

Total No. of Questions : 8]

PA-1457

SEAT No. :

[Total No. of Pages : 3

[5926]-73

T.E. (Electrical)

POWER ELECTRONICS

(2019 Pattern) (Semester - I) (303142)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 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 R load. Draw waveforms of load voltage, load current for  $\alpha = 60^\circ$ . [6]
- b) A single phase full 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  $45^\circ$  determine. [5]
- i) Average output voltage
  - ii) Average output current
- c) With neat circuit diagram derive the equation for average and rms output voltage of single phase fully controlled converter connected to RL Load. [6]

OR

- Q2) a) Draw a neat circuit diagram and explain working of a single - phase fully controlled bridge converter feeding RL load with freewheeling diode. [6]
- b) 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 average value of Output voltage and current. Firing angle is 45 degrees and input ac voltage is 120V, 50Hz. [5]
- c) Write short note on single phase dual converter. [6]

P.T.O.

- Q3) a) Explain operation of two stage ac voltage regulator with an output waveform for RL load. [5]
- b) A three-phase half wave-controlled converter is fed from 3 phase, 400 V, 50 Hz 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 degrees. [5]
- c) Explain working of three phase fully controlled converter with RL Load and firing angle of 60 degrees. Draw output voltage waveforms. [8]

OR

- Q4) a) With the help of circuit diagram and waveforms explain operation of Light dimmer. [5]
- b) A three phase full converter operating from 3 phase 415V, 50Hz supply with Resistive load. Determine average output voltage for  $\alpha = 30$  degrees. [5]
- c) Explain working of three phase Semi controlled converter with R Load and firing angle of 30 degrees. Draw output voltage waveforms. [8]

- Q5) a) Explain with neat labeled circuit diagram working of single - phase full bridge voltage source inverter connected to RL load. Draw output voltage and current waveforms. [5]
- b) Compare current source inverter and voltage source inverter. [5]
- c) Derive expression for output voltage in single pulse modulation by fourier analysis. [7]

OR

- Q6) a) What is need of controlling output voltage in an inverter? Explain any one method in detail. [5]
- b) A  $1\phi$  half bridge inverter using transistors has a resistive load of 2 Ohm. The DC supply is 24 V. Calculate. [5]
- RMS output voltage at fundamental frequency.
  - Output power.
  - Average and peak current.
  - Peak reverse blocking voltage of each transistor.
- c) Explain Sinusoidal pulse width modulation with necessary waveforms. How voltage and frequency control is achieved. [7]

- Q7) a) Explain working of three phase inverter with 180 degree conduction mode with neat diagram, switching sequence of switches and output voltage waveforms. [10]
- b) Draw circuit diagram of three level flying capacitor converter and explain its principal of operation. [8]

OR

- Q8) a) Explain working of three phase inverter with 120 degree conduction mode with neat diagram, Switching sequence of Switches and output voltage waveforms. [10]
- b) Draw circuit diagram of three level flying capacitor converter and explain its principal of operation. [8]

