

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2024)

CLASS: BTECH
BRANCH: Chemical Engineering

SEMESTER : IV
SESSION : SP/2024

SUBJECT: CL227 MATERIALS SCIENCE AND ENGINEERING

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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	Marks	CO	BL
Q.1(a) Calculate the Atomic Packing Factor (APF) for FCC. Draw (111) plane in cubic lattice.	[2]	1	3
Q.1(b) Difference between single crystal and poly crystal. Discuss the material structure which affect the optical properties of aluminium oxide	[3]	1	2
Q.2(a) Define Gibbs Phase rule. Discuss Hyper eutectic and Hypo eutectic alloys.	[2]	1	1
Q.2(b) Discuss the structure sensitive and structure insensitive properties of materials. Give example of two engineering applications where single crystal is essential.	[3]	2	3
Q.3(a) Write the parameters needed for prediction of the density of a material. Classify the defects based on dimensionality.	[2]	1	1
Q.3(b) Show the variation in concentration for core vs equilibrium structural composition of Cu-Ni phase 46wt% composition. List the types of defects arise in solids.	[3]	2	2
Q.4(a) Explain the function of slag used in metal extraction. What are the demerits of carbon smelting?	[2]	3	2
Q.4(b) What are the basic steps of sinter roasting? Describe the densification curve for sintering.	[3]	3	2
Q.5(a) Write down the specific chemical reactions involved in leaching processes in presence of acid and alkali. Point out the limitations of these processes.	[2]	3	2
Q.5(b) Draw the various types of jaw crushers and write down the salient features of these.	[3]	3	3

:::23/02/2024 M:::