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   2
    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   Represent electrode reactions at different electrodes of a Li –ion cell during   2
    discharging.

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=   2
    15% , O= 0.4%, N= 0.3% and S=0.3%

7   Give the principle of reverse osmosis?   2

8   Calculate the BOD of a water sample containing 75 mg of carbohydrate (CH_2O)   2
    per litre.

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   3
     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.

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   3
     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.

14   Write a short note on biodiesel.   3

15   Illustrate break point chlorination with the help of suitable graph. Give any two 3
     advantages of break point chlorination.

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

****