

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 $E_{Zn^{2+}/Zn}^0 = -0.76V$ and $E_{Cu^{2+}/Cu}^0 = 0.34V$. (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. (8)
List any two limitations of the law.
- 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 CO₂ and H₂O. (6)

MODULE 3

- 15 a. Illustrate the information obtained from the TGA and DTA of CaC₂O₄.H₂O. (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)
