

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

CLASS: BSc
BRANCH: CHEMISTRY

SEMESTER : I
SESSION: MO/2025

SUBJECT: CH121 BASIC CHEMISTRY-I

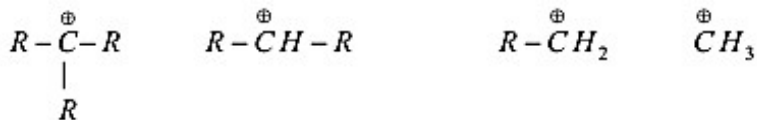
TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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| Q.1(a) What are van der Waal gas constant, a and b? What are collision diameter and collision frequency? Derive the expression for collision frequency of a pure gas. | [5] | 1 | 2 |
| Q.1(b) What is most probable velocity (C_m) of an ideal gas? Derive the expression for C_m . | [5] | 1 | 1 |
| Q.2(a) What do you mean by hybridization? Show hybridization in CH_4 , C_2H_4 and C_2H_2 . | [5] | 2 | 2 |
| Q.2(b) Show the molecular energy level diagram of cyclobutenyldianion and cyclooctatetraene. | [5] | 2 | 2 |
| Q.3(a) Why electron gain enthalpy of fluorine is unexpectedly less negative than that of chlorine?
Discuss Mulliken scale of electronegativity. | [5] | 3 | 2 |
| Q.3(b) A 4s orbital is filled earlier than a 3d orbital. Explain by Slater's rule. Calculate Z_{eff} for K^+ and 3d electron in Cr. | [5] | 3 | 3 |
| Q.4(a) What is surface tension? What is its origin? What is contact angle? What are wetting and non-wetting liquid? Why does water level rise inside a capillary when dipped into water. | [5] | 4 | 2 |
| Q.4(b) Explain the phenomenon viscosity. What is Newton's law of viscosity? Determine the dimension of viscosity coefficient. What will be the effect of temperature on viscosity of fluid? | [5] | 4 | 2 |
| Q.5(a) What do you mean by reaction intermediate? Explain the structure of alkyl free radicals. | [5] | 5 | 2 |
| Q.5(b) Discuss the characteristics of carbocations. Explain the stability order of the following carbocations. | [5] | 5 | 2 |



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