

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

First Semester B.Tech Degree Regular and Supplementary Examination December 2023 (2019 Scheme)

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

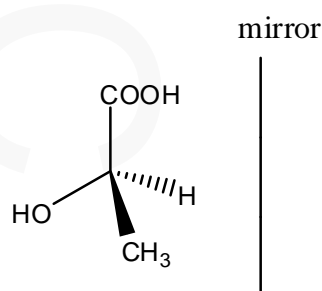
Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 3 marks*

Marks

- |   |   |     |
|---|---|-----|
| 1 | Distinguish between galvanic series and electrochemical series  | (3) |
| 2 | Calculate the voltage of cell $Zn   ZnSO_4 (0.0004M)    CdSO_4 (0.02M)   Cd$ . The standard reduction potential of Zn and Cd are $-0.763 V$ and $-0.403 V$ respectively | (3) |
| 3 | Alkanes are colourless. Explain this in terms of electronic transitions possible in a molecule  | (3) |
| 4 | Which of the following nuclei can give NMR spectrum? Explain<br>a) ${}^6C^{12}$ b) ${}^6C^{13}$ c) ${}^1H^1$ d) ${}^1H^2$   | (3) |
| 5 | Distinguish between TGA and DTA   | (3) |
| 6 | Give any three applications of nanomaterials  | (3) |
| 7 | Demonstrate the structure and two uses of ABS   | (3) |
| 8 | Draw the mirror image and assign the R,S notation of asymmetric carbon atom.  | (3) |



- |    |   |     |
|----|---|-----|
| 9  | What do you understand by hardness of water? How is it expressed? | (3) |
| 10 | What is reverse osmosis? Discuss any one of its merits            | (3) |

**PART B***Answer one full question from each module, each question carries 14 marks.***MODULE 1**

- |    |  |      |
|----|--|------|
| 11 | a) Discuss the mechanism of electrochemical corrosion of iron under different environments | (10) |
|----|--|------|

- b What are the advantages of electroless plating? (4)
- 12 a Why do we prefer glass electrode for the measurement of pH? Explain determination of pH with neat diagram (10)
- b Iodine (I<sub>2</sub>) and bromine (Br<sub>2</sub>) are added to solution containing (I<sup>-</sup>) and (Br<sup>-</sup>) ions. What reaction would occur if the concentration of each species is 1 M? You are given with standard reduction potentials of I<sub>2</sub> & Br<sub>2</sub> (4)
- $$\text{I}_2 + 2\text{e}^- \rightarrow 2\text{I}^- \quad E^\circ = +0.54\text{ V}$$
- $$\text{Br}_2 + 2\text{e}^- \rightarrow 2\text{Br}^-; \quad E^\circ = +1.08\text{ V}$$

### MODULE 2

- 13 a What is meant by the term chemical shift in <sup>1</sup>H NMR spectroscopy? Explain the factors affecting it with suitable examples (10)
- b Why 1,3-butadiene absorbs at longer wavelength compared to 1,4-pentadiene and n-butane? (4)
- 14 a Describe how IR spectroscopy is used for (8)
- determination of functional groups
  - determination of force constant
  - detection of impurities
  - distinguishing intra and inter molecular hydrogen bond
- b Find the ratio of force constants of HF to that of HCl. Given that observed vibrational wave number of HF is 3958 cm<sup>-1</sup> and HCl is 2886 cm<sup>-1</sup>. Masses of H, F, and Cl are 1u, 19 u, and 35 u respectively. (6)

### MODULE 3

- 15 a Explain the classification of nanomaterials with examples (8)
- b Elucidate the DTA of Calcium oxalate monohydrate (6)
- 16 a Discuss the instrumentation and working of HPLC (10)
- b Discuss the visualisation techniques used in TLC (4)

### MODULE 4

- 17 a Discuss the construction, working and advantages of OLED (10)
- b Draw the conformations of ethane, give its potential energy-dihedral angle graph (4)
- 18 a What is stereo isomerism? Explain the classification of stereo isomerism. (10)
- b Discuss the synthesis of Kevlar (4)

### MODULE 5

- 19 a Define COD. How is it determined? Find COD of water sample, if 200 mL of (7)

water sample after reaction with fixed amount of acidified  $K_2Cr_2O_7$  on titration consumes 18.3 mL of 0.125 N ferrous solution. For blank titration the ferrous solution consumed is 26.4 mL.

- b What are ion exchange resins? How is it used for demineralisation of water and how exhausted resins are regenerated? (7)
- 20 a What is meant by dissolved oxygen in water? What are the factors which govern the amount of dissolved oxygen in water? How it is determined by titration? (8)
- b Distinguish between aerobic and anaerobic decomposition of sewage water (6)

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