

7. (a) Explain the Multiple Pulse Width Modulation technique of Single phase inverter. Derive the expression for output voltage. (7.5)
- (b) A single phase half bridge inverter has a resistive load of 10 ohms and the center tapped DC input voltage is 100 V. Determine
- rms value of output voltage.
 - rms value of fundamental component of output voltage.
 - First three harmonics of the output voltage waveform.
 - Fundamental power consumption in load.
 - rms power consumed by load. (7.5)

December 2023

B.Tech. (EL) - V SEMESTER

Line Commutated and Active PWM Rectifier
(ELPE-511)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

- It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
- Answer any four questions from Part-B in detail.
- Different sub-parts of a question are to be attempted adjacent to each other.

PART-A

- (a) Define the term Total Harmonic Distortion for a single phase inverter. (1.5)
- (b) Differentiate between Series Inverter and Parallel Inverter. (1.5)
- (c) What is the function of Third winding present in Forward Converter? (1.5)
- (d) Define Bidirectional core excitation Power supplies. (1.5)

- (e) Enlist various power Factor correction methods of Rectifiers. (1.5)
- (f) What do you understand by a line commutated inverter? (1.5)
- (g) Which type of switch is generally used in SMPS? Why? (1.5)
- (h) What are the disadvantages of a single phase full wave mid point converter? (1.5)
- (i) Explain the term circuit turn off time. (1.5)
- (j) A dc chopper operates using current limit control strategy. The maximum value of load current is 250 A and a lower limit of current is 50 A. Determine the limit of current pulsation. (1.5)

PART-B

2. (a) Describe the operation of a single phase full wave uncontrolled rectifier. Derive its various performance parameters. (7.5)
- (b) A dc battery is charged through a resistor and a diode. The source voltage is V_s . Derive an expression for the average value of charging current. (7.5)
3. (a) Explain the operation of single phase Full wave Bridge Converter with RLE load for Inverter mode of operation. (7.5)

- (b) A 230 V, 50 Hz one pulse SCR controlled converter is triggered at a firing angle of 40 degree and the load current extinguishes at an angle of 210 degree. Find the circuit turn off time, average output voltage and the average load current for
 - (i) $R = 5 \text{ ohm}$ and $L = 2 \text{ mH}$
 - (ii) $R = 5 \text{ ohm}$ and $L = 2 \text{ mH}$ and $E = 110 \text{ V}$. (7.5)
- 4. Discuss the working of a Three phase 6 Pulse AC to DC converter. Explain the switching states and draw the output voltage waveforms for different firing angles. Also derive the expression for rms output voltage. (15)
- 5. (a) What are the requirements of Power Supplies? Differentiate between Linear Power supplies and Switched Mode Power Supplies. (7.5)
- (b) Describe the working of a Flyback converter with the help of circuit diagram and suitable waveforms. (7.5)
- 6. What is the need of power factor correction in Rectifier circuits? Explain any *one* method of power factor correction in a single phase rectifier in detail. Show how the power factor gets improved by power factor correction method. (15)