A000171(028)

B. Tech. (Hon's) (First Semester) Examination, Nov.-Dec. 2023

(ESE Branch)

FOUNDATION of ELECTRONICS ENGINEERING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) from each question is compulsory & carries 4 marks each. Attempt any ***two*** *parts from (b), (c) and (d) of each question & carries 8 marks each.*

Unit-I

1. (a) Explain the significance of the small-signal model of non-linear devices in electronic circuits. 4

(b) Demonstrate about donor and acceptor impurities in semiconductors. How do they affect the conductivity of the material? 8

(c) Briefly differentiate between metals, semiconductors and insulators based on their electrical properties and energy band structures. 8

(d) Describe Poisson's equation and its relevance in semiconductor physics. 8

Unit-II

2. (a) Differentiate between homo-junction and hetero-junction. 4

(b) Describe the IV characteristics of a diode. What regions are typically observed in these characteristics? 8

(c) Provide an overview of small-signal models of diodes. How are they useful in circuit analysis? 8

(d) Briefly explain bridge rectifier. 8

Unit-III

3. (a) Explain the structure of BJT. 4

(b) Draw and label the IV characteristics of a bipolar transistor. Explain the Early effect. 8

(c) Briefly discuss the Ebers-Moll model for bipolar transistors. 8

(d) Give difference between BJT and FET. 8

Unit-IV

4. (a) Describe the features of a JFET. 4

(b) Why is a field-effect transistor (FET) considered essentially a voltage-controlled device? Explain the role of gate voltage in FET operation. 8

(c) Define accumulation, depletion, and inversion regions in a MOSFET. 8

(d) Outline the CV characteristics of a MOSFET? 8

Unit-V

5. (a) Highlight advantages and disadvantages of CB configuration. 4

(b) Provide a brief explanation of the common-source amplifier configuration and its significance in electronic circuits. 8

(c) Explain the operation of a common collector amplifier with neat circuit diagram. 8

(d) Explain the input and output characteristics of common-emitter configuration of a BJT.. 8