

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION

DECEMBER 2009

EE 04 701 POWER ELECTRONICS

(2004 Admissions)

Time : Three Hours

Maximum : 100 Marks

Part A*Answer the following.*

1. Explain the turn on methods of an SCR.
2. Describe RC triggering for a thyristor gate drive in detail.
3. Draw the output voltage and current waveforms of a single phase half controlled thyristor convertor for a firing angle of 60° and also calculate the average and rms voltage if the supply voltage is 200V, 50Hz.
4. Compare series and parallel inverters.
5. A step down DC chopper has an inductive load with a resistance of 20Ω . The input voltage is 220 V. The ON time and OFF time of the chopper are 15 ms and 5 ms respectively. Determine the average load voltage and current.
6. For a single phase AC regulator, justify how pulse gating is suitable for R load and not for RL load.
7. Compare SMPS with a linear power supply.
8. Explain the operation of a buck regulator.

(8 × 5 = 40 marks)

Part B

9. Explain the two transistor analogy of a SCR. Also explain its turn and turn off characteristics. (15 marks)

Or

10. With a neat structural diagram, explain the operation of a power MOSFET. Also explain its characteristics. (15 marks)
11. Explain the operation of three phase, half wave controlled converter with resistive load. Sketch the associated waveforms also. (15 marks)

Or

12. (i) Draw and explain a simple series inverter with waveforms. (8 marks)
- (ii) With necessary waveforms, explain how the harmonics are eliminated in a PWM inverter. (7 marks)

Turn over

13. Explain the operation of a voltage commutated chopper with aid of circuit diagram and necessary waveforms. (15 marks)

Or

14. Describe with neat sketches the operation of a single phase bi-directional AC voltage controller for RL load and derive its rms output voltage. (15 marks)
15. Draw the circuit of boost regulator and explain its working principle with necessary waveforms. Derive the expression for peak to peak ripple voltage of the capacitor that is present across the load. (15 marks)

Or

16. Explain the operation of Switched mode power supply with neat circuit and waveforms. (15 marks)

[4 × 15 = 60 marks]