HI-Tech Institute of Engineering and Technology
IMPORTANT QUESTIONS SET 1
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.	Write down the example of any Chiral drug.	1
b.	Define the term Hypo chromic and Hyper chromic shift?	2
c.	Explain why we use dry ether in preparation of Grignard reagent.	5
d.	Classify the following as thermo plastic and thermosetting. Poly styrene, Polythene, Bakelite, Nylon, Urea formaldehyde, Teflon.	5
e.	Write down the absorption frequencies for following groups: i) –OH ii)>C=O iii) -CHO iv) $-CH_3$	2
f.	What is gross and net calorific value?	4
g.	Find out theAtom economy % for the following given reaction. $CH_3CH=CH-CH_3 + HCl \rightarrow CH_3CH_2CHClCH_3$	1

SECTION B

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

Qno	Question	CO
a	**i)** What are the 12 principles and importance of green synthesis? **ii)** Write down the examples of optically active compounds which do not contain chiral centre with proper explanation.	1 2
b	**i)**What is battery? Discuss the working, construction and principle of Lechlanche cell. **ii)** Discuss preparation, structures and properties of buck minister fullerene.	3 1
c	**i)** Name and write structure of three modes of orientation of groups in polypropylene.Which of them is prepared by the Ziegler-Natta Catalyst? **ii)** Discuss the anodic coatings done for the protection of copper vessel.	3
d	**i)** Complete the following reactions with reagents, conditions and products i) $CH_3COCl \longrightarrow$ ii) $(CH_3CO)_2O \longrightarrow$ iii) $CH_3CONH_2 \longrightarrow$ iv) Reduction of a nitrile with LAH v) Cyclo butanone $\longrightarrow$ **ii)** Discuss the green route of synthesis of paracetamol.	5 1
e	**i)** Write short notes on Plaster of Paris with applications. **ii)** 0.25 gm of a coal sample on burning in combustion chamber in presence of O_2 was found to increase weight of $CaCl_2$ tube by 0.08 gm and KOH tube by 0.5 gm. Find % of carbon and Hydrogen in the coal.	3 4
f	**i)** Name the raw material used in the preparation of Portland cement? Discuss the details of manufacturing and setting of Portland cement with schematic diagram. **ii)** What are Organo-mettalic compounds? How Grignard reagents are prepared? Write any five synthetic applications of Grignard reagents.	3 5

g	i) A zeolite softener was 90% exhausted by removing the hardness completely when 10000 liters of hard water was passed through it. The exhausted zeolite bed required 200 liters of 3% sodium chloride solution for complete regeneration. Calculate the hardness of water sample. ii) Draw molecular orbital diagram of O_2 molecule ion. Calculate its bond order and predict its magnetic properties	4 1

SECTION C

Qno 3	7X1=7	CO
	i)Complete the following reactions with reagents, conditions and products vi) CH_3CH_2CHO ⟶ vii) $C_6H_5C_2H_2CHO$ ⟶ viii) $CH_3CH_2COCH_3$ ⟶ ix) CH_3CH_2COOH ⟶ x) Cyclo hexanone ⟶ ii) Discuss the corrosion issues and prevention in a) Oil & Gas Industry. b) Pulp & Paper Industry	5 3

Qno 4	7X1=7	CO
	i) 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. ii) Write down the molecular orbital configuration of NO, NO^+ and NO^- .Arrange them in increasing order of their stability	4 1

Qno5	7X1=7	CO
	i) Discuss the different types of boiler troubles causes by hard water. ii) Calculate the amount of lime & soda required for softening 30000.liters of water using 20 ppm of sodium aluminate as coagulant. Impurities in water are as follows Ca^{2+}=160 ppm ,Mg^{2+}=96 ppm, dissolved CO_2=34 ppm and HCO_3^-=403 ppm.	4
Qno6	**7X1=7**	**CO**
	i) Write the chemical structure of poly isoprene. How would you crosslink the chains of polyisoprene. ii) Explain the conductivity of polymers with conjugated Pi electron system. How is this conductivity enhanced by doping?	5
Qno 7	**7X1=7**	**CO**
	i) For XY_2 bent molecule shows various types of stretching and bending vibrations in I R spectroscopy. ii) What is Beer-Lambert law in UV-VIS absorption spectroscopy? A compound having concentration 10^{-3} g/l resulted absorbance value 0.20 at lambda max 510 nm using 1 cm cell . Calculate its absorptivity and molar absorptivity values. Molecular weight of compound is 400.	2

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