Seat No. _____

HC-003-0491109

B. Sc/M. Sc. (Applied Physics) (Sem. X) (CBCS) Examination

April - 2023

Nanostructuring with Ion Beams : Paper-16 (Elective-4)

(New Course)

Faculty Code : 003

Subject Code : 0491109

Time : $2\frac{1}{2}$ / Total Marks : **70**

Instructions :

(1) All questions are compulsory.

(2) Numbers in the right margin indicate marks.

1 Attempt any seven short questions : (two marks each) **14**

(1) What is preferential sputtering ?

(2) What is primitive and non-primitive cell ?

(3) Define ion implantation.

(4) Define roughness of the surface and write its equation.

(5) What is unit cell ?

(6) Write down the difference between crystalline and amorphous solid.

(7) What do you mean by Basis or Motif ?

(8) Define Frenkel defect.

(9) Define range and projected range.

(10) What is adatom ?

2 Write the answer of any two questions : **14**

(1) Discuss stereographic projection.

(2) What are symmetry operators ? Discuss different symmetry operations with example.

(3) Derive the relation of atomic size and nearest neighbour ion for simple cubic, body centered cubic and face centered cubic.

(4) Discuss different types of crystal systems.

3 Write the answer of any two questions : **14**

(1) Define surface binding energy and displacement energy of an atom in the target.

(2) Discuss different defect formation during energetic ion bombardment on target.

(3) Discuss linear collagen cascade for ion bombardment on elemental target.

(4) Explain five basic two dimensional Bravis lattice.

4 Write the answer of any two questions : **14**

(1) Explain kinetic roughening with the help of Bradley-Harper mechanism.

(2) Explain in detail about implantation damage and discuss the ways in which it can be healed.

(3) Write a note on diffusion enhanced non-roughening phenomena with Ehrlich Schwoebel mechanism.

(4) What is the difference between Bradley-Harper and Ehrlich Schwoebel mechanisms ?

5 Write the answer of any two questions : **14**

(1) Explain the working of ion implanter.

(2) Write a short note on Bradley-Harper model.

(3) List out the applications of patterned thin films.

(4) Write the advantages of ion induced ripple formation over nano photolithography.
