Elements of Electronics Engineering

Question Bank

Unit – 1

Part – 1 Knowledge/Understanding

1. Explain the forward and reverse biased condition of PN junction. 6 Marks

2. Explain the V-I characteristics of PN junction diode with Shockley's equation 8 Marks

3. Explain the working of Half - Wave Rectifier with circuit diagram and wave form. 6 Marks

4. Explain the working of Full - Wave Bridge Rectifier with circuit diagram and wave form. 6 Marks

5. Explain the working of Half - Wave Rectifier with capacitor filter with the help of circuit diagram and wave form. 6 Marks

6. Explain the working of Full - Wave Bridge Rectifier with capacitor filter with the help of circuit diagram and wave form. 6 Marks

7. What is Regulated power supply? Explain with block diagram. 6 Marks

8. Explain the avalanche and Zener breakdown. 4 Marks

9. Explain load and line regulation of Zener diode. 5 Marks

10. Define the following: 6 Marks

a. PIV b. Reverse break down voltage c. knee voltage d. Reverse saturation current

e. Maximum forward current f. maximum power rating.

11. Compare Half-wave and Full- wave rectifier. 5 Marks

12. List the advantages and disadvantages of half-wave and Bridge rectifier. 6 Marks

Part – 2(Apply)

1. Derive the expression for Ripple factor and efficiency of Half-wave rectifier. 10 Marks

2. Derive the expression for Ripple factor and efficiency of Bridge rectifier. 10 Marks

3. The saturation current density of a pn junction Ge diode is 250mA/m^2 at 300^0K. Find the voltage that must be applied across junction to cause forward current density of 10^5A/m^2 to flow. 5 Marks

I_s = √ I_d = ?

4. A Ge diode is used in a rectifier circuit and is operating at a temperature of 25^0C with a reverse saturation current of 1000µA. Calculate the value of forward current if it is forward biased by 0.22V. Assume the value of η=1 for Ge diode. 4 Marks

5. A half wave rectifier circuit is supplied from a 230V, 50Hz supply with a step-down ratio of 3:1 to a resistive load of 10kΩ. Diode forward resistance is 75Ω, while transformer secondary resistance is 10Ω. Calculate maximum, average, RMS value of current, DC output voltage, efficiency of rectification and ripple factor. 10 Marks

6. A diode with V_f=0.7V is connected as a half wave rectifier. The load resistance is 600 Ω and the RMS AC input is 24V. Determine the peak output voltage, peak load current and diode reverse voltage. 6 Marks

7. A 5KΩ load is fed from bridge connected across a transformer secondary whose primary is connected to 460V, 50Hz supply. The ratio of number of primary turns to secondary turns is 2:1. Calculate DC load voltage, DC load current, ripple voltage and PIV rating of diode. 8 Marks

8. The four diodes in a bridge rectifier circuit have negligible forward resistance and infinite reverse resistance. The ac supply is 240Vrms and load resistance is 48Ω. Calculate the average load current and efficiency. 4 Marks

9. A bridge rectifier has a load of 2KΩ. The AC voltage applied to the diodes is 200-0-200V. Assuming ideal diodes, calculate i) Average DC current ii) Average DC voltage and iii)Ripple voltage. If a capacitor of value 500µF is connected across the load. What is the new value of the ripple voltage. Assume f=50Hz. 8 Marks

10. For a Zener regulator R=2.2K Ω, RL=1K Ω, calculate the range of input voltage for which output will remain constant. VZ=6.1V, IZmin=2.5mA, IZmax=25mA, Rz=0 Ω. 6 Marks

11. In a Zener voltage regulator R=1k Ω, vin=50V, Zener ratings are VZ=10V, IZmin=5mA, IZmax=32mA, Rz=0 Ω. Find the range of RL, IL for a load voltage to be constant. What is the maximum wattage of diode. 6 Marks

Part 3 (Analysis/Design)

1. Design a zener regulator for following specification: Load current I_L = 20mA output voltage V0 = 5 V, Zener wattage Pz = 500mW, Input voltage Vi= 12+2V and I_{Zmin} = 8 mA. 5 Marks

2. A 9V reference source is to be designed using a Zener diode and a resistor connected in Series to a 30V supply. Select suitable components and calculate the circuit current when the supply voltage drops to 27V. Assume Zener current is 20mA. 5 Marks