

Code No: 125AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech III Year I Semester Examinations, September - 2021****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) Give the constructional details of SCR with the help of schematic diagram and circuit symbol.
- b) Compare Power MOSFET, Power IGBT and Power BJT. [7+8]
- 2.a) Explain the dynamic characteristics of SCR in detailed.
- b) Two thyristors having a difference of 10mA in latching current are connected in series in the circuit. Voltages across the devices are 600V and 320V. Calculate the required equalizing resistance and capacitance, if the permissible difference in blocking voltage is 15V and the difference in the recovery charge is $6\mu\text{C}$. [8+7]
- 3.a) Explain the discontinuous mode of operation of single phase half wave converter with RL load with neat waveforms. Derive the expression for average output voltage.
- b) A single phase half-wave rectifier is used to supply power to load having impedance 10 ohms from 230V, 50Hz, ac supply at a firing angle of 30 degrees. Calculate
 - i) Average values of output voltage and current
 - ii) RMS values of output voltage and current. [9+6]
- 4.a) Explain the effect of source inductance on Single phase Full Converter.
- b) What are the advantages of freewheeling diode? [9+6]
- 5.a) Explain the operation of Step down Chopper with RLE load with relevant waveforms.
- b) A step-up chopper has input voltage of 220V and output voltage of 660V. If the conducting time of thyristor-chopper is $100\mu\text{s}$, compute the pulse width of output voltage. In case the output-voltage pulse width is halved for constant frequency operation, find the average value of new output voltage? [9+6]
- 6.a) Describe the operation of AC Chopper with associated voltage and current waveforms.
- b) Enumerate the disadvantages of Jones chopper. [9+6]
7. Describe the operating principle of single-phase to single-phase step-up cycloconverter with the help of mid-point and bridge type configuration. Illustrate your answer with appropriate circuit and waveforms. [15]
8. Explain in detail about 180° Conduction Mode of 3 – ϕ VSI with relevant output line and Phase voltages. [15]

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