

Total No. of Questions : 10]

SEAT No. :

P2504

[Total No. of Pages : 2

[5253] - 529

T.E. (Electrical)

Power Electronics

(2015 Pattern) (End Sem.)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Questions 1 or 2, Question 3 or 4, Question 5 or 6, Question 7 or 8, Question 9 or 10.*
- 2) *Assume suitable data, if necessary.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

- Q1)** a) Elaborate effect of source inductance on the performance of single phase fully controlled converter. [5]
b) With neat constructional diagram explain working of GTO. [5]

OR

- Q2)** a) What is time ratio control in dc choppers? Explain the use of TRC for controlling the output voltage in choppers. [5]
b) Draw turn on characteristic of thyristor and define delay time and rise time. [5]

- Q3)** a) A single phase half controlled bridge converter feeds a load comprising of a resistance of 10 ohm and a large inductance to provide a constant and ripple free current. Calculate the average value of output voltage and current. Firing angle is 45° and input ac voltage is 120V, 50Hz. [5]
b) Draw and explain output and transfer characteristics of MOSFET. [5]

OR

- Q4)** a) Compare MOSFET and IGBT. [5]
b) Write a short note on necessity of input filter. [5]

P.T.O.

- Q5) a)** A three phase half wave controlled converter is fed from 3 phase, 400V, 50Hz source and is connected to a resistive load of 10 ohm per phase. Calculate the average value of load voltage and current for a firing angle of 30° and 60°. [8]
- b)** Explain single phase ac regulator feeding inductive load. Draw output voltage waveform and derive equation for rms output voltage. [8]

OR

- Q6) a)** With neat diagram explain four mode operation of a TRIAC. [8]
- b)** Draw and explain three phase semi converter feeding RL load with output wave forms. [8]

- Q7) a)** Explain working of single phase full bridge voltage source inverter. Draw all waveforms. [8]

- b)** For single pulse width modulation with quasi square wave show that output voltage can be expressed as $V_0 = \sum_{n=1,3,5,\dots}^{\infty} \frac{4V_s}{n\pi} \sin \frac{n\pi}{2} \sin n\omega t$ Where V_s is source voltage and pulse width is $2d$. [8]

OR

- Q8) a)** Explain sinusoidal pulse width modulation as used in PWM inverters. Write important features of the same. [8]
- b)** Explain with circuit diagram and waveforms, operation of single phase current source inverter. [8]

- Q9) a)** List different harmonic elimination techniques used in inverter. Explain any two methods in detail. [8]
- b)** Explain working of three phase six step voltage source inverter in 180° mode of operation. For star connected load draw output voltage waveforms. Show devices conducting in each step. [10]

OR

- Q10) a)** Explain working of three phase six step voltage source inverter in 120° mode of operation. For star connected load draw output voltage waveforms. Show devices conducting in each step. [10]
- b)** Draw a neat diagram and explain cascaded multilevel converter. [8]

