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L – 6108

Reg. No. :

Name :

Third Semester B.Tech. Degree Examination, May 2021

08.302 ; SOLID STATE DEVICES (TA)

(2008 Scheme)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer all questions. Each question carries 4 marks.

1. Explain effective mass?
2. Differentiate between drift and diffusion in a semiconductor.
3. Consider a N-type Silicon. If it is doped with $2 \times 10^{15} / \text{cm}^{-3}$ P atoms, find majority and minority concentration in the semiconductor at room temperature?
4. Show that there exists no gradient in Fermi level in a semiconductor, irrespective of the doping in the semiconductor?
5. Differentiate between avalanche breakdown and Zener breakdown in semiconductor PN junction?
6. Draw the energy band diagram of a Schottky diode formed with N-type semiconductor and explain?
7. Derive the relationship between collector injection efficiency and current transfer ratio of a BJT?
8. Explain the C-V characteristics of a MOS capacitor?
9. Explain DIBL in MOSFETs?
10. Explain the output characteristics of an IGBT?

(10 x 4 = 40 Marks)



P.T.O.



PART – B

Answer any two questions from each Module. Each question carries 10 marks.

Module – I

11. Explain how mobility of a semiconductor can be measured experimentally. Derive the expression for mobility in this case?
12. Derive the expression for the width of a depletion region of a PN junction? What will be the expression for the same if it is a one sided junction?
13. Explain a semiconductor junction under equilibrium? What happens if a bias is applied across the junction? Describe using energy band diagrams.

Module – II

14. Explain the effect of forward bias and reverse bias on an ohmic contact?
15. A P-N junction has an area of 10^{-2} cm^2 and $N_D = 2 \times 10^{15} / \text{cm}^3$. Plot the junction capacitance against applied reverse bias of 1V, 5V and 10V?
16. Explain the working of BJT as a switch?

Module – III

17. Explain channel length modulation and velocity saturation in MOSFETs?
18. Explain the working of a JFET. Derive the expression for its drain current?
19. Explain the principle of working of a UJT? With the help of an equivalent circuit derive the expression for the intrinsic stand-off ratio of the UJT.



(6 × 10 = 60 Marks)

