

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)**Continuous Assessment Test -I (CAT-I) Winter Semester (2022-23)**

Course Name & code : Material Science and Engineering (BCHE 206L)
Programme Name & Branch : B.Tech (Chemical Engineering)
Class Number : VL202230501327
Slot : B1+TB1
Faculty Name : Dr. K. Sivagami
Exam Duration : 90 mins Maximum Marks : 50 Marks

General instruction(s): Assume data if necessary

Q. No.	Question	Max Marks
1.	Cite the four components that are involved in the design, production, and utilization of materials, and briefly describe the interrelationships between these components in the selection of materials for the specific application.	10 (6)
2.	a. Describe in detail about the quantum numbers used to locate the distribution and position of electrons in an atom (8 Marks) b. Why is Tungsten (atomic number -74) much stronger than Aluminium (atomic number -13) though both are metallic? (2 Marks)	10 (9)
3.	Classify the ceramics based on their microstructure. List out its general properties and application of polymer matrix composites and ceramic matrix composites (2+4+4)	10
4.	a. Define Atomic Packing Factor. Calculate the atomic packing factor for Face Centered Crystal (FCC) structure. (6 Marks) b. The atomic radius of Fe is 0.124 nm. Find the lattice parameter of Fe. Consider Fe in the Body Centered Crystal structure. (4 Marks)	10 (10)
5.	a. Copper has an atomic radius of 0.128 nm, an FCC crystal structure, and an atomic weight of 63.5 g/mol. Compute its theoretical density, and compare it with its measured density (8.94 g/cm ³). (5 Marks) b. List out the axial relationship and inter-axial angles relationships with unit cell geometries for any five crystal systems. (5 Marks)	10 (10)