

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Second Semester B.Tech Degree Examination July 2021 (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

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|----|---|-----|
| 1 | What is galvanic series? How is galvanic series advantageous over electrochemical series in corrosion chemistry? | (3) |
| 2 | Why full charging is not allowed in Li-ion cell? | (3) |
| 3 | CHCl ₃ gives a singlet at 7.26 ppm, while CH ₃ Cl shows singlet at 3.06 ppm in the ¹ H NMR spectrum. Give reason. | (3) |
| 4 | Explain the reason for broadening of UV-Visible (electronic) spectrum. | (3) |
| 5 | Write any three applications of TGA. | (3) |
| 6 | Explain the terms retention time (t _R) and relative peak area (RPA) in GC. | (3) |
| 7 | Draw the Fischer projection formula for the <i>meso</i> form of the following and convert it into Saw-Horse structure. C ₆ H ₅ -CH(Cl)-CH(Cl)-C ₆ H ₅ | (3) |
| 8 | Write the synthesis of polypyrrole. | (3) |
| 9 | Which buffer is used in EDTA method? What is its role in titration? | (3) |
| 10 | Explain break point of chlorination. | (3) |

PART B*Answer one full question from each module, each question carries 14 marks***Module-I**

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| 11 | a) Derive Nernst equation and apply it for the emf of Daniel cell. | (8) |
| | b) How is electroless nickel plating done? Write the reactions involved. Give any two applications of it. | (6) |
| 12 | a) With the help of electrochemical equations, show that rusting of iron is more severe in oxygen rich acidic medium than alkaline medium. | (8) |
| | b) A glass electrode- calomel electrode assembly shows an emf of 212 mV with pH= 4 buffer solution and -30mV with pH= 9.2 buffer solution. Find the pH of the test solution if it shows an emf of 120 mV. Also find E _G ⁰ if E _{SCE} = 0.2422 V | (6) |

Module-II

- 13 a) Draw the molecular orbital energy diagram of i) Ethene, ii) 1, 3-butadiene iii) 1,3,5 hexatriene and iv) benzene to explain their UV-Vis absorption. (8)
- b) Explain the origin of spin-spin splitting and draw the splitting pattern in $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-Cl}$. (6)
- 14 a) Discuss the principle of IR spectroscopy. Arrive at the expression for vibrational energy states of a diatomic molecule. Draw the potential energy diagram. (8)
- b) An organic compound $\text{C}_3\text{H}_6\text{O}$ contains a carbonyl group. How will its NMR spectrum decide whether it is an aldehyde or a ketone? (6)

Module-III

- 15 a) Discuss the principle and procedure in column chromatography. Explain how TLC is useful in checking the purity of each fraction. (10)
- b) Sketch the Derivative TG graph of Calcium oxalate monohydrate. (4)
- 16 a) Explain the various chemical methods used for the synthesis of nanomaterials. (10)
- b) Explain the experimental procedure of TLC. (4)

Module-IV

- 17 a) How many optical isomers are possible for $\text{H}_3\text{C-CH(OH)-CH(OH)-CHO}$? Draw the Fischer projection formula of all the isomers. Which among them are optically active? (8)
- b) What are OLEDs? Give the construction and working. (6)
- 18 a) What is meant by structural isomerism? What are the different types of structural isomerism in organic molecules? Explain with examples. (10)
- b) Write the structure of ABS and its monomers. Also list any two applications of ABS. (4)

Module-V

- 19 a) Explain trickling filter and UASB processes in waste water treatment. (10)
- b) Discuss the procedure for the determination of DO in water. (4)
- 20 a) Define reverse osmosis. Explain the method for the desalination of water using reverse osmosis. Give its advantages. (8)
- b) Explain the ion exchange process in water treatment. How is the exhausted resin regenerated? (6)
