Code No: 125AF

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, August - 2022
POWER ELECTRONICS
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) List the advantages of SCR over BJT.
b) Compare the merits and demerits of IGBT and MOSFET.
c) What is meant by commutation of SCR and list its types. [5+5+5]

2.a) Explain the switching characteristics of SCR with voltage and current wave forms.
b) Differentiate latching current with holding current of an SCR.
c) Describe the UJT triggering circuit with neat sketch. [5+5+5]

3. Describe the working of a single phase full converter in the rectifier mode with RL load. Discuss how one pair of SCRs is commutated by an incoming pair of SCRs. Illustrate your answer with the waveforms of source voltage load voltage and source current. [15]

4. Describe the working of 3 ϕ fully controlled bridge converter in the Rectifying mode and inversion mode. And derive the expressions for average output voltage and rms output voltage. [15]

5.a) Explain in detail about the time ratio control strategy used in chopper.
b) A step down chopper is fed from 200V DC and its duty cycle is 0.6. Calculate the RMS value of output voltages for fundamental and third harmonic components. [7+8]

6.a) Derive the expression for the output voltage of step up chopper.
b) A chopper fed from a 200V DC source, is working at a frequency of 50 Hz and is connected to an RL load of R = 4Ω and L = 30 mH. Determine the value of duty cycle at which the minimum load current will be (i) 5 A (ii) 10 A. [7+8]

7.a) Explain the operation of a single phase mid-point step up cyclo converter with R-load. Draw the circuit diagram and waveforms.
b) A single phase voltage controller with resistive load has the following data: supply mains: 230V, 50 Hz, R = 5Ω. Calculate the firing angle at which the greatest forward or reverse voltage is applied to either of the thyristors and the magnitude of these voltages. [7+8]

8.a) Explain the 180^0 conduction mode of operation of three phase inverters with necessary circuit diagram and waveforms.
b) A single phase bridge inverter is fed from a 200 DC. In the output voltage wave, only fundamental component of voltage is considered. Determine the RMS current ratings of an SCR and a diode of the bridge for a resistive load of R = 5Ω. [7+8]

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