Total No. of Questions : 8]

PA-1457

SEAT No. :

[Total No. of Pages : 3

[Max. Marks : 70

[5926]-73

T.E. (Electrical)

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

Time : 2¹/₂ Hours]

Instructions to the condidates:

- 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° 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.
 - b) A 1 φ half bridge inverter using transistors has a resistive load of 2 Ohm. The DC supply is 24 V. Calculate. [5]
 - i) RMS output voltage at fundamental frequency.
 - ii) Output power.
 - iii) Average and peak current.
 - iv) Peak reverse blocking voltage of each transistor.
 - c) Explain Sinusoidal pulse width modulation with necessary waveforms. How voltage and frequency control is achieved. [7]

[5926]-73

- 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 near diagram, Switching sequence of Switches and output voltage waveforms. [10]

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b) Draw circuit diagram of three level flying capacitor converter and explain its principal of operation. [8]