

Total No. of Questions : 6]

SEAT No. :

P5684

TE/INSEM/OCT.-130

[Total No. of Pages : 2

T.E. (Electrical)

POWER ELECTRONICS

(2015 Course) (Semester-1)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3, or Q4, Q5 or Q6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Explain dynamic Characteristics of SCR during its turn on process. Show the variation of voltage across the SCR and current through it with respect to time during this dynamic process. **[6]**

b) Explain the need of commutation in thyristor circuits. Explain Class D Commutation. **[4]**

OR

Q2) a) Explain working of GTO and specify its applications. **[6]**

b) Explain overvoltage and over current protections for SCR. **[4]**

Q3) a) Describe the principle of step up chopper. Derive an expression for the average output voltage in terms of the input voltage and duty cycle. State the assumptions made. **[6]**

b) Explain switching characteristics of MOSFET. **[4]**

OR

Q4) a) Explain the control strategies used in dc choppers to control output voltage. What are the drawbacks of FM control? **[6]**

b) The step up chopper has input voltage of 200 V and output voltage of 600 V. The conduction time of the thyristor chopper is 200 μ sec. Calculate: **[4]**

i) Chopping Frequency

ii) If pulse width is reduced to half for constant frequency of operation, find new output voltage.

P.T.O.

Q5) Draw a neat circuit diagram for a single phase semi controlled converter feeding a highly inductive load from single phase ac supply at firing angle of 45° . [10]

- a) Draw waveforms for output voltage and current.
- b) Currents carried by controlled and uncontrolled devices.
- c) Write expression for average output voltage and current.
- d) Write expression for rms output voltage and current

OR

Q6) a) Explain the effect of source inductance on the operation of 1 phase fully controlled converter and the concept of overlap angle. [6]

b) A single phase fully controlled bridge converter is fed from 230V, 50 Hz supply and delivering power to the resistance of 10Ω in series with a large smoothing inductor. Find out the following for firing angle of 45° . [4]

- i) $V_{0(av)}$
- ii) $V_{0(rms)}$
- iii) Form Factor
- iv) Ripple Factor

