

Total No. of Questions : 8]

[Total No. of Printed Pages : 2

Roll No.....

MEPE-102**M.E./M.Tech. I Semester**

Examination, December 2017

Power Electronics Devices and Phase Control**Time : Three Hours****Maximum Marks : 70**

- Note:** i) Answer any five questions.
ii) All questions carry equal marks.

1. a) With the help of neat diagram explain the working and characteristics of IGBT. List advantages and disadvantages of IGBT over power BJT.
b) What do you mean by commutation of SCR? What are the different classes of forced commutation method? Explain.
2. a) What is Snubber circuit? Why is it needed? Draw a Snubber circuit for a SCR and give guidelines for selecting its components.
b) Explain the resistance triggering, RC-triggering and UJT based triggering of SCR.
3. a) Describe multiple pulse control technique to mitigate harmonics in phase controlled rectifier with necessary circuit and wave diagrams.
b) Describe a procedure for designing a Chopper circuit with neat sketch.
4. a) Explain concept of dual converter. Using circuit diagram explain the working of any type of dual converter.

[2]

- b) What are the different methods for braking of DC motor? Explain regenerative braking scheme with schematic diagram.
5. a) What is Load commutated cycloconverter? How does it differ from line commutated cycloconverter?
b) A three pulse cycloconverter feeds a single phase load of 190V, 45A at a power factor of 0.7 lagging. Determine:
i) The required supply voltage
ii) Thyristor rms current and p l v
iii) Power factor of the supply current
6. a) Explain the operation of three-phase current source inverter with circuit and output wave diagrams and mention its advantages over VSI. Give also its applications.
b) Describe the converter reactions on load side and source side.
7. a) A single phase Full bridge inverter is used to control power in a resistance load and is supplied from a 220V dc source. A uniform pulse width modulation with 5 pulses per half cycle is used and width of each pulse is 30°. Determine:
i) The rms voltage of the load and
ii) The pulse width to maintain the same load power if the input dc voltage source increased by 10%
b) Explain the working of multiphase choppers. Mention their advantages, limitations and areas of application.
8. Write a short note on any two of the following:
a) Isolation transformer and optical isolator
b) Design of rectifier circuit
c) Mode of operation of 3- ϕ controller
d) Symmetrical and Asymmetrical control of cycloconverter