

B.E. Sixth Semester (Electrical & Electronics Engineering) (CGS)
10393 : Power Electronics - I : 6 EX 06

P. Pages : 2

Time : Three Hours



AU - 2767

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.
 5. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) Explain two transistor analogy of SCR. 7
- b) Draw and explain construction and V - I characteristics of DIAC. 7

OR

2. a) Give the comparison between power transistors and thyristors. 7
- b) Describe the different modes of operation of thyristor with the help of V - I characteristics. 7
3. a) What are the various methods of triggering of thyristors connected in series? Explain any **one in detail**. 7
- b) Calculate the no. of SCR's to be connected in series and parallel each with rating of 500V, 75A for total voltage and current ratings of 7.5.kV and 1000A. Assume derating factor of 20% 6

OR

4. a) What is necessity of connecting SCRs in series? What are the problems associated with series connection of SCRs? 7
- b) Explain triggering of thyristors connected in parallel. 6
5. a) An SCR is used to control the power of 1kw, 230V 50Hz heater. Determine heater power for firing angles of 45° and 90°. 6
- b) Draw the circuit diagram and waveforms for single phase full wave rectifier with resistive load. also derive the expression for RMS value of load voltage, load current and average dc output voltage. 7

OR

6. a) With the help of waveforms explain single phase half wave controlled rectifier with inductive load with free wheeling diode. 7

- b) A single phase half wave controlled converter is operated from a 120V, 50Hz supply. Load resistance $R=10\Omega$. If the average output voltage is 25% of the minimum possible average output voltage, determine the firing angle, rms output current, and average and rms voltage. 6

SECTION – B

7. a) Explain the operation of single phase transistorized bridge inverter with the help of load voltage and load current waveforms. 7
- b) Draw basic series inverter circuit and explain its working with the help of waveforms. 7

OR

8. Explain principle of operation for three phase bridge inverter in 180° mode. 14
9. a) Draw and explain AC chopper with diagram and waveforms. 7
- b) Design a single phase to single phase cycloconverter using center tap transformer to obtain the output frequency equal to one fourth of the input frequency, Explain with voltage waveforms. 6

OR

10. a) Draw the circuit of cycloconverter and explain the principle of operation. 6
- b) Explain the operation of step-up chopper. Prove that output voltage of step up chopper is twice to that of the applied voltage. 7
11. a) Draw fan speed regulator circuit using PIAC and TRIAC and Explain it. 6
- b) Explain the working of UPS with the help of neat diagram. Differentiate between online and offline UPS. 7

OR

12. a) Draw and explain speed control of a DC series motor using chopper. 6
- b) With the help of diagram explain static DC circuit breaker. 7
