



-
- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
 6. Non programmable calculator is permitted.

1. a) Design a buck converter to produce an output voltage 18V across a 10Ω load resistor. The output voltage ripple must not exceed 0.5%. The dc supply is 48V, Design for continuous inductor current. Specify the duty ratio, the switching frequency, the values of the inductor and capacitor, the peak voltage rating of each device, and the rms current in the inductor and capacitor. Assume ideal components. **8**

- b) Explain boost converter with diagram and necessary waveforms. **8**

OR

2. a) Describe the classification of chopper in details. **8**

- b) Describe buck boost converter with various loads. **8**

3. a) Explain with a neat circuit diagram the basic principle of a dual converter. **8**

- b) Explain the operation of a single-phase half-controlled bridge a.c. to d.c. converter with RLE loads. Derive the expression for average load voltage, average load current, and RMS load voltage. Also, sketch the associated waveforms. **8**

OR

4. a) What is converter, list the types of converters and explain in details. Explain the effect of freewheeling diode in HWCR. **8**

- b) A single-phase semi converter 230V, 1KW heater is connected across 1 phase 230V, 50Hz supply through an SCR. For firing angle delay of 45° and 90° , calculate the power absorbed in the heater element. **8**

5. a) Write a note on CSI. Give the circuit analysis of the current source inverter with resistive load. **8**

- b) Explain VSI in detail. **8**

OR

6. a) Explain in detail MC Murray Bedford commutated half bridge inverter. 8
- b) Explain three bridge invertors, give its out phase and line voltage waveform. 8
7. a) What is SVM space vector modulation and how does it work. 8
- b) State and explain the methods of voltage control in inverter. 8

OR

8. a) What are techniques of harmonic reduction in inverters, discuss PWM techniques. 8
- b) Describe in detail about single-phase VSI sine triangle PWM. 8
9. a) Give the various configuration of the three-phase ac controller. List the important points of comparison between these circuits. 8
- b) A single-phase-to-single-phase cycloconverter is supplying an inductive load comprising a resistance of 5Ω and an inductance of 40mH from a 230V , 50Hz single-phase supply. It is required to provide an output frequency that is $1/3$ of the input frequency. If the converters are operated as semi converters such that and firing delay angle is 120° . Neglecting the Harmonic content of load voltage, determine:
- (a) rms value of output voltage
- (b) rms current of each thyristor and
- (c) input power factor. 8

OR

10. a) What is an a.c. voltage controller? List some of its industrial applications. Enumerate its merits and demerits. 8
- b) Explain single-phase to single-phase step-up cycloconverter with the help of mid-point configuration in detail. 8
