Total number of printed pages: **Programme(D)/1st Semester/DCH102/DCH101**

2022

Chemistry

Full Marks : 100

Time : Three hours

(The figures in the margin indicate full marks for the questions.)

Question 1 is mandatory. Answer any four from the rest.

1. Answer all the questions 1 x 20=20

A. Which of the following is a weak base?

i) CH_3COOH

ii) H_2CO_3

iii) H_3PO_4

iv) NH_3

B. Hydrolysis of water is an

i) Electrolytic reaction

ii) Electrochemical reaction

iii) Either electrolytic or electrochemical reaction depending on conditions

iv) Electro-deposition reaction

C. When electricity is generated from an electrochemical reaction, which of the following statement is true.

i) Free energy change (ΔG) of the process increases.

ii) Free energy change (ΔG) of the process decreases.

iii) Free energy change (ΔG) of the process will be zero

iv) Free energy change (ΔG) of the process cannot be predicted

D. "Scrubber" is a device used for removing

i) Particulate matters

ii) CO gas

iii) SO_2 gas

iv) CO_2 gas

E. Cause of temporary hardness of water is due to the presence of

i) $Ca(HCO_3)_2$ and $Mg(HCO_3)_2$

ii) $Ca(OH)_2$ and $Mg(OH)_2$

iii) $CaCl_2$ and $MgCl_2$

iv) CaS and MgS

F. Who discovered electrons?

i) J J Thomson

ii) Goldstein

iii) Chadwick

iv) Bohr

G. Atomic mass of an element is the

i) Number of protons

ii) Number of neutrons

iii) Number of nuclei

iv) None of the above

H. The shape of p orbital is

i) Trigonal planar

ii) Circular

iii) Dumbbell shaped

iv) Spherically symmetrical

I. _____ is an example of nuclear fuel.

i) ^{233}U

ii) ^{234}U

iii) ^{235}U

iv) ^{236}U

J. Glass is made from

i) Only sand (SiO_2)

ii) Sand (SiO_2) and soda ash (Na_2CO_3)

iii) Sand (SiO_2), soda ash (Na_2CO_3) and limestone ($CaCO_3$)

iv) None of the above

K. In Calcination of Ores

i) Sulphide Ores are concentrated

ii) Carbonated ores are concentrated

iii) Oxidation reaction takes place

iv) None of these

L. One example of acidic flux is

i) SiO_2

ii) CaO

iii) FeO

iv) None of these

M. Bauxite is an ore of

i) Gold

ii) Silver

iii) Aluminum

iv) Copper

N. The ores of Buna-N rubber are : Acetonitrile and ----------

i) isoprene

ii) 1,3- butadiene

iii) styrene

iv) None

O. Which one of the following is not correct:

i) For co-polymers, the building blocks are not identical

ii) For co-polymers, the building blocks are identical

iii) Homo-polymers are linear

iv) None

P. Example of unsaturated hydrocarbon

i) Hexane

ii) Butene-1

iii) n-Propane

iv) n-Propanol

Q. Tertiary carbon atom is designated by

i) 1°

ii) 2°

iii) 3°

iv) None

R. Alcohols are suffix by

i) ole

ii) ene

iii) ane

iv) yne

S. General formula of Grignard Reagent

i) RMgX

ii) RX

iii) Pd/C

iv) NaOH

T. In group, the ionization energy

i) Decreases top to bottom

ii) Decreases right to left

iii) Increases top to bottom

iv) Increases right to left

2. A. What is electrochemical reaction? Give one example. 2

B. Define strong and weak electrolytes with two examples each. 4

C. Discuss Faraday's first law of electrolysis with mathematical equation. Define electrochemical equivalent. 5

D. Calculate how much charge is carried out by one mole of electron? 2

E. 0.718 gram of Ag and 0.218 gram of zinc are deposited on the electrodes when same amount of electricity is passed through $ZnSO_4$ solution and $AgNO_3$ solution. What is the equivalent mass of silver? [C.E. of zinc = 32.7] 4

F. Write down industrial applications, where electrolytic reactions are used. 3

3. A. Differentiate between primary and secondary pollutants with example. 2

B. Write down the sources and biochemical effects of SO_2 gas. 3

C. What is five-day BOD or BOD_5? Why dissolved oxygen in water bodies is very important from environmental point of view? 2 +3

D. Explain why an odoriser is generally used in gas fuels. 2

E. Write a short note on portland cement. 3

F. Explain the terms octane and cetane numbers. 5

4. A. Define isotopes and isobars giving examples. 2

B. Mention the important properties of an ideal lubricant. 3

C. Explain the use of Aufbau principle, Pauli's exclusion principle and Hund's rule in writing the electronic configuration of nitrogen. 5

D. What is petroleum? Write about the fractional distillation of crude oil. 5

E. Describe the process of ethanol manufacture from starch by fermentation. 5

5 Answer the following:

A. Distinguish between co-polymer and homo-polymer. 3

B. Write short notes on Buna-S-rubber. 3

C. Define minerals, ore, flux and slag. 3

D. Distinguish between Calcination and Roasting. 3

E. What do you mean by concentration of ore? How $FeWO_4$ can be separated from ores of Tin using magnetic separation method. 3

F. What is the monomer of natural rubber? Give the reaction for preparation of 1+ 2= 3

		natural rubber assigning 1,4 addition reaction.	
	G.	Write short notes on **(any one)** : PP or Perpex	2
6.	A.	What do you mean by condensation polymerisation? Write the reaction of Bakelite preparation.	2+2 = 4
	B.	What do you self-reduction method? Give reactions for self- reduction method involved in the case of Copper pyrites.	2+1= 3
	C.	"Silver can be extracted from silver chloride by Amalgamation method." Explain the statement with reactions.	3
	D.	(i) Give example of saturated and unsaturated compounds. (ii)Write the structure of t-butanol and isopropyl alcohol	2+2
	E.	(i) Give a laboratory method for preparation of alkane. (ii) Ionization energy of oxygen is less than nitrogen, why?	4 +2
7.	A.	Write a preparation method for alcohols.	4
	B.	Write common characters of transition elements	4
	C.	(i) Give two differences between metal and non-metal. (ii) Draw the structure of glucose.	2+2
	D.	Give physical properties of alkane	2
	E.	Write the general formula of alkane, alkene, alkyne and alkyl halide.	4
	F.	What would be the root name or word or parent name and write the structural formula if carbon number having (i) 1 and (ii) 2.	2