

Total No. of Questions : 8]

SEAT No. :

P-7562

[Total No. of Pages : 2

[6180]-76

T.E. (Electrical)

POWER ELECTRONICS

(2019 Pattern) (Semester - I) (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) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- 5) Use of calculator is allowed.

Q1) a) With neat circuit diagram explain operation of single phase fully controlled converter connected to RL Load. Derive the equation for average and rms output voltage. Draw output voltage and output current waveforms for $\alpha = 60^\circ$. [9]

b) A single phase semi converter is supplied from 120V, 60Hz source. The load consists of $R = 10\Omega$. If the average output voltage is 25% of the maximum possible average output voltage, determine- [8]

- i) Delay Angle
- ii) RMS & average output voltage
- iii) RMS & average thyristor current.

OR

Q2) a) With neat circuit diagram explain operation of single phase semi controlled converter connected to RL Load. Derive the equation for average and rms output voltage. Draw output voltage and output current waveforms for $\alpha = 45^\circ$. [9]

b) A single phase full converter is supplied from 230V, 50Hz source and delivering power to the resistance of 10Ω in series with large smoothing inductor. For a firing delay of 45° determine [8]

- i) Average output voltage
- ii) Average output current
- iii) Form Factor
- iv) Ripple Factor

P.T.O.

- Q3) a)** Explain working of three phase half controlled converter with R Load. Draw output voltage and current waveforms. Derive the expression for average and RMS output voltage. [10]
- b)** An On- off-type ac regulator is operating with a resistive load of $R = 10 \text{ Ohm}$ and RMS supply voltage is 230 V . The controller remains on for 40 cycles and is off for 60 cycles. Determine, [8]
- i) RMS Load voltage.
- ii) Input power factor

OR

- Q4) a)** Explain working of three phase full controlled converter with RL Load. Draw output voltage and current waveforms. Derive the expression for average and RMS output voltage. [10]
- b)** Explain operation AC voltage regulator with an output waveform for RL load. Derive the expression for average and RMS output voltage. [8]
- Q5) a)** What is need of controlling output voltage in an inverter? Explain any two method in detail. [8]
- b)** Explain with circuit diagram and waveforms, operation of single phase single phase bridge inverter. Derive the expression for output voltage and current. [9]

OR

- Q6) a)** Explain with circuit diagram and waveforms, operation of single phase current source inverter. [8]
- b)** Explain Sinusoidal Pulse width modulation with necessary waveforms. How voltage and frequency control is achieved. [9]
- Q7) a)** Explain working of three phase voltage source inverter in 120° mode of operation. For star connected load draw output voltage waveforms. Show devices conducting in each step. [10]
- b)** Write short note on Diode clamped multilevel inverter. [8]

OR

- Q8) a)** Explain cascaded multilevel inverter using 3 H-bridges connected to input supply. Draw output voltage waveforms. What are its advantages? [10]
- b)** Explain various PWM techniques used in inverters. How sinusoidal PWM is used for harmonic elimination? [8]

