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B B7024 **Total Pages: 2**

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 $^{1}H = 1.673 \times 10^{-27}$ kg and $^{35}Cl = 58.06 \times 10^{-27}$ 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 °C to 29.8 °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

OR

18	a)	Define chemical shift in NMR spectroscopy. Also explain the factors influencing chemical shift.	5
	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 potential of copper and zinc?	5

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 acid.	5
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 fire points.	5
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 treatment.	5
	b)	A sample of water on analysis gave the following results: Ca^{2+} = 200 mg/L, Mg^{2+} = 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.	5

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