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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY B.Tech Degree S1 (S,FE) S2 (S,FE) Examination May 2025 (2019 Scheme

Course Code: CYT100

Course Name: ENGINEERING CHEMISTRY

(2019 - Scheme)

Max. Marks: 100

Duration: 3 Hours

Pages: 3

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PART A

	Answer all questions, each carries 3 marks	Marks
1	Differentiate between Galvanic series and electrochemical series.	(3)
2	How does the EMF vary with temperature in Daniel cell?	(3)
3	A 0.02M dye solution gives an absorbance of 0.025 at 475nm. A sample of	(3)
	unknown concentration of the same dye gives an absorbance of 0.012 under the	
	same experimental conditions. Find the concentration of the unknown sample.	
4	Draw the possible modes of vibrations in water (H ₂ O) molecule.	(3)
5	Draw the DTA of calcium oxalate monohydrate in a current of air.	(3)
6	Define retention factor (R _f) in TLC. Give its significance	(3)
7	Draw the chair conformations of mono methyl cyclohexane. Which is more	(3)
	stable?	
8	Give the structures of keto enol tautomers of 2-propanone	(3)
9	Differentiate between BOD and COD	(3)
10	List out any three disadvantages of using hard water	(3)
	PART B	

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

MODULE 1

- 11 (a) Explain the principle and procedure of potentiometric titration employed in the (8) redox reaction between ferrous sulphate solution and ceric ammonium sulphate solution.
 - (b) A glass electrode-calomel electrode assembly shows emfs 220mV and -40mV (6) with buffer solutions of pH 4 and pH 9.2, respectively. Find the pH of test

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solution if it gives an emf of 84 mV.

- 12 (a) Explain the construction of a Li ion cell with the reactions taking place during (8)charging and discharging of the battery.
 - (b) Explain oxygen absorption corrosion in acid and alkaline media with examples. (6) **MODULE 2**
- 13 (a) Explain chemical shift in ¹H NMR spectroscopy? Describe any three factors (8) affecting chemical shift with examples.
 - (b) Explain how IR spectroscopy can be applied (i) in the identification of the functional groups in alcohols and (ii) in distinguishing intermolecular and (6) intramolecular hydrogen bonding with examples.
- 14 (a) Explain the principle, instrumentation and any two applications of UV-visible (8) spectroscopy?
 - (b) Explain the principle of ¹H NMR spectroscopy. Which of the following nuclei (6) are NMR active-⁴He, ³⁷Cl, ¹³C, ¹²C. Why?

MODULE 3

- 15 (a) Explain the principle, instrumentation and procedure adopted in Gas (10) Chromatography (GC).
 - (b) How are nanomaterials classified based on materials? (4)
- 16 (a) Describe the principle, instrumentation and any two applications of (10) thermogravimetric analysis (TGA) with an example.
 - (b) Give the principle and any two applications of SEM. (4)

MODULE 4

- 17 (a) Draw the structures of geometrical isomers (cis- & trans-) of 1,4- (10) dimethylcyclohexane and their chair conformations. Compare the stability of these conformations.
 (4)
 - (b) Why the E and Z notations are required in geometrical isomerism? What are the rules for assigning E-Z notation? Give one example.
- 18 (a) Explain the principle, construction, working and advantages of OLEDs. (10)
 - (b) What is ABS? How is ABS synthesised? List out any two applications of ABS. (4)

MODULE 5

19 (a) Explain the principle, process and any two advantages of ion exchange process (10)

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for the removal of hardness of water.

- (b) Explain break point chlorination?
- 20 (a) What is the principle involved in the estimation of hardness using EDTA (10) method? 20 mL of a standard hard water sample containing 20 g of CaCO₃ per litre, required 18mL EDTA solution. 50 mL of sample water required 12 mL EDTA solution. 50mL of water sample after boiling required 8 mL EDTA solution. Calculate the temporary hardness of the given sample of water in ppm.

(4)

(b) Explain the Upflow Anaerobic Sludge Bed reactor (UASB) process in sewage (4) treatment.
