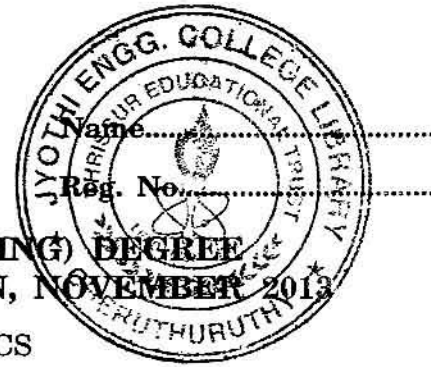


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**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
[REGULAR/SUPPLEMENTARY] EXAMINATION, NOVEMBER 2013**

EE 09 504—POWER ELECTRONICS

Time : Three Hours

Maximum : 70 Marks

Part A

All questions are compulsory.

1. Define Critical Rate of Rise of 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 90° .
3. What are the advantages of PWM inverter ?
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 r.m.s. output voltage.
5. List the merits of online UPS.

(5 × 2 = 10 marks)

Part B

Answer any four questions.

6. Explain the problems associated with parallel connection of SCRs. How are they eliminated ?
7. Derive an expression for r.m.s. load voltage for a single phase half-controlled converter with inductive load.
8. Explain why a PWM inverter is superior to a square wave inverter.
9. Explain with a neat circuit diagram, the working of a step down chopper.
10. A single phase a.c. voltage regulator feeds power to a resistive load of 10Ω from 230 V, 50 Hz source. Draw the power circuit and sketch the waveforms of input voltage, current, and output voltage, current for the firing angle of $\alpha = 90^\circ$.
11. List the advantages and disadvantages of boost regulator.

(4 × 5 = 20 marks)

Part C

12. Describe the different modes of operation of a thyristor with the help of its VI characteristics.

Or

13. With a neat sketch, explain the cross-sectional structure of power MOSFET.

Turn over

14. Describe in detail with associated waveforms, the continuous 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 180° conduction mode.
16. Explain the basic principle of operation of a single-phase to single-phase cycloconverter for both continuous and discontinuous conduction.

Or

17. Discuss the operation of a single-phase a.c. regulator with RL load when α is less than, or equal to, the load phase angle ϕ . Hence show that for α less than ϕ , output voltage of the a.c. regulator cannot be regulated.
18. Discuss briefly the operation of Cuk regulator with the help of a circuit diagram and voltage and current waveforms.

Or

19. Explain with suitable diagram, the operation of offline UPS.

(4 × 10 = 40 marks)