Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Automation & Robotics) (2011 & Onward) (Sem.–4)

POWER ELECTRONICS & MOTORS

Subject Code : BTAR-401

M.Code : 63014

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1. Answer briefly :

a. Why do we use silicon in comparison to germanium in thyristors?

b. Why snubber circuit is required? Explain.

c. What is the need of commutation in a thyristor circuit? Discuss.

d. What is impulse commutation? Explain.

e. Explain the importance of phase angle control.

f. What is the purpose of connecting diodes in antiparallel with Thyristors in inverter circuits?

g. List the advantages and disadvantages of cycloconverter.

h. Differentiate between constant frequency system and variable frequency system control strategies of chopper.

i. Draw the Symbol and characteristics of PUT.

j. What is the purpose of a chopper? Discuss.

SECTION-B

2. Explain the operation of a Thyristor with the help of its static VI characteristics.

3. A circuit employing resonant pulse commutation has C = 20 μF and L=5μH. Initial voltage across the capacitor is V_s = 230V. For a constant load current of 300A, calculate :

   a) Conduction time for the auxiliary thyristor

   b) Voltage across the main thyristor when it gets commutated

4. Describe the working of a type D chopper with appropriate waveforms to demonstrate the operation in first as well as fourth quadrants.

5. Explain (in detail) the reduction of harmonics in the inverter output voltage using stepped wave inverters.

6. Explain the basic circuit and operating principle of single phase to single-phase step up bridge cycloconverter.

SECTION-C

7. Explain the practical dual converter with circulating current mode and non-circulating current mode in detail.

8. a) A step up chopper has input voltage of 220 V and output voltage of 660V. If the conducting time of the chopper is 100 micro second, compute the pulse width of the output voltage. In case output voltage pulse width is halved for constant frequency operation, find the average value of the new output voltage.

   b) What are the different methods of commutation? Discuss any one of them, involving two thyristors, with neat schematic and waveforms.

9. Discuss the following in detail :

   a) Single phase voltage source bridge inverter

   b) RC firing circuit of Thyristors

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.