Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2018
Course Code: CY100
Course Name: ENGINEERING CHEMISTRY

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 2 marks
Marks

1	HCl is IR active but N_2 is not. Why?	(2)
2	List out the advantages of fuel cell.	(2)
3	What are the visualisation techniques used in TLC for colourless compounds?	(2)
4	Give the structure of ABS polymer. List two properties.	(2)
5	What are the functions of lubricants?	(2)
6	Indicate the significances of flash and fire points.	(2)
7	A sample of water contains 325 mg of $MgSO_4$ per litre. Calculate the hardness in terms of $CaCO_3$ equivalents. (Equivalent weight of $MgSO_4$= 60).	(2)
8	Briefly explain any one method for disinfection of water.	(2)

PART B
Answer all questions, each carries 3 marks

9	Distinguish between absorption spectrum andemission spectrum.	(3)
10	Calculate the emf of the following cell, $Zn(s)/Zn^{2+}(0.3M)//Ag^{+}(0.04 M)/Ag(s)$ at 25ºC. Write the cell reaction. The $E^{0}cell$ is 1.56 V at 25ºC.	(3)
11	Define retention factor and retention time.	(3)
12	Brief out fullerenes. Give two properties.	(3)
13	Define Cetane number and indicate its significance.	(3)
14	A Sample of coal contains: C = 70%, O = 14.7%, H = 10%, S = 5% and 0.3% ash. Calculate GCV and NCV of coal using Dulong's formula. Given latent heat of steam=587cal/g.	(3)
15	What is the principle behind ion exchange process for softening of water?	(3)
16	Define COD and comment on the significance of COD.	(3)

PART C
Answer all questions, each carries 10 marks

17	a)	Explain the basic principle and instrumentation of UV-Visible spectroscopy	(5)
	b)	What is meant by spin-spin splitting? Predict the number of signals and splitting pattern of the NMR spectrum of CH_3CH_2OH.	(5)

OR

18	a)	State Beer-Lambert's law. A solution shows a transmittance of 30%, when taken in a cell of 4 cm thickness. Calculate the concentration of the solution, if the molar absorption coefficient is 3000 $dm^{3}mol^{-1}cm^{-1}$.	(5)
	b)	How many vibrational modes are possible for CO_2 and H_2O? Sketch the possible vibrational modes for both.	(5)
19	a)	Explain the working of calomel electrode with a neat sketch.	(5)

b) What is meant by potentiometric titration? Explain the principle of redox titration by potentiometric method. (5)

OR

20 a) Explain theworking of Lithium-ion cell. Give two applications. (5)

b) What is meant by single electrode potential? How is electrode potential determined using SHE? (5)

21 a) Describe the experimental determination of conductance of an electrolytic solution. (5)

b) Explain the working of DTA apparatus with a block diagram. (5)

OR

22 a) Discuss the principle behind gas chromatography. Write three differences between GSC and GLC. (5)

b) Explain the principle of HPLC and draw the schematic diagram of the instrument. (5)

23 a) What are conducting polymers? Give the preparation and applications of polyaniline. (5)

b) What are carbon nanotubes? How they are classified? List out two applications. (5)

OR

24 a) Discuss OLED. List out two advantages. (5)

b) Explain the classification of nanomaterials based on dimension with examples. Discuss one chemical method for the preparation of nanomaterials. (5)

25 a) What do you mean by viscosity index of lubricating oil? How is it determined? (5)

b) Define Calorific value of a fuel. Calculate the HCV and LCV of a coal sample from the following data obtained from a bomb calorimeter. Weight of coal =0.83 g, weight of water in the calorimeter= 2500 g, water equivalent of calorimeter= 470 g, initial temperature =22 ºC and final temperature=26ºC, % of H= 3 and latent heat of steam=587cal/g. (5)

OR

26 a) Give an account of biodiesel. What are the advantages? (5)

b) What is grease? Explain the classification of grease. (5)

27 a) Comment on different types of hardness. Define two units to express hardness. (5)

b) Describe UASB process with a neat sketch. (5)

OR

28 a) What is desalination of water? Discuss reverse osmosis and its advantages. (5)

b) Standard hard water contains 5 g of $CaCO_3$ per litre. 20 ml of this solution required 48 ml of EDTA solution for titration. 20 ml of hard water sample required 15 ml of EDTA solution for titration. 20 ml of the same water sample on boiling, filtering etc. required 10 ml of EDTA solution. Calculate the temporary and permanent hardness of water. (5)

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