A – 4189

Reg. No. : ....

Name : ....

Fourth Semester B.Tech. Degree Examination, June 2016
(2013 Scheme)
13.405 : POWER ELECTRONICS (E)

Time : 3 Hours   Max. Marks : 100

PART – A

Answer **all** questions :   (10×2=20 Marks)

1. What is meant by commutation ?

2. Draw the thermal equivalent circuit of SCR.

3. What is forward voltage triggering ?

4. Draw the characteristics of UJT and GTO.

5. What is the difference in construction of IGBT and power MOSFET ?

6. What is freewheeling diode ?

7. Write condition for inverter operation of converter (RLE load). Draw waveforms.

8. Draw the output waveform of 6 pulse converter.

9. What is overlapping period ?

10. Differentiate between MPWM and SPWM.

PART – B
Module – I   (4×20=80 Marks)

11. a) Explain two transistor analogy of SCR.   10

    b) Discuss the VI characteristics of SCR with relevant waveforms.   10

OR

12. a) Explain in detail the static and dynamic equalization circuit with necessary expression and derivation.   15

    b) Differentiate between forced commutation and natural commutation.   5

Module – II

13. Explain in detail with relevant design equations, the following triggering circuits for a SCR.   20

    i) RC triggering circuit   ii) UJT trigger circuit

    iii) R triggering circuit.

OR

14. a) Describe the construction operation and VI characteristics of a TRIAC.   10

    b) Explain the operation and VI characteristics of IGBT and GTO.   10

Module – III

15. Explain in detail the operation of 1 φ phase controlled converter with RLE load and also derive expression for load current (draw necessary diagrams and waveforms).   20

OR

16. Explain in detail about 3 φ fully controlled bridge converters with working principle and relevant waveforms.   20

Module – IV

17. With a neat diagram and waveforms, explain voltage commutated chopper and derive necessary expressions.   20

OR

18. i) A single phase full bridge inverter is connected to an RL load. For a dc source voltage of V_s and output frequency $f = 1/T$, obtain expressions for load current as a function of time for the first two half cycles of the output voltages.   10

    ii) Derive also the expression for steady state current for the first two half cycles.   4

    iii) For $R = 20 \Omega$ and $L = 0.1$ H, obtain current expression for parts

        i) and ii) in case source voltage is 240 V dc and frequency of output voltage is 50 Hz.   6