

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: BE
BRANCH: EEE**

**SEMESTER: V
SESSION : MO/2018**

SUBJECT : EE5205 POWER ELECTRONICS

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

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- Q1 (a) List few applications of Power Converters in the industrial electrical drives. [2]
(b) Explain dynamic switching characteristics of an SCR with appropriate circuit diagram waveform for anode to cathode thyristor voltage and thyristor current. Denote Reverse Recovery Time and di/dt . [3]
- Q2 (a) What are different methods of Thyristor commutation? Explain 'Class-B' commutation. [2]
(b) Calculate the latching current of a Thyristor connected in series with an R-L Load of 20 Ω and 0.5 H if the minimum width of firing pulse is 50 μ S. [3]
- Q3 (a) Draw snubber circuit of an SCR for dv/dt and di/dt protection. [2]
(b) Evaluate maximum di/dt during turning-off Thyristor in presence of (RLC) snubber circuit. [3]
- Q4 (a) What is series derating of thyristors? [2]
(b) A thyristor string is formed by series and parallel connection of thyristors. Voltage and current rating of the strings are 6kV and 4kA respectively. Available thyristors have voltage rating and current rating of 1.2kV and 1kA respectively. The string efficiency is 90% for both series and parallel connection. Calculate the number of thyristors to be connected in series and parallel. [3]
- Q5 (a) List applications of phase controlled converters. [2]
(b) A single phase half wave thyristor controlled converter supplies an RLE load. Draw load current waveform, output voltage waveform, voltage waveform across thyristor. [3]
- Q6 (a) Explain operating principle of a single phase fully controlled bridge rectifier for a highly inductive load with supply voltage, load voltage, and Thyristor current waveforms. [2]
(b) A single phase full wave fully controlled converter has a purely resistive load and a firing angle of $(\pi/6)$ is maintained. Calculate (i) Rectification Efficiency (ii) The Form Factor (iii) Transformer Utilization Factor (TUF) [3]

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