

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)



B. Tech (Fourth Semester - Regular) Examinations, April 2026 23BVTPC24004 – Microfabrication and Semiconductor Materials EE (VLSI)

Time: 3 hrs

Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

- | | CO # | Blooms
Level |
|---|------|-----------------|
| a. Define Packing Factor (PF) and state its significance in determining the properties of crystal structures. | CO1 | K1 |
| b. What is point defect in crystalline solid? | CO1 | K1 |
| c. Explain the function of masks in lithography. | CO2 | K2 |
| d. What is polishing in wafer preparation? | CO3 | K2 |
| e. What is X-ray lithography? | CO4 | K3 |

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

- | | Marks | CO # | Blooms
Level |
|---|-------|------|-----------------|
| 2. a. Find following characteristic parameter for BCC system: | | | |
| i) Number of atoms per unit cell | | | |
| ii) Coordination Number | 5 | CO1 | K2 |
| iii) Atomic radius | | | |
| iv) Packing Fraction | | | |
| b. Differentiate between intrinsic and extrinsic semiconductors. | 5 | CO2 | K4 |
| (OR) | | | |
| c. Draw and explain the band-structure for n-type and p-type semiconductors including fermi level. | 5 | CO1 | K2 |
| d. What is doping? Explain different doping techniques in short. | 5 | CO2 | K2 |
| 3.a. Explain the Float-Zone (FZ) technique for crystal growth with neat sketch. Discuss its advantages and disadvantage for crystal growth. | 10 | CO3 | K2 |
| (OR) | | | |
| b. What is defects in crystal. Explain defects for ionic and non-ionic crystal with neat diagram. | 10 | CO3 | K2 |
| 4.a. Explain oxide-growth kinetics for growth of oxide on silicon substrate. | 10 | CO4 | K3 |
| (OR) | | | |
| b. Explain the process of photolithography in electronic chip fabrication industry with neat diagram. | 10 | CO4 | K3 |
| 5.a. Draw the schematic of ion implementation system and explain its working steps. | 10 | CO5 | K4 |
| (OR) | | | |
| b. Explain different types of diffusion mechanisms in Silicon with neat diagrams. | 10 | CO5 | K4 |
| 6.a. Explain the significance of metallization in IC fabrication. | 5 | CO6 | K3 |
| b. Explain nanoimprint lithography in short. | 5 | CO6 | K3 |
| (OR) | | | |
| c. Explain Physical Vapor Deposition (PVD) with a neat diagram. | 5 | CO6 | K3 |
| d. Explain electron beam lithography (E-beam lithography) in short. | 5 | CO6 | K3 |

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