI
10. A single Phase full bridge inverter uses a uniform PWM with 4 pulses/half cycle. Determine the pulse width if RMS output voltage is 80% of the input dc voltage.

PART – B

(5 X 16=80 MARKS)

- 11.i). For the converter shown in fig 1 with $V_{in} = 28$ V and $f = 50$ KHz calculate the ripple factor if the power delivered to the load is 25 watts at an average input current of 1.5A. (6)



- ii) A three phase fully controlled converter is connected to a 415V, 50 Hz supply having an reactance of 0.35 ohm/phase and resistance of 0.05 ohm/phase. The converter is operating in the inverting mode at a firing advance angle of 35° . Determine the mean generator voltage, overlap

angle and recovery angle when the current is level at 60A. Assume a thyristor drop of 1.5V.

(10)

12.a.(i). Explain working of MOSFET with switching characteristics. Discuss the output and transfer characteristics. (12)

(ii) Compare IGBT and MOSFET in terms of operating frequency and on state voltage drop. (4)

(OR)

12.b. Draw the load voltage waveform for $\alpha = 75^\circ$ for 3 phase semiconverter and derive the average voltage in terms of α

13.a. Consider a boost converter with following circuit parameters $V_{in} = 10V$, $V_o = 15V$ and $I_o = 5A$. For $f = 50$ KHz determine a) D b) Critical inductance c) maximum and minimum inductor currents for $L = 100 L_{critical}$ d) average input and output power e) capacitance if output voltage ripple not to exceed 3.5%. Derive expression used.

(OR)

13.b. Explain class C Chopper for lightly loaded, heavily loaded and regenerative mode with waveforms.

14.a. A two stage sequence controlled single phase ac voltage controller is feeding a load of $R = 20 \Omega$. The source voltage is 230V, 50Hz and turns ratio from primary to each transformer secondary is unity. For two stage sequence control, the firing angle of upper thyristors is 60° Draw the load voltage waveform and calculate rms value of output voltage.

(OR)

14.b. Explain the principle of operation of step down cycloconverter feeding RL load for both continuous and discontinuous conduction.

15.a. A single phase full bridge inverter has a resistive load $R = 2.4 \text{ ohm}$ and the dc input voltage is $V_s = 40V$. Determine the rms output voltage at the fundamental frequency V_{01} b) output power c) THD d) DF of the 3rd and 5th harmonic.

(OR)

15.b. Explain the different methods of voltage control in inverter circuit.