Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (S,FE) S2 (S,FE) Examinations May 2026 (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 Define Electrochemical series. Why does blue colour of $CuSO_4$ is discharged when iron rod is dipped in it? Given that $E^0_{Fe2+/\ Fe}$ = -0.44V and $E^0_{Cu2+/\ Cu}$ =0.34V. (3)

2 What is electroless plating? What are its advantageous? (3)

3 Plot the high resolution NMR spectrum of ethanol and explain the splitting of peaks. (3)

4 Sketch the various modes of vibrations possible for CO_2.Which of them are IR active? Give reasons. (3)

5 With reference to chromatography explain (a) Retention time (b) Retardation factor. (3)

6 Explain the classification of nanomaterials on the basis of dimensionality. (3)

7 Differentiate between enantiomers and diastereomers. (3)

8 Discuss the preparation and properties of Kevlar. (3)

9 How is the exhausted resin regenerated from an ion exchange process? (3)

10 Mention the units in which hardness of water is expressed. (3)

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

MODULE 1

11 (a) Draw a well labelled diagram of calomel electrode. Write electrode reaction and representation of the electrode. How will you employ the calomel electrode for the determination of electrode potential of Cu electrode? (8)

(b) Explain the variation of emf of Daniel cell with respect to temperature and concentration. (6)

12 (a) What is cathodic protection? Explain sacrificial anodic protection method and impressed cathodic protection method with a neat labelled diagram (8)

(b) Discuss the construction and working of Li-ion cell when it acts as voltaic cell. (6)

MODULE 2

13 (a) Explain the various types of electronic transitions possible in a molecule. Why does electronic spectrum appear broad? (8)

(b) State Beer- Lambert's Law. Calculate the transmittance, absorbance and absorption coefficient of a solution which absorbs 70% of a certain wavelength of light beam passed through a 1 cm cell containing 0.50 M solution. (6)

14 (a) What is chemical shift in NMR spectroscopy? Explain the causes of chemical shift. Predict the number of signals, peak ratio and multiplicity in the NMR spectrum of CH_3-CH_2-CH_2-Cl. (8)

(b) Explain the Principle of MRI. Also write the applications of MRI. (6)

MODULE 3

15 (a) Explain the classification of chromatography. Write a note on column chromatography. (8)

(b) Briefly explain the principle and instrumentation of SEM with the help of a diagram. (6)

16 (a) Explain the principle and instrumentation of TGA with a neat labelled block diagram. Also explain the thermogram of calcium oxalate monohydrate. (8)

(b) Describe the principle, instrumentation, and applications of HPLC. (6)

MODULE 4

17 (a) What is meant by structural isomerism? What are the different types of structural isomerism in organic molecules? Explain with examples. (8)

(b) What is OLED? Explain the construction and working of OLED. (6)

18 (a) Explain the classification of conducting polymers. Describe the different types of doping? (8)

(b) Draw and explain the conformers of ethane molecule. Also draw the energy level diagram with dihedral angle. (6)

MODULE 5

19 (a) Explain the EDTA method for the estimation of hardness of water with calculation steps. (8)

(b) Explain Reverse Osmosis with a labelled figure and mention its advantages and disadvantages (6)

20 Explain the biological processes used in sewage treatments under aerobic and

(a) anaerobic conditions. (8)

(b) What is breakpoint chlorination? Write any two advantages of breakpoint chlorination. (6)

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