

Total No. of Questions : 8]

SEAT No. :

PD4266

[Total No. of Pages : 3

[6403]-62

T.E. (Electrical)

POWER ELECTRONICS

(2019 Pattern) (Semester - V) (303142)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicates full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary.

Q1) a) Describe working of single phase semi converter with RL load. Draw waveforms of load voltage, load current. [6]

b) A single phase fully controlled converter is supplied from 230V, 50Hz source. The load consists of $R = 10\Omega$ and a large inductance so as to render the load current constant. For a firing delay of 45° determine : [6]

- i) Average output voltage
- ii) Average output current.

c) Describe working of circulating current type single phase dual converter with waveforms. [6]

OR

Q2) a) Compare- single phase Fully controlled converter and single phase semi converter on following points. [6]

- i) Output voltage waveform for R load
- ii) Output voltage waveform for RL load
- iii) Average output voltage for R & RL load

b) Draw and explain single phase fully controlled converter feeding R-L load with output voltage and current waveform. [6]

c) 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. [6]

P.T.O.

Q3) a) Draw output voltage waveform for three phase fully controlled converter with R load for $\alpha = 60^\circ$. [5]

b) A three phase fully 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° . [5]

c) Describe working of three phase Semi converter with output waveforms for firing angle of 60° with RL load [8]

OR

Q4) a) Explain single phase ac regulator feeding RL load. Draw output voltage waveform. [5]

b) Derive expression for RMS output voltage (V_{rms}) and current (I_{rms}) of single phase ac voltage regulator feeding R load. [5]

c) Draw neat diagram of two stage AC voltage regulator and explain its working for R load. [8]

Q5) a) State different voltage control techniques used in single phase inverter. Elaborate any one method in detail. [5]

b) Explain Sinusoidal Pulse width modulation with necessary waveforms. [5]

c) 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 2α . [7]

OR

Q6) a) Compare VSI and CSI [5]

b) With neat circuit diagram and waveforms, explain operation of single phase current source inverter. [5]

c) Explain working of single phase full bridge voltage source inverter. Draw all waveforms. [7]

Q7) a) 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]

b) Draw a neat diagram and explain cascaded multilevel converter. [7]

OR

Q8) 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) List different harmonic elimination techniques used in inverter. Explain any two methods in detail. [7]

