

Packing density :

Total No. of Questions: 4

Enrollment No. EN21C8304039



Faculty of Engineering

Mid Sem – II Examination May – 2022

EN3BS13/SC3BS05 Engineering Physics

Programme: B.Tech./ B.Sc.(CS, AIML, CTIS, MAIS) Branch/Specialisation: All

Duration: 2 Hrs.

Maximum Marks: 40

- Q.1
- The scattered radiation in the Compton effect has _____ 1
a. Lower frequency b. Higher frequency
c. No change in frequency d. None of these
 - The uncertainty in the location of a particle is equal to its de-Broglie wavelength, then the uncertainty in its velocity will be: 1
a. Equal to its velocity b. Half of its velocity
c. Twice its velocity d. Four times its velocity
 - A moving particle is associated with a wave packet. The group velocity is equal to 1
a. Velocity of light b. Velocity of sound
c. Velocity of the particle d. None of the above
 - A particle moving in an infinitely deep potential well can have energies that are multiple of: 1
a. n b. n^2 c. $1.5n$ d. n^3
 - The equation of motion of matter waves was derived by: 1
a. Heisenberg b. de-Broglie
c. Schrödinger d. Bohr
 - The SI unit of packing density is: 1
a. g/m^2 b. kg/cm^2 c. mg/mm^2 d. none of the above
 - The lattice planes of a crystal have intercepts $2a$, $3b$, and $6c$ on the axes. The Miller indices will be: 1
a. (1 2 3) b. (3 2 2) c. (3 2 1) d. (2 1 3)
 - If $a=b=10.73 \text{ \AA}$, $c=14.3 \text{ \AA}$, $\alpha=\beta=90^\circ$, and $\gamma=120^\circ$, the crystal structure is: 1
a. Triclinic b. Monoclinic
c. Orthorhombic d. Hexagonal

Critical temperature: highest temp at which subs. can exist as liquid.

- ix. In a metal, 1
a. The electrical conduction is by electrons and holes
b. With the rise in temperature, the conductivity decreases
c. The conduction band is empty
d. There is a small energy gap between the two bands
- x. Superconductors are perfect: 1
a. Ferromagnetic materials
b. Diamagnetic materials
c. Paramagnetic materials
d. Antiferromagnetic materials
- Q.2 i. What is uncertainty principle? 2
ii. Derive an expression for the energy and eigenfunction for a particle trapped inside an infinitely deep potential well. 8
- OR iii. Sketch and explain the Compton effect and obtain an expression for the Compton shift. Can we observe this effect in visible radiation? Justify your answer. 8
- Q.3 i. What are the assumptions of classical free electron theory. 2
ii. Sketch and discuss cubic lattices. 3
iii. Discuss the Hall effect with the help of an illustration and derive an expression for the Hall voltage. 5
- OR iv. What do you understand by Fermi level? Discuss its position in intrinsic and extrinsic semiconductors with the help of neat diagrams. 5
- Q.4 i. Define and explain the following: 3
(i) Unit cell, (ii) Packing density, and
(iii) Critical temperature
- ii. Discuss wave velocity and particle velocity and establish a relationship between them. 7
- OR iii. Sketch and explain the Meissner effect. Discuss type-I and type-II superconductors with an example of each. 7

Unit cell: Smallest group of atoms / ~~base~~
Smallest repeated unit with full crystal
packing density structure symmetry