

**VIT****Vellore Institute of Technology**
(Deemed to be University under section 3 of UGC Act, 1956)**Continuous Assessment Test -I (CAT I) Winter Semester (2023-24)**

Course Name & code : Materials Science and Engineering & BCHE206L
Programme Name & Branch : BCM & School of Chemical Engineering
Class Number : VL2023240501189
Slot : C1+TC1
Faculty Name : Prof. Samarshi Chakraborty (17023)
Exam Duration : 90 minutes **Maximum Marks:** 50 Marks

General instruction(s):

1. All questions are to be answered. 2. Carrying a Periodic Table is allowed.

Q. No.	Question	Max Marks
1.	a) Why should you study material science and engineering as a chemical engineering undergraduate student? (3 Marks) b) Differentiate between various ferrous metals based on their properties and application area. (7 Marks)	10
2.	a) Differentiate between primary and secondary atomic bonds. (5 Marks) b) Cerium has four naturally occurring isotopes: 0.185% of ^{136}Ce , with an atomic weight of 135.907 amu; 0.251% of ^{138}Ce , with an atomic weight of 137.906 amu; 88.450% of ^{140}Ce , with an atomic weight of 139.905 amu; and 11.114% of ^{142}Ce , with an atomic weight of 141.909 amu. Calculate the average atomic weight of Ce. (5 Marks)	10
3.	a) What are the key features of a smart material? (4 Marks) b) Identify key differences between Bohr's model and Heisenberg's uncertainty principle on atomic structure. (6 Marks)	10
4.	a) Write short notes on Miller indices and crystal directions. (4 Marks) b) Show that the atomic packing factor for the BCC crystal structure is 0.68. (6 Marks)	10
5.	a) Differentiate different types of crystal defects. (5 Marks)	10