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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(Automation &amp; Robotics) (2012 &amp; 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****Answer briefly :**

1. Draw the symbol and V-I characteristics of a DIAC.
2. What is the principle of operation for dual converter?
3. Why equalizing networks are required in series connection of SCRs?
4. Write two comparisons between transistors and thyristors.
5. The reverse biased junction capacitance of an SCR is 40 picofarads. The device can be turned on if the charging current flowing through the junction capacitor is 10 mA. Calculate the  $dV/dt$  capability of the device.
6. What are the causes of overvoltages in thyristors circuits?
7. List the applications of cycloconverters.
8. Discuss two disadvantages of harmonics present in the inverter system.
9. Differentiate between voltage-fed and current-fed inverters.
10. Describe time - ratio control (TRC) method in choppers.

**SECTION-B**

11. A thyristors string is formed by the series and parallel connection of thyristors. The voltage and current ratings of the string are 5 kV and 1000 A respectively. Available thyristors have the voltage and current ratings of 750 V and 225 A respectively. The string efficiency is 80% for both the series and parallel connections. Calculate the number of thyristors to be connected in series and parallel.
12. Explain the various types of triggering methods of SCR briefly. Which is the universal method and why?
13. Explain in detail the operation of a single - phase full converter bridge rectifier with RLE load. Describe with circuit diagram and appropriate waveforms.
14. Describe the working of type-C and type-D choppers along with their reliable waveforms.
15. Describe modified McMurray half - bridge single - phase inverter with relevant voltage and current waveforms.

**SECTION-C**

16. a) What is impulse commutation? Describe it with a circuit diagram and appropriate waveforms.  
b) Draw and explain the switching characteristics of an SCR.
17. a) A chopper circuit is operating at a frequency of 1 kHz on a 220 V dc supply. If the load voltage is 180 V, calculate the  $T_{on}$  and  $T_{off}$  of thyristors in each cycle.  
b) Define firing angle, extinction angle, and conduction angle by showing in appropriate waveform.
18. a) Discuss the principle of working of a three - phase bridge inverter with an appropriate circuit diagram. Draw voltage waveforms on the assumption that each thyristor conducts for  $180^\circ$  and the resistive load is star - connected. The sequence of firing of various SCRs should also be indicated in the waveforms.  
b) List the advantages and disadvantages of dual converter with circulating current mode.

**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.**