

Register No:

Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER B.TECH DEGREE EXAMINATION(R), NOVEMBER 2024**Common to Electronics and Communication Engineering & Electronics Engineering (VLSI Design and Technology)
(2024 SCHEME)****Course Code : 24EST1004-J****Course Name : Semiconductor Physics and Devices****Max. Marks : 60****Duration: 2.5 Hours****PART A***(Answer all questions. Each question carries 3 marks)*

1. Why is Fermi level important in determining the electrical properties of a material?
2. What is the significance of the saturation current (I_0) in the diode current equation?
3. Why is transistor considered a current-controlled device?
4. Write the equation for transconductance g_m in a MOSFET and explain terms.
5. Which parameter determines the colour of light emitted by an LED?

PART B*(Answer one full question from each module, each question carries 9 marks)***MODULE I**

6. Explain what happens to s and p subshells of outermost shell, when neighbouring atoms interact in the crystal structure of Silicon. 9

OR

7. Explain Fermi Dirac distribution. Compare the behavior of Fermi-Dirac distribution function at different temperatures. 9

MODULE II

8. Discuss the role of the depletion region in preventing current flow under equilibrium conditions in a PN junction. How does the width of the depletion region vary with doping levels? 9

OR

9. Explain the two main mechanisms of reverse breakdown in a PN junction diode. 9

MODULE III

10. Discuss the current gain γ in the Common Collector (CC) configuration. Derive the relationship between β and γ . 9

OR

11. Explain the input and output characteristics of Common Emitter configuration. 9

MODULE IV

12. Explain the VI characteristics of JFET. 9

OR

13. Explain the VI characteristics of MOSFET. 9

MODULE V

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| 14. Describe the structure and working of Photo Diode. | 9 |
| OR | |
| 15. Describe the structure and operation of Varactor Diode. | 9 |
