

Total No. of Questions : 12]

SEAT No. :

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P2316

[4758] - 51

T.E. (Electrical)

POWER ELECTRONICS

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks*
- 4) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Draw and explain switching characteristics of SCR. [8]
- b) State different gate triggering circuits of thyristor. Explain any one in detail. [8]

OR

- Q2)** a) What are different protections provided to SCR? Explain briefly. [8]
- i) dv/dt
- ii) di/dt
- b) Draw and explain Gate characteristic of SCR. [8]

- Q3)** a) With neat circuit diagram and output waveforms explain working of single phase fully controlled converter. Derive expressions for output voltage, average & rms voltage. [Assume load is RL load]. [9]
- b) Explain working of three phase semi converter with output waveforms. Obtain expression for phase and line voltage. [9]

OR

- Q4)** a) What is overlap angle? Derive expression for voltage drop due to overlap angle. [9]
- b) Explain single phase dual converter with circulating current mode, draw output waveforms for $\alpha_1 = 60^\circ$. [9]

P.T.O.

- Q5) a)** Explain four mode operation of TRIAC. [8]
- b) Describe the working of two stage sequence control of voltage regulators for R load. State advantage of it over single phase full wave regulator. [8]

OR

- Q6) a)** Draw neat diagram and explain working of single phase full wave regulator with RL load. Derive rms output voltage expression, with output waveforms. [8]
- b) Explain step by step procedure of design of snubber circuit. [8]

SECTION - II

- Q7) a)** Draw and explain construction of MOSFET and its switching characteristics. [8]
- b) What is Safe Operating Area (SOA)? Compare MOSFET & BJTSOA. [8]

OR

- Q8) a)** Explain IGBT characteristics & Latch up in IGBT. [8]
- b) Explain construction & characteristics of MCT, with applications. [8]

- Q9) a)** How choppers are classified? Explain working of class C chopper with neat circuit diagram. [6]
- b) A step down chopper has input voltage of 200V feeding RLE load with $R = 2\Omega$, $L = 10\text{ mH}$ and $E = 20\text{V}$. The time period of chopping cycle is $1000\mu\text{sec}$ and on time of chopper is $300\mu\text{sec}$.

Find: [10]

- i) Maxi. & mini value of Load current.
- ii) Average load current.

OR

- Q10)a)** For a step down chopper feeding RL load, derive expression for [10]
- i) average output voltage & current
 - ii) RMS output voltage
 - iii) Effective input resistance of chopper

Draw circuit diagram & relevant waveforms

- b) What are control strategies used in chopper circuits? Explain. [6]

- Q11)a)** Draw circuit for 1ph. full bridge inverter feeding inductive load & explain its operation. Draw output voltage and current waveforms. Calculate RMS output voltage. [10]

- b) Explain sinusoidal PWM used for harmonic control in inverters. [8]

OR

- Q12)a)** Explain working of three phase bridge inverter using 180° mode of conduction feeding 3ph resistive load. Draw control signals & phase voltages. [10]

- b) Explain why: [8]

- i) IGBTs are preferred over SCRs in inverter circuits.
- ii) Antiparallel diodes are used across switching devices in inverters feeding inductive loads.

