

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATION- 2026

B. Tech.-Vth Semester (EE (VLSI Design & Technology))

COURSE CODE (CREDITS): 25B11EC520 (3)

MAX. MARKS: 15

COURSE NAME: Fundamentals of Semiconductor Devices

COURSE INSTRUCTOR: Dr. HARSH SOHAL

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed

Q. No.	Question	CO	Marks
Q1	(a) Explain different types of cubic lattices with suitable diagrams. (b) Define a coordination number in crystalline solids? Calculate the coordination number for a BCC crystal.	1	2+2=4
Q2	(a) Describe the term distribution coefficient (k_d) while doping during growth of substrate. What are the factors effecting its value?	1	2
Q3	An 'Si' crystal is to be grown by Czochralski's method and it is desired that the ingot contain 10^{15} phosphorous atoms/cm ³ . Si density is given to be 2.34g/cm ³ (a) What concentration of Phosphorous atoms should the melt contain to give this impurity concentration in the crystal during the initial growth? For P in Si, $k_d = 0.30$. (b) If the initial load of Si in the crucible is 4kg, how many grams of phosphorous should be added? Atomic weight of phosphorous is 31.	1	3
Q4	What are direct and Indirect semiconductors? Differentiate the two on the basis of their E_g vs k diagrams. Also mention their application areas.	2	3
Q5	How the variation in alloy composition in compound semiconductors does varies the Energy band diagram? Explain. Also plot the Band gap energy vs fraction 'x' for the compound $Al_xGa_{1-x}As$. for 'x' ranging from 0 to 1.	2	3