B   B7024

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: CY100

Course Name: ENGINEERING CHEMISTRY

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each question carries 2 marks

1	Calculate the fundamental vibrational frequency HCl molecule, if the value of force constant of the molecule is 483 Nm^{-1}. The atomic masses are ^{1}H = 1.673 x 10^{-27} kg and ^{35}Cl = 58.06 x 10^{-27} kg.	2
2	Represent electrode reactions at different electrodes of a Li –ion cell during discharging.	2
3	Distinguish between retention factor and retention time in chromatography	2
4	What is ABS? How is it prepared?	2
5	Define a) Octane number and b) Cetane number.	2
6	Calculate the theoretical GCV of a petroleum fuel with composition C= 84%, H= 15% , O= 0.4%, N= 0.3% and S=0.3%	2
7	Give the principle of reverse osmosis?	2
8	Calculate the BOD of a water sample containing 75 mg of carbohydrate (CH_2O) per litre.	2

PART B

Answer all questions, each question carries 3 marks

9	State and explain Beer- Lamberts law. Mention any two limitations of the law.	3
10	A zinc rod is dipped 0.3 M CuSO4 solution. Displacement reactions take place and allowed to attain equilibrium. Find the equilibrium constant of the reaction. [Given that E^0$_{Cu2+/Cu}$ = +0.34V and E^0$_{Zn2+/Zn}$ = -0.76V.	3
11	Explain the visualisation techniques in TLC.	3
12	Explain the synthesis and applications of polypyrrole.	3
13	On burning 0.75g of fuel in a bomb calorimeter, the temperature of 2000g of water increases from 27.0 ^{o}C to 29.8 ^{o}C. The water equivalent of calorimeter and latent heat of steam are 385.0g and 587.0 cal/g respectively. If the fuel contains 0.9% hydrogen, calculate its gross and net calorific values.	3
14	Write a short note on biodiesel.	3
15	Illustrate break point chlorination with the help of suitable graph. Give any two advantages of break point chlorination.	3
16	Briefly explain the UASB process for sewage water treatment.	3

PART C

Each question carries 10 marks.

17	a)	Outline the principles of IR spectroscopy.	5
	b)	How will you distinguish ethanol and dimethyl ether using NMR spectroscopy?	5

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OR

18 a) Define chemical shift in NMR spectroscopy. Also explain the factors influencing   5
       chemical shift.
   b) Discuss the possible electronic transitions in acetaldehyde.   5
19 a) Outline the setting up of a calomel electrode with a neat diagram.   5
   b) How will you employ the calomel electrode for the determination of electrode   5
       potential of copper and zinc?

OR

20 a) Explain the working and electrode reactions in H_2-O_2 fuel cells.   5
   b) Give the procedure for potentiometric estimation of an alkali using a standard   5
       acid.
21   Explain the principles, instrumentation, working and applications of TGA.   10

OR

22   Explain the principles, instrumentation, working and applications of HPLC.   10
23 a) Briefly outline chemical synthesis of nanoparticles.   5
   b) What are conducting polymers? Briefly explain their classification.   5

OR

24 a) Discuss the classification of nanomaterials.   5
   b) Outline the preparation, properties and application of silicone rubbers.   5
25   Discuss the determination of calorific value of a fuel using a bomb calorimeter.   10

OR

26 a) What are lubricants? How are they classified?   5
   b) Briefly outline following properties of lubricants a) viscosity index b) flash and 5
       fire points.
27   Describe the EDTA method for determination of Hardness of water.   10

OR

28 a) What is meant by COD? How it is determined? Explain its significance in sewage   5
       treatment.
   b) A sample of water on analysis gave the following results: Ca^{2+} = 200 mg/L, Mg^{2+} 5
       = 180 mg/L, HCO_3^- = 360 mg/L, Na^+ = 80 mg/L and Cl- = 200 mg/L. Calculate
       the temporary, permanent and total hardness of the sample.

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