

D 70294

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Name.....

Reg. No.....

**FIFTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE
EXAMINATION, NOVEMBER 2014**

EE/PTEE 09 504—POWER ELECTRONICS

Time : Three Hours

Maximum : 70 Marks

Part A

Answer all questions.

Each question carries 2 marks.

1. Define Peak Inverse Voltage of an SCR.
2. An SCR is used to control the power of 1 kW, 230 V, 50 Hz heater. Determine the heater power for firing angle of 45° .
3. State the limitations of series inverters.
4. A step down chopper has input voltage $E = 200$ V. When the chopper remains ON, its voltage drop is 2.5 V. If the duty cycle is 50 %, calculate the average output voltage.
5. What are switching regulators ?

(5 × 2 = 10 marks)

Part B

Answer any four questions.

Each question carries 5 marks.

6. Explain the problems associated with series connection of SCRs. How are they eliminated ?
7. Give the comparison between transistors and thyristors.
8. Derive an expression for average load voltage for a single-phase half-controlled converter with resistive load.
9. With a neat circuit diagram, explain the working of a step up chopper.
10. Explain why the single-phase a.c. regulator using two SCRs must have its trigger sources isolated from each other.
11. List the advantages and disadvantages of buck boost regulator.

(4 × 5 = 20 marks)

Part C

Answer all questions.

Each question carries 10 marks.

12. With the help of a neat diagram, explain the two transistor analogy of an SCR. Also discuss the condition which must be satisfied for turning on an SCR with gate signal.

Or

Turn over

13. Explain briefly, the different methods of commutation.
14. Describe in detail with associated waveforms, the discontinuous conduction mode of operation of a three-phase fully controlled bridge converter with resistive load.

Or

15. With the help of a neat circuit diagram and waveforms, explain briefly the operation of transistorized three-phase bridge inverter with resistive load in 120° conduction mode.
16. Discuss in detail with neat sketches, the operation of four quadrant type E chopper showing operation of conduction devices.

Or

17. For a single-phase a.c. regulator feeding a resistive load, draw the waveforms of source voltage, gating signals, output voltage, source and output currents and voltage across SCRs. Describe its working with reference to the waveform.
18. With the help of neat circuit diagram and associated waveforms, discuss the operation of a buck regulator.

Or

19. Explain the flyback SMPS with relevant equivalent circuits and waveforms. Derive the various expressions for voltages and currents involved.

(4 × 10 = 40 marks)