VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examination for Academic Session 2023-24

COURSE NAME: B.Tech

SEMESTER: 1st

BRANCH NAME: Non-Circuit Branches
SUBJECT NAME: Chemistry

FULL MARKS: **30**

TIME: **90 Minutes**

Answer **All** Questions.
The figures in the right-hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions. **[2 × 3]**

a) Why is the electron affinity of Be, Mg, and N zero? - CO1

b) Enthalpy and entropy changes of a reaction are 40.63 kJ mol^{-1} and 108.8 J K^{-1} mol^{-1}, respectively. Predict the feasibility of the reaction at 27 °C. - CO2

c) When a UV light passes through a solution, then its radiant power is reduced to 50%. Calculate the absorbance. - CO3

Q2. **[8]**

a) (i) What is Effective nuclear charge and how is it affected by shielding effect and penetration effect? Discuss the variation of shielding along the periodic table. [6] - CO1

(ii) The atomic radius of second and third row of the d-block element is almost similar. Justify. [2]

OR

b) Define the term periodicity? What is the cause of periodicity? [2] - CO1
Define Electronegativity based on Pauling scale. Discuss any two applications of Electronegativity. [6]

Q3. **[8]**

a) Explain about entropy and feasibility. Derive the mathematic expression for entropy of a mixture of ideal gases. - CO2

OR

b) Define free energy. Derive the expression of Gibb-Helmholtz equation. - CO2
The free energy change accompanying a given process of -138kJ at 303K and -135 kJ at 313K. Calculate the change in enthalpy for the process at 308K.

Q4. **[8]**

a) (i) Write the basic principle of microwave spectroscopy. Derive the expression for bond length of a diatomic molecule by the application of microwave spectroscopy.[4] - CO3
(ii) A gaseous HCl molecule exhibiting microwave spectrum produces a series of equally spaced lines with an interspacing of 20.7cm. Calculate the bond length of HCl molecule. [4]

OR

b) (i) Explain the basic principle of electronic spectroscopy with a description on the different types of electronic transition. [6] - CO3
(ii) A solution shows transmittance of 10%, when taken into a cell of 2.5cm thickness. Calculate the concentration of the solution, if the molar absorption coefficient is 12000dm^3/mole/cm. [2]