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Reg. No. :

Name :

**Fifth Semester B.Tech. Degree Examination, November 2014
(2008 Scheme)**

**Branch : Electrical and Electronics
08.504 : POWER ELECTRONICS**

Time : 3 Hours

Max. Marks : 100

Instruction : Answer *all* questions from Part A and *one full* question from *each* Module of Part B.

PART – A



1. Briefly explain the characteristics of a power MOSFET.
 2. What are the different isolation techniques for the gate circuit of an SCR ?
 3. What is 'derating factor' in series connected SCRs ?
 4. A thyristor is rated to carry full load current with an allowable case temperature of 100°Cs and a maximum junction temperature of 125°C. The thermal resistance between the case and the ambient is 0.5°C/W and the thermal resistance between the sink and the ambient is 0.4°C/W. Find the sink temperature for an ambient temperature of 40°C.
 5. Derive the output voltage expression for a 1- ϕ full wave bridge converter with R-L load. Assume continuous conduction.
 6. What is a line commutated inverter ?
 7. Discuss the effect of free wheeling diode in phase controlled rectifiers.
 8. What are the advantages of 1- ϕ bridge converters over mid point converters ?
 9. Compare voltage source inverters with current source inverters.
 10. What is current limit control in choppers ?
- (10×4=40 Marks)**

P.T.O.



PART – B

All questions carry equal marks.

Module – I

11. a) Explain the dynamic characteristics of an SCR.
b) The maximum on-state rms current of an SCR is 35 A. If this SCR is used in a resistive circuit, compute the average on-state current rating for half sine wave current for conduction angle 30° . 20

OR

12. a) What are the difficulties encountered during the parallel operation of thyristors? Briefly explain how these problems are overcome.
b) Briefly explain the line synchronized triggering circuit of an SCR using UJT. 20

Module – II

13. a) Discuss the effect of source inductance on the performance of 1- ϕ phase controlled rectifiers.
b) With the help of circuit diagram and relevant wave forms explain the operation of a 1- ϕ semiconverter connected to an RL load. 20

OR

14. a) A battery is charged using a single phase half wave rectifier circuit through a resistor R.
i) For an ac voltage source of 230V, 50Hz, find the value of average charging current for $R = 8\Omega$ and $E = 150\text{ V}$.
ii) Find the power supplied to the battery and that dissipated in the resistor. Assume maximum conduction period for the SCR.
b) Explain with the help of a neat circuit diagram and relevant waveforms, the operation of a 3- ϕ fully controlled bridge rectifier with RL load for a firing angle of 60° . 20

Module – III

15. a) Explain the working of a 3- ϕ bridge inverter for 180° conduction mode having a star connected resistive load. Draw the relevant waveforms and a neat circuit diagram.
b) Explain the operation of a step up chopper. Derive an expression for the average output voltage in terms of input d.c. voltage and duty cycle. 20

OR

16. a) Discuss the various methods of voltage control in inverters.
b) Explain the working of a type c chopper with the help of circuit diagram and waveforms. 20