Roll No. 2300101 7055

Total Pages : 03

017302

December 2024

B.Tech. (ENC/EEIoT) (Third Semester)

Semiconductor Devices (ECP 302)

Time : 3 Hours] *[Maximum Marks : 75*

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

1. (a) Define the drift phenomenon. **1.5**

(b) What are extrinsic semiconductors ? **1.5**

(c) Draw the circuit of Zener diode as a voltage regulator. **1.5**

(d) What do you understand by solar cell ? **1.5**

(e) What is the relation between α and β ? **1.5**

(f) Why the thickness of base in BJT is small ? **1.5**

(g) What is channel length modulation ? **1.5**

(h) Draw the small signal model of MOS Transistor. **1.5**

(i) What is Photodiode ? **1.5**

(j) What do you understand by oxidation in fabrication ? **1.5**

Part B

2. (a) With the help of E-k diagram explain direct and indirect semiconductor. Also give examples. **8**

(b) Derive the expression for electron diffusion current. **7**

3. (a) Explain the working of P-N junction diode in detail. **10**

(b) Explain the process of Avalanche breakdown. **5**

4. Draw the structure of n-channel Enhancement MOSFET. Explain the process of current flow in the device in detail. Also draw its characteristics curves. **15**

5. (a) Explain the switching characteristics of P-N junction. **7**

(b) Draw the structure of n-channel junction FET and explain its working in detail. **8**

6. (a) Explain the working of Bipolar Junction Transistor in detail. **8**

(b) Draw and explain the input and output characteristics of common emitter configuration. **7**

7. Explain the following fabrication process : **15**

(a) Ion implantation

(b) Chemical vapour deposition

(c) Photolithography.