Name: Enrolment No:	

UPES
End Semester Examination, May 2023
Course: s&p-Block Element, States of Matter, Chemical Kinetics
Semester: IV
Program: B.Sc (Physics) & Int B.Sc/M.Sc Physics; B.Sc (H) Mathematics & Int B.Sc/M.Sc Mathematics; B Sc. (H) Geology   **Time: 03 hrs.**
Course Code: CHEM 1010G   **Max. Marks: 100**

Instructions:

<table>
<tr><td colspan="4" align="center">SECTION A
(5Qx4M=20Marks)</td></tr>
<tr><td>S. No.</td><td></td><td>Marks</td><td>CO</td></tr>
<tr><td>Q 1</td><td> What is Ellingham diagram? What kind of information one can extract from these diagrams?</td><td>4</td><td>CO2</td></tr>
<tr><td>Q 2</td><td>Complete the following reaction:

$NH_3 + CO_2 \xrightarrow[\text{High P}]{180\text{-}200^oC} \mathbf{A} \xrightarrow[\text{High P}]{180\text{-}200C} \mathbf{B} + \mathbf{C}$</td><td>4</td><td>CO3</td></tr>
<tr><td>Q 3</td><td>Highlight the significance of pressure correction factor (P_a) and volume correction factor (b) of the van der Waal equation.</td><td>4</td><td>CO2</td></tr>
<tr><td>Q 4</td><td>What is hydroboration reaction? Provide the details of this reaction with appropriate examples.</td><td>4</td><td>CO1</td></tr>
<tr><td>Q 5</td><td>How many crystal systems exist in solids? Define essential conditions of their classification.</td><td>4</td><td>CO2</td></tr>
<tr><td colspan="4" align="center">SECTION B
(4Qx10M= 40 Marks)</td></tr>
<tr><td>Q 6</td><td>Differentiate ideal and real gases. Compare their distinct properties.</td><td>10</td><td>CO2</td></tr>
<tr><td>Q 7</td><td>Define Andrews isotherms of CO_2.</td><td>10</td><td>CO2</td></tr>
<tr><td>Q 8</td><td>Define hydrometallurgy. Discuss hydrometallurgy process by giving two examples.</td><td>10</td><td>CO1</td></tr>
<tr><td>Q 9</td><td>What is Bragg's law? Derive the Bragg's equation for the reflection of X-rays from crystalline solids.
<div align="center">OR</div>
Name the following products A, B, C, and D in a given chemical reaction:</td><td>10</td><td>CO3</td></tr>
</table>

	$CuS \xrightarrow[\text{in air}]{\text{Roast}} A + B \xrightarrow[\text{without air}]{\text{Roast}} C + D$		

	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	Discuss the postulates of kinetic theory of gases. Derive the kinetic gas equation.	**20**	**CO2**
Q 11	Derive the van der Waal equation. Highlight the fundamental assumptions of kinetic theory of ideal gas and the van der Waal equation. OR Discuss the method of preparation, chemical/physical properties, and applications of hydrazic acid (HN_3). Give appropriate chemical reactions to justify your answers.	**20**	**CO3**