

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2024

B.Tech-II Semester (BT/BI)

COURSE CODE(CREDITS):04

MAX. MARKS: 15

COURSE NAME: Bioinstrumentation Techniques (18B11PH212)

COURSE INSTRUCTORS: Dr. Ragini Raj Singh

MAX. TIME: 1 Hour

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

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

**Q.1.** What is the relation between accelerating voltage and interaction volume; and atomic number and interaction volume in SEM analysis? [Marks: 1.5, CO: 1]

**Q.2.** Differentiate SE1 and SE2. Also list the factors that affect SE emission. [Marks: 1.5, CO: 1]

**Q.3.** What is innovative in ESEM in comparison to conventional SEM? Discuss GSE detector of ESEM with the help of diagram. [Marks: 2, CO: 1]

**Q.4.** Discuss in short [Marks: 1.0 each, CO: 2]

- (1) Spherical Aberration
- (2) Chromatic Aberration
- (3) Immuno-labeling
- (4) Negative staining

**Q.5.** Solve the following problems [Marks: 1.5 each]

(1) Copper has FCC structure and the atomic radius is 1.278 Å. Calculate its density. Given  $M=63.54$ . [CO: 1]

(2) Obtain the Miller indices of a plane with intercepts  $(a/2, b, 3c)$  in a SC unit cell. [CO: 2]

(3) In a general lattice  $a=b=3 \text{ \AA}$  and  $c=2 \text{ \AA}$ . Deduce the lattice spacing between for (111) plane. [CO: 2]

(4) Find the perpendicular distance between two planes having Miller indices (2, 2, 2) and (4, 4, 4) in a unit cell of a cubic lattice constant parameter  $a$ . [CO: 3]