

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Mid Semester Examination November - 2019

COURSE NAME: B.Tech

SEMESTER: Ist

BRANCH NAME: H, I, J, K, L, M, N

SUBJECT NAME: CHEMISTRY

FULL MARKS: 20

TIME: 2 Hours

Answer All Questions.

The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions.

[1 × 5]

- a) Write the Schrodinger wave equation and explain the terms involved.
- b) What is Eigen value and Eigen function?
- c) What is zero point energy?
- d) What is Frank-Condon principle?
- e) The percentage transmittance of a 1×10^{-6} molar solution at 350 nm is 20 % in a 1 cm cell. Calculate the absorbance.

Q2.

[5]

- a) Solve the Schrodinger wave equation for particle in 1-D box with potential energy=0 (inside the box) and infinite (outside the box) to get the expression of energy.

OR

- b) Explain the Absorbance, fluorescence and phosphorescence using Jablonski diagram.

[5]

Q3.

- a) What is IR Spectroscopy? How the interaction of IR region radiation takes place with matter? What is the basic principles of it?

OR

- b) What are microwave active molecules? From the pure rotational spectra $^{12}\text{C}^{16}\text{O}$ and $^{13}\text{C}^{16}\text{O}$, the values of the rotational constants for the two have been found to be 1.92118 cm^{-1} and 1.83669 cm^{-1} , respectively. Calculate the atomic mass of ^{13}C , if the atomic masses of ^{12}C and ^{16}O are 12 amu and 15.9994 amu, respectively.

[5]

Q4.

- a) What is Beer-Lambert law? Derive an expression for it.

OR

- b) What do you mean by fundamental and overtone band? The force constant for HF molecule is $9.7 \times 10^2 \text{ Nm}^{-1}$. Calculate the oscillation frequency and wave number in cm^{-1} , of the radiation to excite the molecules from $v=0$ to $v=1$.