0100CYT100052408

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S1 (S,FE) S2 (S,FE) Degree Examination December 2025 (2019 Scheme)

Course Code: CYT100

Course Name: ENGINEERING CHEMISTRY

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks Marks

1 List any three applications of electrochemical series with suitable examples. (3)

2 If the standard reduction potentials of Fe and Ag are -0.42V and 0.80V respectively, calculate the EMF for $Fe(s)|Fe^{2+}(0.1M)(aq)||Ag^{+}(0.1M)(aq)|Ag(s)$ at 298K. (3)

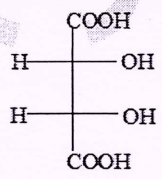
3 The 0.001M solution of a compound shows a transmittance 20% when taken in a 2cm cuvette. Calculate the molar absorbance coefficient of the compound. (3)

4 Tetramethyl Silane is used as the reference compound in NMR spectroscopy. Give reasons. (3)

5 Explain how R_f value is determined in TLC. (3)

6 Write a note on the preparation of nanomaterials by hydrothermal method. (3)

7 Give structures of the optical isomers of tartaric acid shown below. Identify enantiomers and diastereomers among those isomers. (3)



8 How is ABS prepared? List its properties. (3)

9 Calculate the temporary and permanent hardness of a water sample containing the following salts in the given amounts. (3)

$Ca(HCO_3)_2$ = 32.4mg/L, $CaSO_4$ = 13.6mg/L , $CaCl_2$ = 33.3mg/L.

10 Explain how reverse osmosis is used for desalination of sea water. (3)

PART B

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

MODULE 1

11 a) Write a note on types of secondary reference electrodes and their working. Also, mention the applications of each type. (10)

b) Explain the variation of EMF of a cell with temperature. (4)

12 a) Discuss the construction and working of Lithium ion cell. What are the advantages of Lithium ion cells over other types of cells. (10)

b) Write a note on electroless plating. (4)

MODULE 2

13 a) What are stretching and bending vibrations in IR spectroscopy? Illustrate with a neat sketch using CO_2 and H_2O molecules as examples. (10)

b) Explain the possible electronic transitions in the UV-Visible spectra of 1,3-butadiene and 1,3,5-Hexatriene with the help of MO diagram. (4)

14 a) Explain the factors affecting chemical shift and predict the NMR spectrum of CH_3-CO-CH_3. (8)

b) Briefly explain the principle and applications of MRI. (6)

MODULE 3

15 a) Explain the principle of DTA using Calcium oxalate monohydrate as an example. Also give instrumentation and applications of DTA. (10)

b) Discuss the characteristics of HPLC that makes it superior over conventional Column Chromatography. (4)

16 a) Give the instrumentation and working of SEM. (8)

b) List the applications of nanomaterials. (6)

MODULE 4

17 a) Write a note on the working and advantages of OLED. (8)

b) Describe the conformational analysis of n-Butane and cyclohexane. (6)

18 a) Write a note on the synthesis, properties and applications of Polyaniline and Polypyrrole. (10)

b) Draw the Fischer projection of R and S configuration of 2-hydroxy propanoic (4)

acid $CH_3CH(OH)COOH$.

MODULE 5

19 a) Write a note on Ion Exchange process used for water softening. (8)

b) Distinguish between BOD and COD. (6)

20 a) Discuss the primary, secondary and tertiary processes involved in sewage treatment with the help of flow diagram. (10)

b) Define DO. Give a brief procedure for its estimation. (4)

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