B.E. Electronics Telecommunication / Communication Engineering / Electronics Engineering Fifth Semester

ET / EN 503 : Power Electronics

P. Pages : 2 **GUG/W/18/1623**

Time : Three Hours * 1 2 7 7 * Max. Marks : 80

Notes : 1. Same Answer book must be used for each question.
2. All questions carry marks as indicated.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Describe with neat circuit diagram & waveform the VI characteristics of SCR. **8**

b) Explain the basic firing circuits of SCR. **8**

OR

2. a) Describe the following devices with reference to construction, characteristics & applications – **8**
i) TRIAC ii) DIAC
iii) IGBT.

b) Latching current of SCR inserted between a DC voltage source of 200V & a load is 100 mA. Compute the minimum width of gate pulse current required to turn on this SCR, in case the load consists of $R = 20\Omega$ in series with $L = 0.2H$. **8**

3. a) Explain with circuit diagram & waveforms the operation of single phase Half wave controlled Rectifier with RL load. **8**

b) Describe with circuit diagram the single phase Dual Converter. **8**

OR

4. a) Explain the operation of single phase full wave bridge controlled rectifier with free wheeling diode. **8**

b) A single phase converter employs two SCR & Centre tapped transformer with turn ratio 2:1. The load is inductive $(R = 10\Omega \& L = 1mH)$ & delay angle is 40º. Determine average load voltage, average load current, supply voltage is 230V at 50Hz. **8**

5. a) Explain the operation of basic series inverter with all necessary waveforms. Also give the limitation of basic series inverter. **8**

b) What is commutation? Classify it & explain the operation of Class-D commutation. **8**

OR

6. a) Describe the operation of 3 phase bridge inverter in 180 degree mode operation. Assume that load is purely inductive, balanced & connected in star fashion. Also draw its waveforms. **8**

b) Calculate the values of R & C to be used for commutating SCR1 in class-C commutation, when it is conducting a full load current of 15A. The minimum time for which SCR is reverse biased for proper commutation is $40\mu s$. The holding current of SCR2 is 3mA. **8**

7. a) Give the classification of choppers. Explain the step-up & step-down chopper circuits. **8**

b) What do you understand cyclo-converter? Explain the operation of 1ϕ bridge type cyclo-converter in continuous current mode operation. Assume load to RL type. **8**

OR

8. a) Describe two quadrant choppers with neat circuit diagram. **8**

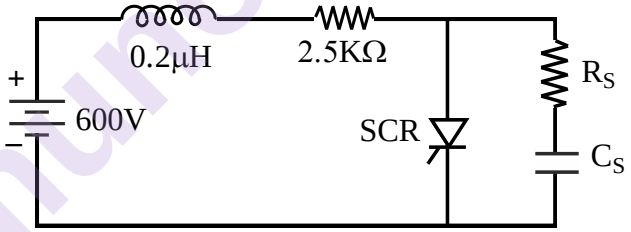
b) Discuss with neat circuit diagram the Morgan's chopper. **8**

9. a) Describe the need & methods of multiple connections of SCR. **8**

b) Explain with neat circuit diagram of over voltage protection of SCR. **8**

OR

10. a) Calculate the values of Snubber components R_S & C_S for the circuit shown in fig. to protect the SCR. Given dv/dt rating is $120\,V/\mu sec$. Assume damping factor = 0.7. **8**



b) Explain dv/dt & di/dt protection in detail. **8**

****