Roll No .....

MEPE-102

M.E./M.Tech., I Semester

Examination, December 2014

Power Electronics Devices and Phase Control

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. What is IGBT? With the help of neat structural diagram, symbol and equivalent circuit, explain the working of IGBT . Explain various IGBT characteristics with the help of neat circuit diagram and waveforms.

2. a) Give neat circuit diagrams only of various types of triggering techniques of SCR and explain the functioning of any one technique.
   b) Give the common circuit diagrams of various types of opto-isolator.

3. a) Enumerate the various commutation circuit techniques used in SCR. Explain them clearly (any two) except class B commutation.
   b) A single phase full converter bridge is connected to RLE load. The source voltage is 230V, 50Hz. The average load current of 10 amp. is continuous over the working range. For R=0.4Ω and L=2mH. Compute:
      i) Firing angle delay for E = 120V
      ii) , Firing angle delay for E = –120V
      iii) Input power factor in both above cases.

4. Describe the methods of power factor improvements and harmonic reduction in converter fed systems.

5. Describe the voltage commutated chopper with relevant current and voltage waveform as a function of time. Explain the working of this chopper by dividing into various commutation process intervals into various well defined modes. Show that effective on period of is load dependent. Find also the minimum permissible on period in terms of commutating parameters.

6. Write the working principle of three-phase to single phase cycloconverter. Draw its schematic diagram and voltage waveforms, clearly mentioning when the positive group converter will act as a rectifier and when as an inverter.

7. a) Discuss the working of single phase CSI with ideal switches. Draw schematic diagram and waveforms.
   b) Explain how the harmonic reduction is obtained in single phase inverters by PWM?

8. Write short notes on any two of the following :
   a) Depletion type MOSFET.
   b) Four quadrant choppers.
   c) Line commutated inverters.
   d) Three phase full converter with RLE load.

******