ABV-INDIAN INSTITUTE OF INFORMATION TECHNOLOGY & MANAHEMENT GWALIOR

B.Tech CS/BMS/EEE (Academic Session: 2023-2024)
Fundamental of Electrical and Electronics (EE-101)
Major Exam

Date: 01/12/2023
Time: 10 AM - 1 PM

Duration: 3 Hour
Max. Marks: 60

Semester - I
Faculty: Dr. Pinku Ranjan

Important Instructions:

- **This is a closed book, closed notes examination.**
- **This question paper comprises a total of 15 questions.**
- **All the questions are compulsory and attempt all questions in sequence.**
- **All notations have their usual meanings.**

1. Describe the physical mechanism of avalanche and Zener breakdown in a p-n junction diode. **(4 Marks)**
2. Draw and explain the V-I characteristics of a p-n junction diode with neat diagram. **(4 Marks)**
3. Draw the full wave rectifier circuit using center tap transformer and explain its operation with wave form taking input as sin wave. **(4 Marks)**
4. Draw the circuit of bridge rectifier and explain its operation. Give the input and output waveforms. **(4 Marks)**
5. A halfwave rectifier circuit is supplied from a 230 V, 50 Hz supply with a step-down ratio of 3:1 to a resistive load of 10 k ohm. The diode forward resistance is 75-ohm while transformer secondary resistance is 10 ohms. Calculate maximum, average, RMS values of current, D.C. output voltage, efficiency of rectification and ripple factor. **(4 Marks)**
6. A Zener diode has a breakdown voltage of 10 V. It is supplied from a voltage source varying between 20-40V in series with a resistance of 820 ohm. Using an ideal Zener model obtain the minimum and maximum Zener currents. **(4 Marks)**
7. Clearly show the biasing arrangement of a NPN transistors for conduction and describe with neat diagram. **(4 Marks)**
8. Draw a sketch to show the various current components in a NPN transistor and deduce the relation between various current components. **(4 Marks)**

9. For a certain transistor, 99.6 %of the carriers injected into the base cross the collector-base junction. If the leakage current is 5 A and the collector current is 20 mA, calculate: i) The value of α ii) The emitter current. **(4 Marks)**

10. A transistor has $\alpha=0.9$. If $I_E=10mA$, find the values of β, γ, I_B and I_C. **(4 Marks)**

11. Explain with suitable diagram: **(4 Marks)**

    a. Series Negative Clipper Circuit

    b. Series Positive Clipper Circuit

    c. Parallel Clipper with Positive Clipping

    d. Parallel Clipper with Negative Clipping

12. Write Comparison of Rectifier Circuits (Half wave, Full wave and Bridge) **(4 Marks)**

13. Define and write the expressions for the average dc current, dc load voltage, rectifier efficiency, ripple factor, PIV rating and ripple frequency for the full wave rectifier circuit with two diodes. **(4 Marks)**

14. Define Active region, Saturation region and Cut-off region with respect to transistor biasing. **(4 Marks)**

15. Establish the relationship between α and β. **(4 Marks)**