BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : V**
BRANCH: CHEM. ENGG **SESSION : MO/22**

SUBJECT: **CL309R1 MATERIALS SCIENCE AND ENGINEERING**

TIME: 3hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions all questions are mandatory.
2. The missing data, if any, may be assumed suitably.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. Answer in brief and to the point

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Q.1(a)	Illustrate the factors on the properties of a material.	[2]
Q.1(b)	Outline the functionally graded materials. Give examples.	[3]
Q.1(c)	Classify defects in materials. Discuss Frenkel defects and Schottky defects.	[5]
Q.2(a)	Describe the cooling curve for 50% Ni and 50% Cu alloy cooling curve during casting.	[2]
Q.2(b)	Explain the relative amount and sizes of eutectic cells in equivalent volume of inoculated and uninoculated iron.	[3]
Q.2(c)	Show the Temperature vs composition of Ni-Cu phase diagram. Examine the strategies required for strengthening grain size.	[5]
Q.3(a)	Why do we need concentration step during extraction of metals from ores?	[2]
Q.3(b)	Compare between Electrowinning and Electrorefining processes in terms of i) cell type and design, ii) electrolyte, iii) cathode /anode iv) metals extracted by these.	[3]
Q.3(c)	Classify leaching process. Describe the salient features of each type. Mention the name of metals which are extracted by these methods. Write down demerits of these processes(if any).	[5]
Q.4(a)	Why does Tg of PVC (76.8 °C) vary with variation in additive concentration? Give example of a suitable additive that affects Tg.	[2]
Q.4(b)	We can prepare miscible polymer blends with PS and PMMA in toluene. Explain the reasons behind this fact.	[3]
Q.4(c)	Why do we see variation in Tg and toughness of the following pairs of polymers: PS/ABS, LDPE/ UHMWHDPE, PVC/PVDC	[5]
Q.5(a)	Discuss main type of commercial glass.	[2]
Q.5(b)	Flow diagram for Industrial glass preparation.	[3]
Q.5(c)	Discuss the different types of phosphate glass. Classify refractory based on chemical composition.	[5]

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