Reg No:..... K24FY 1484 (B)
Name :.....

First Semester FYUGP Physics Examination
NOVEMBER 2024 (2024 Admission onwards)
KU1DSCPHY115 (SEMICONDUCTOR PHYSICS AND ELECTRONICS)

(DATE OF EXAM: 4-12-2024)

Time : 90 min Maximum Marks : 50

Part A (Answer any 6 questions. Each carries 2 marks)

1. Why do different elements have different properties? 2
2. Distinguish between intrinsic and extrinsic semiconductors 2
3. Represent graphically the input and output signals of a half wave rectifier 2
4. Write the expression for efficiency of a full-wave rectifier.What is its maximum value? 2
5. Why is a zener diode heavily doped? 2
6. What are the various parts of the transistor? 2
7. Draw common emitter npn transistor circuit 2
8. Give the expression for input and output resistance in common emitter connection 2

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Part B (Answer any 4 questions. Each carries 6 marks)

9. A dc source generating 500 V has an internal resistance of 1000 ohm. Find the load current if load resistance is (i) 10 ohm (ii) 50 ohm (iii) 100 ohm. 6
10. Name the commonly used semiconductors? Draw the orbital diagram for the commonly used semiconductors. 6
11. A full wave rectifier uses two diodes. The internal resistance of each diode may be assumed to be constant at 20Ω. The transformer r.m.s from centre tap to each end of secondary is 50V and load resistance is 980Ω .Find the mean load current and r.m.s value of load current 6
12. Explain how the Zener diode maintains constant voltage across the load. 6
13. For an npn transistor connected in CE configuration, $\beta = 45$, and the voltage drop across the 1kΩ collector resistance is 1 V. Determine the base current 6
14. Define α and show that it is always less than unity 6

Part C (Answer any 1 question(s). Each carries 14 marks)

15. (a) Analyze the role of the depletion region in controlling current flow through a pn junction under different biasing conditions. How does the width of the depletion region change with biasing? 7

(b) Describe the voltage-current (V-I) characteristics of a pn junction diode under both forward and reverse bias conditions. How do these characteristics change with different materials like silicon and germanium? 7

16. Explain the role of valence electrons in electrical conductivity by comparing their behavior in conductors, semiconductors, and insulators. Discuss how the number of valence electrons affects the flow of free electrons and the overall conductivity of each material. 14

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