

Note: i) Attempt any one question from each unit. ii) All questions carry equal marks.
ii) Assume missing data, if any.

UNIT-I

1. a) What is the purpose of resonant converters in the design of SMPS? Explain any one technique.
- b) Explain the following terms related with power supply :
i) Regulation ii) Ripple iii) Power loss iv) Efficiency

OR

2. a) How dual voltage operating capability can be obtained in a power supply? Explain.
- b) Discuss the forward converter topology used in SMPS with the help of appropriate diagrams.

UNIT-II

3. a) Explain the working of a Cuk regulator. Derive the relationship between the average dc output value and duty ratio.
- b) A boost regulator has an input voltage of 12 V. The average output voltage is 15 V with an average load current of 0.5A. The chopping frequency is 20 kHz. If $L = 200 \text{ mH}$ and $C = 400 \text{ pF}$, calculate the duty ratio and ripple current of the inductor.

OR

4. a) Discuss the working of an isolated Fly Back Regulator and derive the expression for rms value of primary current. www.rgpvonline.com
- b) An isolated regulator has 300 turns in the primary and 240 turns in the secondary. The dc input voltage is 150 volts. The regulator operates at 50 kHz and has a 25% duty ratio. The number of turns in the feedback winding is 200. Find the duration and the voltage across the primary and feedback windings during turn - on and turn - off periods.

UNIT-III

5. a) Explain the operation of a three-phase bridge inverter in 120° conduction mode.
- b) A single phase Half bridge inverter with an RL load of $R = 20 \Omega$ and $L = 10 \text{ mH}$, produces a square wave. It is fed from a 120 V dc input. Find the rms load voltage, first fundamental rms and total harmonic distortion.

OR

6. a) Draw and explain the circuit diagram of a three-phase current - driven inverter.
- b) A single-phase full bridge inverter has a pure resistive load of $R = 20 \Omega$ and the output voltage is controlled by multiple PWM technique. The width of each pulse is 28° and each half cycle has 4 pulses. The input voltage is 120 V dc. Find the rms output voltage and the maximum possible input voltage if the maximum pulse width is 35° .

UNIT-IV

7. a) What do you mean by AC choppers? What are the advantages of AC choppers over AC voltage controllers?
- b) Describe the working of a single-phase PWM AC chopper. Analyze its output using Fourier series.

OR

8. Explain the steady - state model of a PWM AC chopper. Describe its phase diagram.

UNIT-V

9. a) What are the losses associated with power switching devices and how they can be reduced by soft switching? Explain.
- b) How zero - voltage switching technique is used to improve the efficiency of the DC - DC converter? Explain.

OR

10. Write short note on the following :

- a) ZCT DC converter b) Generalized switching cell