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SET - 1

III B. Tech I Semester Supplementary Examinations, May -2018 **POWER ELECTRONICS** (Electrical and Electronics Engineering) Time: 3 hours Max. Marks: 70 Note: 1. Question Paper consists of two parts (Part-A and Part-B) 2. Answering the question in **Part-A** is compulsory 3. Answer any THREE Questions from Part-B PART -A 1 a) How the secondary breakdown occurs in Power BJT? Show it on I-V characteristics [3M] of Power BJT. b) How the freewheeling diode effects the performance of single phase half wave [3M] converters? Explain why the firing angle is restricted in single phase fully controlled converter c) [4 M] with RLE load. What is six pulse converter? Write its advantages. d) [4M] What are the control strategies used in DC-DC converters? e) [4M] What are the methods used for control the output voltage of inverter? f) [4M] PART –B 2 a) Describe the turn-on methods of SCR. [4M] Explain the dynamic characteristics of power IGBT. [8M] b) c) What is the importance of snubber circuit in protection of SCR? [4M] Explain the operation of half wave converter with RL load and freewheeling diode 3 a) [8M] and also reduce the expression for average load current. A single phase full-wave ac voltage controller feeds a load of R=30 Ω with an input b) [8M] voltage of 230V, 50Hz. Firing angle for both the thyristors is 65°. Calculate (i) rms value of output voltage. (iii) Average and rms current of thyristors. A single phase full converter, connected from 230 V, 50 Hz source, is feeding a load 4 a) [8M] $R = 25 \Omega$ in series with a large inductance that makes the load current ripple free. For a firing angle 30°, calculate the input and output performance parameters of this converter. Explain the operation of single phase semiconverter feeding RLE load with neat b) [8 M] circuit diagram and waveforms also deduce the rms output voltage. 5 Explain the effect of source inductance on three phase full converter in detail. a) [8 M] b) Design a three phase dual converter to achieve at four quadrant operation for $I_d = 10 \text{ A}$ [8 M] at 200 V. The converter is supplied from 400 V, three phase and 50 Hz supply. $I_{ripple} =$ 2A. 6 Discuss the working of a single phase bridge type cycloconverter with RL loads and a) [8 M] for continuous waveform operation with neat circuit diagram and output rms voltage and current wave form for fo = 4 fs. Explain the operation of Boost chopper with relevant waveforms and derive the b) [8 M] expression for average output voltage. 7 Explain the operation of unipolar switching in full bridge inverter. [6 M] a) Explain the operation of three phase bridge inverter for 120° mode of operation with b) [10M] aid of relevant phase and line voltage waveforms. *****