

**005504**

**JAN. 2022**  
**B.Tech. (EL)-V SEMESTER**  
**LINE COMMUTATED AND ACTIVE PWM**  
**RECTIFIERS (ELPE-511)**

Time : 90 Minutes]

[Max. Marks : 25

*Instructions :*

1. *It is compulsory to answer all the questions (1 mark each) of Part-A in short.*
2. *Answer any three questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

**PART-A**

1. (a) Write the functions of Free-wheeling diode in rectifiers. (1)
- (b) What are the advantages of SMPS over Linear power supplies. (1)
- (c) Enlist various methods of power factor improvement in Phase controlled converters. (1)

- (d) Write the advantages of PWM inverters. (1)
- (e) Define the term amplitude modulation ratio for PWM inverters. (1)
- (f) Differentiate between series inverter and parallel inverter. (1)
- (g) What are the various requirements of power supplies? (1)
- (h) Enumerate the applications of Inverters. (1)
- (i) Define the term Transformer utilization factor and rectification efficiency for a uncontrolled rectifier. (1)
- (j) State the condition for which a controlled rectifier can work for Regenerative braking. (1)

### PART-B

- 2. (a) Describe the working of a single-phase half wave diode rectifier with RL load using appropriate circuit diagram and waveforms. Derive the expressions for average and rms value of output voltage and current. (2.5)
- (b) A single-phase full wave rectifier circuit is fed from a 220 V, 50 Hz supply. It consists of four diodes, a load resistance of 20 ohms and a very large inductance, so that the load current is constant. Determine (a) the average output voltage (b) the average load current (c) dc output power. (2.5)

- 3. (a) Explain the working of a single-phase full wave Phase controlled converter with RLE load with continuous conduction. Draw the relevant waveforms of voltage and currents. Also derive the expression for average value of output voltage and current. (2.5)
- (b) A single-phase half wave uncontrolled rectifier with R load is fed from 220 V, 50 Hz ac supply. When  $R = 10 \text{ ohm}$  and firing angle is 45 degrees. Determine (a) average and rms output voltage (b) Form Factor (c) Ripple factor (d) Rectification efficiency. (2.5)
- 4. Discuss the operation of a three phase, phase-controlled converter by showing the switching scheme of all the thyristors. Draw and describe the line voltage and phase voltage waveforms. (5)
- 5. (a) How Single pulse width modulation technique of Bridge inverter is used to control the output voltage of inverter. Explain with the help of relevant waveforms. (2.5)
- (b) Discuss any *one* method of power factor correction of phase-controlled converter. (2.5)
- 6. Give the classification of Switched Mode Power Supplies. Explain the Flyback converter topology in detail. Draw the waveforms and find the relation between output voltage and input voltage. (5)