SEAT No. :

## **P745**

## [Total No. of Pages : 3

# [5870]-1048 T.E. (Electrical) POWER ELECTRONICS (2019 Pattern) (Semester - I) (303142)

Time : 2<sup>1</sup>/<sub>2</sub> 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 side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume Suitable data if necessary.
- Q1) a) Explain working of single phase semi-controlled bridge converter connected to R Load with neat circuit diagram and waveforms. [6]
  - b) Derive the equation for average and rms output voltage of single phase fully controlled converter connected to RL. Load. [6]
  - c) The semi controlled converter with RL Load is connected to a 120 V, 60 Hz supply. The load current  $I_L$  is assumed to be continuous and ripple free. If delay angle is 90 degrees, calculate average output voltage, rms voltage, DF and PF. [6]

OR

**Q2**) a) Explain working of single phase fully controlled bridge converter connected to R Load with neat circuit diagram and waveforms. [6]

- b) Derive the equation for average and rms output voltage of single phase semi controlled converter connected to RL Load. [6]
- c) A single phase fully controlled bridge converter is connected to R Load of  $10\Omega$ . The input voltage to the bridge 1: 230 V. Calculate. [6]

i) Average and RMS load voltage

ii) Average and RMS load voltage

Firing angle is 60 degrees.

- Q3) a) Explain working of single phase AC Voltage regulator with R Load. Draw output voltage waveforms. [5]
  - b) A three phase full converter operating from 3 phase 415 V, 50 Hz supply with Resistive load. Determine average output voltage for  $\alpha = 30$  degrees &  $\alpha = 90$  degrees. [5]
  - c) Explain working of Three phase fully controlled converter connected to R Load with near circuit diagram and waveforms. Consider firing angle  $\alpha = 60$  degrees. [8]

### OR

- Q4) a) Explain working of two stage AC Voltage regulator with RL Load. Draw output voltage waveforms. [5]
  - b) Compare Three phase Semi converter and Three phase fully controlled converters based on Number of SCRs, Quadrant of Operation, Modes of Operation, Energy feedback, Average load voltage for RL Load. [5]
  - c) Explain working of Three phase semi controlled converter connected to R Load with neat circuit diagram and waveforms. Consider firing angle  $\alpha = 30$  degrees. [8]
- Q5) a) Explain working of single phase full bridge voltage source Inverter connected to RL load with neat circuit diagram. Draw output voltage and current waveforms.
  - b) What is need of controlling output voltage in an inverter? Explain any one method in detail [5]
  - c) Compare current source inverter and voltage source inverter [5]

#### OR

- *Q6*) a) Explain working of single phase full bridge voltage source inverter connected to R load with neat circuit diagram. Draw output voltage and current waveforms.
  - b) Explain working of single phase current source inverter with neat circuit diagram. Draw output voltage and current waveforms. [5]
  - c) What is need of UPS? Explain working of UPS with neat circuit diagram.

[5]

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- Q7) a) What are different harmonic elimination techniques in inverter? Explain any one method. [5]
  - b) What is necessity of using Multilevel Inverters? Draw circuit diagram of H bridge multilevel Inverter. [5]
  - c) Explain working of three phase inverter with 180 degree conduction mode with neat diagram and switching sequence of switches. [7]

#### OR

- *Q8*) a) Compare multi-pulse and multilevel inverters. [5]
  - b) Draw circuit diagram of three level flying capacitor converter and explain its principal of operation. [5]
  - c) Explain working of three phase inverter with 120 degree conduction mode with near diagram and switching sequence of switches. [7]