

B.Tech III Year I Semester (R15) Supplementary Examinations June 2018

POWER ELECTRONICS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define latching current and holding current.
 - Write any four advantages of GTO over SCR.
 - What is the function of freewheeling diodes in controlled rectifier?
 - Define input power factor in controlled rectifier and write its expression.
 - Explain about time ratio control in choppers.
 - What is meant by DC chopper and write its applications.
 - What does ac voltage controller mean and write its advantages.
 - Write the difference between On-Off control and phase control.
 - Write the application of inverter.
 - Write the advantages of CSI.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Discuss different modes of operation of thyristors with the help of static VI characteristics.

OR

- 3 Explain the operation of TRIAC with the help of its VI characteristics.

UNIT – II

- 4 Describe the working of three phase semi converter and derive the expressions for average output voltage and r.m.s output voltage.

OR

- 5 A single-phase full converter has a RL load having $L = 6.5 \text{ mH}$, $R = 0.5 \Omega$ and $E = 10 \text{ V}$. The input voltage is $V_s = 120 \text{ V}$ at (r.m.s) 60 Hz. Determine: (i) The average thyristor current I_a . (ii) r.m.s thyristor current I_R . (iii) The average output current I_{dc} .

UNIT – III

- 6 Discuss the principle of operation of DC-DC step down chopper with suitable waveforms.

OR

- 7 (a) Explain the operation of Step-up chopper with relevant waveforms
(b) A step-up chopper has an input voltage of 150 V. The voltage output needed is 450 V. Given that thyristor has a conducting time of $150 \mu\text{s}$. Calculate the chopping frequency.

UNIT – IV

- 8 Describe the working of a single phase half bridge inverter. What is its main drawback? Explain how this drawback is overcome.

OR

- 9 What are the different PWM techniques employed for inverter? Explain sinusoidal PWM technique with neat wave forms.

UNIT – V

- 10 (a) Describe the operation of single phase full wave AC voltage controller feeding RL load with relevant waveforms.
(b) A single phase AC voltage controller has a resistive load of $R = 10 \text{ ohms}$ and the input voltage is $V_s = 120 \text{ V}$, 60 Hz. The delay angle of thyristor is 90 degrees. Determine: (i) The r.m.s value of output voltage V_o . (ii) The input power factor. (iii) The average input current.

OR

- 11 Explain the operation of single phase bridge configuration of cyclo-converter with continuous load current.