HI-Tech Institute of Engineering and Technology
IMPORTANT QUESTIONS SET 1I

Subject: Engineering Chemistry BAS-102

NOTE: i) Attempt all sections. If require any missing data then choose suitably. MM =70

SECTION A

1. **Attempt all the following questions in brief** **7x2= 14**

Qno.	Question	CO
a.	Differentiate between addition polymerization & condensation polymerization.	**5**
b.	Graphite is better lubricant than molybdenumdisulphide Why?	**2**
c.	Calculate the amount of rust ($Fe_2O_3.3H_2O$) formed by complete rusting of 1kg of iron?	**3**
d.	What do you understand by polymer blend?	**5**
e.	An exhausted zeolite softener was regenerated by passing 200 liters of NaCl solution, having strength of 0.2 gm/L of NaCl .Find the total volume of water that can be softened by this zeolite softener, if the hardness of water is 350 clarke.	**4**
f.	Differentiate between BMO and ABMO.	**1**
g.	Calculate the EMF of the following cell Zn/Zn^{2+}(0.001M)II Ag^+ (0.1M)/Ag the standard potential of Ag/Ag^+==0.80 V and Zn/Zn^{2+} is 0.76 V.	**3**

SECTION B

2. Attempt any *three parts* of the following questions **3X7 = 21**

Qno	Question	CO
a	**i)** Discuss the proximate analysis of coal? **ii)** 1.56 gm of a sample of coal was treated by kjedahl method and NH_3 gas evolved was absorb in 50 ml of 0.1 N H_2SO_4.After absorption, the excess residue acid required 6.25 ml of 0.1 N NaOH for neutralization. Calculate the % of N_2 in coal sample.	**4**
b	**i)** Write short notes on ion –exchange process. **ii)** 500 ml of a water sample, on titration with N/50 HCl gave a titre value of 29ml to phenolphthalein end point and another 500 ml sample on titration with same acid gave a titre value of 58 ml of to methyl orange end point. Calculate the alkalinity of the water sample in terms of $CaCO_3$ and comment the type of alkalinity present .	**4**
c	**i)** What is nano-technology? Write a short note on nano materials. **ii)** Define liquid crystal, classify them and give applications.	**1**
d	**i)** Define chemical shift. Show the expected NMR signals and their splitting in the following compounds. $CH_3CH_2CH_2OH$ and $C_6H_5\ CH_3$. **ii)** Discuss the green route of synthesis of adipic acid.	**2** **1**
e	**i)** Show molecular orbital's of HF molecule with the help of diagram and calculate its bond order. **ii)** Discuss in brief dia-stereomers , enantiomers and meso compounds with suitable example.	**1** **2**
f	**i)** Differentiate the following: a) Thermo plastic and Thermo setting polymers b) Homo Polymer and Co-polymer **ii)** Calculate the gross and net calorific value of coal having the following compositions carbon 85%,hydrogen =8%,sulphur=1%,nitrogen=2%, ash=4%, latent. heat of steam=587 cal/g.	**5** **4**
g	**i)** Explain bio- degradable polymers with examples. **ii)** Write the method of preparation and uses of the following polymers: Nylon 6, Lucite , Thiokol, Teflon, Kevlar and Bakelite.	**5**

SECTION C

Qno 3	7X1=7	CO
	i) Define HCV and LCV of a coal sample and calculate their values if analysis data of a solid fuel using Bomb calorimeter are given here weight of crucible = 3.5 gm; weight of crucible and coal=4.9 gm; water equivalent of calorimeter=570gm; water taken in calorimeter =2100gm; observed rise in temperature =2.4^0 C; cooling correction =0.045^0 C; Acid correction =50 Cal; Fuse wire correction=3.5 cal; cotton thread correction =1.5 Cal; Hydrogen % =1.0 and latent heat of steam =580 Cal/ gm. ?	4
	ii) Explain the NMR spectrum of CH_3CH_2OH molecule. What is spin-spin coupling; explain with the help of splitted signals of the above molecule?	2

Qno 4	7X1=7	CO
	i) What is electrochemical theory of corrosion? Discuss the mechanism of electrochemical corrosion of iron with, Absorption of Oxygen & Evolution of Hydrogen. Explain the term cathodic protection. Indicate how metallic coatings prevent corrosion.	3
	ii) What is biomass? Write short note on biogas.	4

Qno5	7X1=7	CO
	i) Discuss preparation, structures and properties of carbon nano tubes	1
	ii) What are Secondary batteries? Discuss the various reactions involve during the charging and discharging of lead storage battery.	3
Qno6	**7X1=7**	**CO**
	i) What is shielding and de-shielding. an organic compound with molecular weight 130 shows the following bands in IR spectrum (i) 3080 to 2860 cm^{-1} (ii) 1825 cm^{-1}(iii) 1755 to 1455 cm^{-1}In its nmr spectrum two signals result (i) triplet δ (8.7) (ii) quartet δ (7.08) determine the structure of the compound. **ii)** Discuss in brief the basic principle of IR spectroscopy .A compound having molecular formula$C_2H_4O_2$ while studied for its IR analysis resulted the following peak in the spectrum : 2900 -2950 , 1710 and 3500- 3650 cm^{-1}.The compound also gave effervences with Na_2CO_3 . Suggest the structure of the compound.	2
Qno 7	**7X1=7**	**CO**
	i) What are corrosion inhibitors'? Explain the mechanism of their action. Write short notes on (i) Pitting Corrosion (ii) Concentration Cell corrosion. **ii)** Discuss the corrosion issues and prevention in i) Power generation Industry. ii) Chemical Processing Industry.	3

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