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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

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_3Cl shows singlet at 3.06 ppm in the ^1H 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 ***meso*** form of the following and convert it into Saw-Horse structure. C_6H_5-CH(Cl)- CH(Cl)-C_6H_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

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^0_G 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 CH_3-CH_2-CH_2-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 C_3H_6O 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 H_3C-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)

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