

Dr. Jai Prakash

19/12/2022
4

Roll No.:

National Institute of Technology, Hamirpur (HP)

Name of the Examination: B.Tech. End-Semester Theory Examination, Dec. 2023

B. Tech : 1st Year Semester : 1st
Title of the Course : Engineering Chemistry Course Code : CY-101
Time: 3 Hours Maximum Marks: 50

Note: All questions are compulsory.

1. What are the bathochromic and hypsochromic shifts in the absorption spectra? Which of CH_3COCH_3 and $\text{CH}_2=\text{CHCOCH}_3$ will absorb at higher wavelength in UV-vis spectra and why? 3
2. What do you understand by chemical and electrochemical corruptions? Explain stress corrosion with suitable example. 3
3. What is solar energy and how can it be harnessed? Describe the solar cell and its working principle in brief. 3
4. Explain different types of corrosion inhibitors with examples. 3
5. Discuss the principle and working of SEM. 3
6. Discuss the functioning and applications of Li-ion batteries. 3
7. What are 2D nanomaterials? Write two important properties and applications of graphene. 3
8. Discuss the n- and p- type doping in semiconductor nanomaterials. How these are different from intrinsic semiconductors. 3
9. The fundamental vibration frequency of CO is 2140 cm^{-1} . Calculate the force constant of the molecule. Given the atomic masses $\text{C} = 19.9 \times 10^{-27} \text{ kg}$ and $\text{O} = 26.6 \times 10^{-27} \text{ kg}$. 3
10. The concentration of yeast t-RNA in an aqueous solution is 10 M. The absorbance is found to be 0.209 when this solution is placed in a 1.00 cm cuvette and 258 nm radiations are passed through it. Calculate the (a) specific absorptivity (b) absorbance if solution is 5M and (c) absorbance if the path length of the original solution is increased to 5.00 cm. 3
11. Discuss the working principle and limitations of TGA. Draw a neat diagram of DTA. How is it different from TGA? 5
12. Discuss the concept of green chemistry and any of its four principles with examples. 5
13. Write notes on the following: 5
 - a) NMR spectroscopy
 - b) Conducting polymers
14. What do you understand by phase rule. Draw and label the phase diagram for water system. Explain the significance of areas, curves and triple point. 5