

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Second Semester B.Tech Degree Regular and Supplementary Examination June 2023 (2019 Scheme)



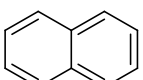
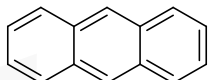
**Course Code: CYT 100****Course Name: ENGINEERING CHEMISTRY  
(2019 -Scheme)**

Max. Marks: 100

Duration: 3 Hours

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

Marks

- 1 Write anode, cathode reactions and Nernst equation for the net cell reaction (3)  
 $2 \text{Al (s)} + 3 \text{Fe}^{2+} \text{(aq)} \rightarrow 2 \text{Al}^{3+} \text{(aq)} + 3 \text{Fe (s)}$ .
- 2 What is galvanic series? (3)
- 3 Which of the following compounds will have highest  $\lambda_{\text{max}}$  in UV-vis spectrum? (3)  
 Give reason
- a.  b.  c.  d. 
- 4 The C=C stretching absorbs at higher wave number ( $\sim 1600 \text{ cm}^{-1}$ ) compared to C-C stretching ( $\sim 1200 \text{ cm}^{-1}$ ). Give reason (3)
- 5 What is retention factor and retention time? Elucidate the need of them in chromatography (3)
- 6 Discuss the principle involved in DTA (3)
- 7 Draw the Fischer projection formula for R-isomer of 2-butanol (3)
- 8 Discuss the structure of KEVLAR and give reason for its high strength (3)
- 9 Calculate the temporary and permanent hardness of a sample water containing 14.6 mg/L of  $\text{Mg}(\text{HCO}_3)_2$ , 81 mg/L of  $\text{Ca}(\text{HCO}_3)_2$ , 68 mg/L of  $\text{CaSO}_4$ . (3)
- 10 What is disinfection? Give the advantages and disadvantages of UV disinfection of water. (3)

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

- 11 a Write the cell reactions and cell representation of Zn-Ag Cell. Given that  $E^0$   $\text{Zn}^{2+}/\text{Zn} = -0.76\text{V}$  and  $E^0 \text{Ag}^+/\text{Ag} = +0.80\text{V}$ . Calculate the emf of the cell at  $25^\circ\text{C}$  when concentration of  $\text{Zn}^{2+} = 0.1\text{M}$  and  $\text{Ag}^+ = 0.01\text{M}$ . (7)

- b Explain the working of calomel electrode with diagram. Calculate the potential of calomel electrode in 0.1 M KCl solution and in saturated KCl solution (4.53M), Given that  $E^0$  standard calomel = 0.2810V at 25°C. (7)
- 12 a Discuss potentiometric titration taking the case of redox titration with the help of graphs. What are its advantages? (10)
- b Calculate the single electrode potential of Pt/Fe<sup>3+</sup>/Fe<sup>2+</sup> electrode at 25°C, when concentration of Fe<sup>2+</sup> = 0.01M and Fe<sup>3+</sup> = 0.1M. Given that  $E^0$  Fe<sup>3+</sup>/Fe<sup>2+</sup> = +0.77V (4)

**MODULE 2**

- 13 a Explain the instrumentation and working of UV-vis spectrometer (8)
- b What is Chemical shift? Why tetramethyl silane (TMS) is used as the internal reference in <sup>1</sup>H NMR spectroscopy? (6)
- 14 a Sketch the modes of vibration possible for HCl, CO<sub>2</sub> and H<sub>2</sub>O. Predict the IR activity of each mode of vibration (10)
- b What are the applications of NMR spectroscopy? (4)

**MODULE 3**

- 15 a Explain the instrumentation and working of SEM (8)
- b What are nanomaterials? Discuss its classification based dimension with examples. (6)
- 16 a Discuss the principle and working of TGA with a neat diagram. (7)
- b Explain the principle and steps involved in Column chromatography. (7)

**MODULE 4**

- 17 a Discuss conformational analysis of n-butane. (10)
- b Compare chain and position isomerism with examples. (4)
- 18 a Explain the construction, working and advantages of OLED (10)
- b What is geometrical isomerism? Explain the need for E,Z notation instead of cis-trans. (4)

**MODULE 5**

- 19 a Explain the steps involved in sewage treatment with the help of a flow diagram. (10)
- b Write any four disadvantages of hard water. (4)
- 20 a Discuss the ion-exchange process of softening of water. How is exhausted resins regenerated in an ion-exchange method? (8)
- b What is desalination? How it is performed by reverse osmosis process? (6)

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