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18EC33

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Electronics Devices

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the classification of material based on conductivity and energy band diagram. (08 Marks)
- b. With a neat diagram explain direct and indirect semiconductor. (08 Marks)
- c. Describe different types of bonding forces in solids. (04 Marks)

OR

- 2 a. What is Hall effect? With suitable diagram and equation explain how does Hall - effect works. (08 Marks)
- b. Discuss Electron-Hole pair concept with the help of neat diagram and equations. (08 Marks)
- c. Calculate the Intrinsic carrier concentration in Silicon at room temperature $T = 300\text{ K}$, where B is the material dependent parameter 5.4×10^{31} and E_G as the bandgap energy 1.12 eV , where K is the Boltzman constant $= 8.62 \times 10^{-5}\text{ eV/K}$. (04 Marks)

Module-2

- 3 a. What is tunneling? Explain voltage current characteristic of a tunnel diode with the help of energy band diagram. (10 Marks)
- b. Describe Avalanche breakdown with relevant equations. (10 Marks)

OR

- 4 a. Outline the qualitative description of current flow at P-N junction under equilibrium and biased condition. (10 Marks)
- b. Illustrate the structure and operation of solar cell. Indicate the significance of Fill Factor. (10 Marks)

Module-3

- 5 a. Draw the Ebers – Moll model for a PNP transistor and explain its significance. (10 Marks)
- b. Describe how BJT acts as a amplifier with the help of equation. (10 Marks)

OR

- 6 a. Explain the process flow for double polysilicon self aligned BJT Fabrication. (10 Marks)
- b. Discuss the effect of base narrowing with neat diagram. (05 Marks)
- c. Mention the specification for switching transistor BJT with suitable diagram. (05 Marks)

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Module-4

- 7 a. Draw and describe the I-V characteristics of n-channel PNJFET for different biasing voltages. (07 Marks)
- b. Outline small signal equivalent circuit of JFET with neat diagram. (07 Marks)
- c. Discuss two terminal MOS structure using energy band diagram. (06 Marks)

OR

- 8 a. Explain n-channel enhancement and depletion type MOSFET with their circuit symbols. (10 Marks)
- b. Describe the ideal capacitance voltage characteristics of an MOS capacitor with P-type substrate. (10 Marks)

Module-5

- 9 a. With schematic diagram, illustrate ION-implementation system. (07 Marks)
- b. Describe low pressure chemical vapour deposition reactor. (07 Marks)
- c. Explain the process of Photolithography. (06 Marks)

OR

- 10 a. Explain integration of other circuit elements with suitable diagram. (10 Marks)
- b. Discuss CMOS process of integration with the help of neat diagram. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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