TE/INSEM/OCT.-130
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 μsec. 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

<div align="center">OR</div>

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 10 Ω 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

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