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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester B.Tech Degree (R,S) Examination May 2024 (2019 Scheme)

Course Code: CYT 100
Course Name: ENGINEERING CHEMISTRY
(2019 -Scheme)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks Marks

1 Sketch a neat labelled diagram of calomel electrode and write its electrode reaction and electrode representation. (3)

2 Calculate the equilibrium constant of Daniel cell at standard condition. Given that $E^0_{Zn^{2+}/Zn} = -0.76V$ *and* $E^0_{Cu^{2+}/Cu} = 0.34V$. (3)

3 Give the condition for a molecule to be IR active. Write examples for IR active and IR inactive molecules. (3)

4 Briefly explain the principle of NMR spectroscopy. (3)

5 What are the advantages of TLC as compared to column chromatography? (3)

6 List any three applications of GC. (3)

7 A compound can have only one enantiomer, but more than one diastereomer. Justify the statement with an example. (3)

8 Draw the structure and mention any two uses of Kevlar. (3)

9 What are the disadvantages of using hardwater? (3)

10 What is dissolved oxygen? What are the factors affecting dissolved oxygen? (3)

PART B

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

MODULE 1

11 a. What are ion selective electrodes? How can you determine pH of a solution using an ion selective electrode? (8)

b. Illustrate the applications of electrochemical series with suitable examples (6)

12 a. Explain any two methods to prevent corrosion in buried metallic structures. (8)

b. Write the principle and procedure of electroless Ni plating. (6)

MODULE 2

13 a. State Beer Lambert's law. Deduce its mathematical and graphical representation. List any two limitations of the law. (8)

b. How can you differentiate 1-chloropropane and 2-chloropropane by NMR spectroscopy? (6)

14 a. With suitable examples explain the different types of electronic transition possible in organic molecules. (8)

b. Sketch the vibrational modes and predict the IR activity of CO_2 and H_2O. (6)

MODULE 3

15 a. Illustrate the information obtained from the TGA and DTA of $CaC_2O_4.H_2O$. (8)

b. Describe the instrumentation and working of HPLC. (6)

16 a. Explain the synthesis of nanomaterials by hydrothermal and sol-gel method. (6)

b. Describe the instrumentation and working of SEM. (8)

MODULE 4

17 a. Describe the classification of structural isomers providing examples for each type. (10)

b. Write the rules to assign E/Z configuration of geometrical isomers. (4)

18 a. Explain the classification of conducting polymers. (10)

b. Give the synthesis and applications of ABS. (4)

MODULE 5

19 a. Brief out the principle and procedure for the determination of permanent and temporary hardness by EDTA method. (8)

b. What is desalination? Explain the role of reverse osmosis in desalination process. (6)

20 a. Describe an aerobic method and an anaerobic method for treating sewage water. (8)

b. Define BOD. 100 mL of sewage water sample is diluted to 600 mL with dilution water, the initial dissolved oxygen was 8.5 ppm. The dissolved oxygen level after 5 days of incubation was 3.5 ppm. Find the BOD of the water sample. (6)

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