Total No. of Questions :5] *[Total No. of Printed Pages :2*

Roll No .....

EI - 504

B.E. V Semester

Examination, December 2014

Power Electronics

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each questions are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Draw the symbolic representation of power BJT, triac, IGBT and thyrister.
   b) Draw the transistor analogue of a thyrister.
   c) What are the turn-on methods of a thyrister?
   d) Give a cross sectional view of TRIAC and explain its different modes of operations.

   OR

   What is IGBT? Sketch and explain the equivalent circuit and transfer characteristics.

2. a) What do you mean by rectification?
   b) Differentiate between uncontrolled and controlled rectification.
   c) Explain the use of flywheel diode in controlled rectifier.
   d) Explain the operation of a single phase full wave mid point controlled rectifier for RL load with circuit diagram and output waveforms.

   OR

   A three phase half-wave controlled rectifier is connected to a 230V-50 Hz input supply with a 100 Ω load resistance. If the desired average output voltage is 50% of the maximum possible average output voltage, calculate the relay angle α.

3. a) Why does a inverter and chopper need forced commutation?
   b) Define chopper efficiency.
   c) Differentiate current source inverter and voltage source inverter.
   d) Explain with the help of neat circuit diagram the basic concept of PWM inverters.

   OR

   A chopper is operating at a frequency of 2.0 KHz on a 230V dc input supply. If the load voltage is 150V, calculate the conduction and non-conduction period of the thyrister in each cycle.

4. a) Give the classification of the ac voltage controller.
   b) Compare the merits and demerits of on-off and phase-angle ac voltage controllers.
   c) What do you mean by a cycloconverter? State its industrials applications.
   d) Discuss the working of a single-phase bridge cycloconverter for a 3:1 frequency ratio with a resistive load.

   OR

   A single-phase full-wave ac voltage controller has a load of 10Ω. The input voltage is 120 V rms. Calculate the rms output voltage. Current and input power factor for delay angle π/2.

5. a) How can a thyrister be used for the purpose of protection against over voltage?
   b) Differentiate between induction heating and dielectric heating.
   c) Explain welding cycle.
   d) What are the different methods of speed control of dc motor? Describe with diagrams any one method.

   OR

   What do you mean by solid state relay? Explain the principle of ac solid state relay.

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