B

0000CYT100121901

Pages: 3

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S1 (Special Improvement) Examinations January 2021 (2019 scheme)

Course Code: CYT100

Course Name: ENGINEERING CHEMISTRY

(2019-Scheme)

Max. Marks: 100 Duration: 3 Hours

PART A

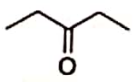
Answer all questions, each carries 3 marks. Marks

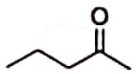
1 Compare electrolytic and electrochemical cells. (3)

2 Write the cell reactions, cell representation and calculate the standard EMF of the cell formed by silver and aluminium electrodes. $E^0_{Ag+/Ag}$= 0.8V, $E^0_{Al3+/Al}$= -1.66V (3)

3 What is the requirement for a molecule to be IR active? Write two examples for IR active and inactive molecules. (3)

4 Predict number of signals for the following and justify your answer. (3)

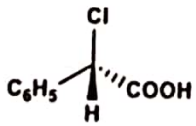
a) 

b) 

5 TGA will not give information regarding phase changes .Give reason. (3)

6 Mention any three applications of SEM. (3)

7 Assign the ***R-S*** configuration for the following molecule and also write its Fischer projection formula. (3)



8 What are co-polymers? Give one example each for addition and condensation co-polymers. (3)

9 What is the chemistry behind the removal of temporary hardness by boiling? (3)

10 What are the factors that affect DO level in water? (3)

PART B

Answer one full question from each module, each question carries 14 marks

Module-I

11 a) Which are the different types of electrodes? Give examples for each type. Also write the equation for the electrode potential of each type. (7)

b) Illustrate the applications of electrochemical series with suitable examples. (7)

12 a) What is the principle in potentiometric titration? Explain the end point determination of a redox reaction by potentiometric titration. (7)

b) Describe the methods of cathodic protection. (7)

Module-II

13 a) Draw the expected NMR spectrum of methyl propanoate and point out how it differs from ethyl acetate (10)

b) Write the mathematical representation of the law governing absorption of light by molecules of a solution. Also calculate the concentration of a solution if it shows a transmittance of 20% when taken in a cell of 2.5 cm thickness (Molar absorption coefficient is 12000 dm^2 mol^{-1}). (4)

14 a) How can you differentiate NMR spectrum of CH_3CH_2Cl and CH_3CHCl_2 using the concept of spin-spin splitting? (8)

b) Comment on the various electronic transitions that are possible in the following molecules (i) C_2H_6 (ii) CH_3CH_2OH and (iii) 1,3 butadiene. (6)

Module-III

15 a) Explain the principle and instrumentation of DTA with a neat diagram. Interpret the DTA thermogram of $CaC_2O_4.H_2O$. (10)

b) Discuss the classification of nanomaterials based on materials. (4)

16 a) Describe the principle, instrumentation, procedure and applications of GC. (10)

b) Explain hydrothermal method of synthesis of nanomaterials. (4)

Module-IV

17 a) What is optical isomerism? What are the conditions for a molecule to be optically active? What are enantiomers and diastereoisomers? Give two examples for each. Mention two properties each of enantiomers and diastereoisomers. (8)

b) What is polypyrrole? How is it synthesised? Mention two properties and two applications of polypyrrole. (6)

18 a) Draw and explain the conformational isomerism in *(cis)* and *(trans)* 1,2-dimethyl cyclohexane. Which conformer is more stable in each case? Give reason. (10)

b) Write the structure of Kevlar and explain why it is used in cryogenic applications? (4)

Module-V

19 a) Explain aerobic and anaerobic methods for the waste water treatment. (10)

b) A water sample contains 16.2 mg/L $Ca(HCO_3)_2$, 7.3 mg/L $Mg(HCO_3)_2$, 9.5 mg/L $MgCl_2$ and 13.6 mg/L $CaSO_4$. Calculate the temporary and permanent hardness of water and what will happen if 10.6 mg/L $NaHCO_3$ is added? (4)

20 a) Explain the complexometric titration method for the estimation of hardness of water. Write necessary calculation steps. (10)

b) Write any four disadvantages of hard water. (4)

****