VIT

Vellore Institute of Technology

Final Assessment Test (FAT) – June 2022

Programme	B.Tech	Semester	Winter Semester 2021-22
Course Title	ENGINEERING CHEMISTRY	Course Code	BCHY101L
Faculty Name	Prof. Krishnendu Biswas	Slot	E1+TE1
		Class Nbr	CH2021222300134
Time	3 Hours	Max. Marks	100

ANSWER ANYTEN QUESTIONS

Part A (10 X 10 Marks)
Answer any 10 questions

1. i) Describe the three laws of thermodynamics and give their significance. 5 M [10]
   ii) Give the relation which predicts the efficiency of a heat engine. Find out the work done if an engine supplied by heat of 350 kJ works between 30 °C and 220 °C. 5 M
2. i) The rate of a reaction increases with temperature. Justify based on an equation that relates the two. 5 M [10]
   ii) Find the activation of the reaction which has rate constants of 5.6×10^{-9} L/mol.s and 2×10^{-5} L/mol.s at 300K and 500 K respectively. 5 M
3. Explain how ligands affect the M-C bond in metal carbonyls based on their structure. Give any two examples of organometallics along with their applications. [10]
4. Describe any five applications of metal complexes with suitable examples. [10]

5. Discuss any three factors that determine i) stability of carbocation ii) stability of carbanion iii) aromaticity with suitable examples. [10]

6. Organic compounds find application in the pharmaceutical and dye industry. Justify by giving an example of each. [10]

7. An electrochemical cell using a colored material generates electricity with the help of sunlight. Explain the working and construction of the cell with a neat diagram [10]

8. Li can be used to make an energy source that is reversible. Explain the working and construction of the battery with a neat diagram. [10]

9. i) Describe the structure of ZnS and TiO_2. 5 M
ii) Polyacetelyne is a conducting polymer. Explain the mechanism of conduction and give any two applications of conducting polymers. 5 M [10]

10. An instrument uses Bragg's law as the principle of analyzing solid samples. Explain the working and construction of the instrument with a block diagram. [10]

11. i) Give the principle of reverse osmosis for the purification of water. 5M
ii) Cathodic protection is done for protecting metal from corrosion. Explain one method for protecting a metal structure that is below the ground. 5M [10]

12. i) A solid sample calorific value is to be determined. Briefly explain the method. 5 M
ii) Knocking is undesirable. Give the reason for knocking and two ways to avoid it. Also, give the order of knocking in hydrocarbons. 5 M [10]