Printed Page:- 04 **Subject Code:-** AAS0102

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM:I CARRY OVER THEORY EXAMINATION-AUGUST 2023

Subject: Engineering Chemistry

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **20**

1. Attempt all parts:-

1-a. Choose the incorrect statement from the following. A good fuel is one which: (CO1) 1

(a) is readily available

(b) Produces a large amount of heat.

(c) Leaves behind many undesirable substances

(d) burns easily in air at a moderate speed

1-b. Ignition temperature is (CO1) 1

(a) Lowest temperature at catch fire

(b) Higher temperature at catch fire

(c) Any temperature

(d) None of these

1-c. Which of the following system has More than ONE Phase (CO 3) 1

(a) Air

(b) Milk and water

(c) Unsaturated salt solution of NaCl in Water

(d) Saturated salt solution of NaCl in Water

1-d. How many phases coexist at Triple point for water system? (CO2) 1

(a) 3

(b) 2

(c) 1

(d) Can not predict

1-e. Which of the following component is formed on the positive plate after the discharged reaction in a lead-acid battery? (CO 3) 1

(a) Sulphuric acid

(b) Lead peroxide

(c) Lead sulphate

(d) All Above

1-f. Which of the following is formed at the graphite electrode during the charging process of a battery when the lithium-ion move through the separator?(CO 3) 1

(a) Water

(b) Graphite

(c) Lithium hydroxide

(d) Lithium carbide

1-g. A plastic resin which becomes soft on heating & rigid on cooling is called (CO 4) 1

(a) thermo plastic

(b) thermo setting

(c) Fibres

(d) None

1-h. Neoprene is form by (CO4) 1

(a) Addition polymerization

(b) Condensation polymerization

(c) Copolymerization

(d) Step growth polymerization

1-i. The defect that occurs due to a displacement of an ion is known as _____ (CO 5) 1

(a) Vacancy defect

(b) Schottky defect

(c) Frankel defect

(d) Interstitial defect

1-j. Which of the following are considered to be the lowest form of Electromagnetic radiation? (CO 5) 1

(a) IRradiation

(b) Microwaves

(c) UVradiation

(d) Radio waves

2. Attempt all parts:-

2.a. What is fuel cell? (CO1) 2

2.b. Why Zeolite process is called Permutit Process? (CO 2) 2

2.c. What are corrosion inhibitors? (CO 3) 2

2.d. Give the name of biodegradable polymers? (CO 4) 2

2.e. The graphite layers are held together by _____. (CO 5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. A coal sample on analysis gives the following composition by weight : C = 90%, O = 3%, S= 0.5%, N=0.5%, and Ash = 2.5%. Net calorific value of the coal was found to be 8490.5 kcal/kg. Calculate the percentage of hydrogen and Gross calorific value. (CO 1) 6

3-b. Calculate the gross and net calorific value of a coal which analyses: C 74%, H 6%, N 1%, O 9%, S 0.8%, moisture 2.2% and ash 8%. (CO 1) 6

3-c. What do you mean by boiler feed water? Explain the calgon conditioning method of descaling? (CO 2) 6

3-d. Can four phase co-exist in equilibrium in a one component system? Justify (CO 2) 6

3.e. What is the function of lubricants? (CO 3) 6

3.f. Classify the polymers on the basis of their tacticity and give suitable examples? (CO 4) 6

3.g. What are the Nano materials, explain with suitable examples? (CO 5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

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4-a. Calculate Gross and Net Calorific Value of Bituminous and Anthracite Coal. The composition are : Anthracite coal: C 85, H 1.9, O 4, N 0.6, S 2.3, Ash 5.2, Moisture rest Bituminous Coal: C 79, H 5, O 4.5, N 1.2, S 2.7, Ash 7.5, Moisture rest (CO1) 10

4-b. Discuss Bomb calorimeter method for determination of calorific value with corrections of solid fuel (CO1) 10

5. Answer any <u>one</u> of the following:-

5-a. A water sample was found to contains the following salts in mg/l: $CaSO_4$ = 20.4, $MgCl_2$ = 9.5 and HCl = 7.3 Calculate the quantity of lime (85% pure) and soda (80% pure) required for softening 80,000 litres of water. What would be the total cost of chemicals if lime and soda are Rs. 9 and Rs. 35 per Kg? (CO 2) 10

5-b. Calculate the quantities of Lime(74%) and soda (92%) required for cold softening of 125,000 L of water with the following analysis, using 10 ppm of $NaAlO_2$ as coagulant. (CO 2) 10

Analysis of Raw water: Ca^{+2} = 160ppm, Mg^{+2} = 48ppm, CO_2 = 66ppm, HCO_3^- = 264ppm, H^+ = 20ppm, NaCl = 4.7ppm

Analysis of Treated water : CO_3^{-2} = 45ppm, OH^- = 68ppm

6. Answer any <u>one</u> of the following:-

6-a. The Lithium Batteries are important for future vehicles. Support the statement with working of lithium ion batteries. (Give the reactions involved in charging and discharging.) (CO 3) 10

6-b. What is corrosion? Which factors affect the corrosion? (CO 3) 10

7. Answer any <u>one</u> of the following:-

7-a. Comment on "blending will improve the properties of the molecule", Describe with suitable examples? (CO 4) 10

7-b. Write the structure, preparation, and applications of following polymers: Nylon-6; Nylon-6,6; Terylene, Bakelite (CO 4) 10

8. Answer any <u>one</u> of the following:-

8-a. How can you distinguish $CH_3CH_2CH_2CHO$ from $(CH_3)_2CH$ CHO by NMR spectroscopy? (CO 5) 10

8-b. Explain the structure, properties and application of Fullerene (CO 5) 10