

Code No: RT31025

**R13**

**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 of Power BJT. [3M]
- b) How the freewheeling diode effects the performance of single phase half wave converters? [3M]
- c) Explain why the firing angle is restricted in single phase fully controlled converter with RLE load. [4 M]
- d) What is six pulse converter? Write its advantages. [4M]
- e) What are the control strategies used in DC-DC converters? [4M]
- f) What are the methods used for control the output voltage of inverter? [4M]

**PART -B**

- 2 a) Describe the turn-on methods of SCR. [4M]
- b) Explain the dynamic characteristics of power IGBT. [8M]
- c) What is the importance of snubber circuit in protection of SCR? [4M]
- 3 a) Explain the operation of half wave converter with RL load and freewheeling diode and also reduce the expression for average load current. [8M]
- b) A single phase full-wave ac voltage controller feeds a load of  $R=30 \Omega$  with an input voltage of 230V, 50Hz. Firing angle for both the thyristors is  $65^\circ$ . Calculate (i) rms value of output voltage. (iii) Average and rms current of thyristors. [8M]
- 4 a) A single phase full converter, connected from 230 V, 50 Hz source, is feeding a load  $R= 25 \Omega$  in series with a large inductance that makes the load current ripple free. For a firing angle  $30^\circ$ , calculate the input and output performance parameters of this converter. [8M]
- b) Explain the operation of single phase semiconverter feeding RLE load with neat circuit diagram and waveforms also deduce the rms output voltage. [8 M]
- 5 a) Explain the effect of source inductance on three phase full converter in detail. [8 M]
- b) Design a three phase dual converter to achieve at four quadrant operation for  $I_d = 10 \text{ A}$  at 200 V. The converter is supplied from 400 V, three phase and 50 Hz supply.  $I_{\text{ripple}} = 2\text{A}$ . [8 M]
- 6 a) Discuss the working of a single phase bridge type cycloconverter with RL loads and for continuous waveform operation with neat circuit diagram and output rms voltage and current wave form for  $f_o = 4 \text{ fs}$ . [8 M]
- b) Explain the operation of Boost chopper with relevant waveforms and derive the expression for average output voltage. [8 M]
- 7 a) Explain the operation of unipolar switching in full bridge inverter. [6 M]
- b) Explain the operation of three phase bridge inverter for  $120^\circ$  mode of operation with aid of relevant phase and line voltage waveforms. [10M]

\*\*\*\*\*

