Printed Page:- 04 **Subject Code:- AAS0202**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (2022-2023 .)

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. The liquid lubricant may be _____in Extreme pressure conditions (CO1) 1

(a) Boiled

(b) Evaporated

(c) Sublimated

(d) Heated

1-b. Shyam was cooking potato curry on a chulha. To his surprise he observed that the copper vessel was getting blackened from outside. It may be due to (CO1) 1

(a) proper combustion of fuel

(b) improper cooking of potato curry.

(c) improper combustion of the fuel

(d) burning of copper vessel.

1-c. Boiler problem caused due to the presence of surfactants (i.e oil, soap) in water is (CO 2) 1

(a) Caustic Embrittlement

(b) Corrosion of Boiler

(c) Sludge

(d) Foaming

1-d. What is the number of phases when $CaCO_3$ is heated.(CO2) 1

(a) 1

(b) 2

(c) 3

(d) 4

1-e. Which of the following is the correct reaction at Cathode in Daniel cell? (CO 3) 1

(a) $Zn \rightarrow Zn^{2+} + 2e^-$

(b) $Zn \rightarrow Zn^{+} + e^-$

(c) $Cu^{+2} + 2e^- \rightarrow Cu$

(d) $Cu^{+} + e^- \rightarrow Cu$

1-f. The anode of the galvanic cell has _____ (CO 3) 1

(a) Positive polarity

(b) Negative polarity

(c) No polarity

(d) Neutral

1-g. The following polymer has ester links in its structure (CO 4) 1

(a) Nylon

(b) Bakelite

(c) PVC

(d) terylene

1-h. Which of the following is an elastomer (CO 4) 1

(a) PVC

(b) nylon

(c) polystyrene

(d) neoprene

1-i. when absorption intensity of compound is decreased it is called (CO 5) 1

(a) Red shift

(b) Blue shift

(c) Hypochromic shift

(d) Hyperchromic shift

1-j.	Density of a crystal remains unchanged as a result of (CO 5) (a) Vacancy defect (b) Interstitial defect (c) Frankel defect (d) Schottky defect	1

2. Attempt all parts:-

2.a.	What is fuel? Define combustion (CO1)	2
2.b.	Why Ion Exchange process is better than Zeolite process? (CO 2)	2
2.c.	Define oxidation and reduction potential.(CO 3)	2
2.d.	Give five common uses of nylon? (CO 4)	2
2.e.	Define Microwave Spectroscopy. (CO 5)	2

SECTION B **30**

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

3-a.	A coal sample was subjected to ultimate analysis, 0.6gm of coal on combustion in a bomb calorimeter, produces 0.05g $BaSO_4$. Calculate % of S in Coal Sample. (CO1)	6
3-b.	A 2.499 gms of coal sample was taken in silica crucible and heated in oven maintained at 110 ^{o}C for one hour. The weight after heating was 2.368 gms. The same sample was analysed for volatile matter and weight obtained was 1.75 gms the sample as further treated to get fixed carbon of 0.95 gms. Calculate the percentage of moisture, volatile matter, ash and fixed carbon for this sample. (CO1)	6
3-c.	What do you mean by boiler feed water? Explain the calgon conditioning method of descaling? (CO 2)	6
3-d.	What are the different units of the hardness of water? Write relationship among them? (CO 2)	6
3.e.	Write a balanced chemical equation for reaction in the airbag gas generator (CO 3)	6
3.f.	What are the Conducting Polymers? Show the conducting mechanism of any one conducting polymers? (CO 4)	6
3.g.	What do you understand with Fullenenes give its structure and applications? (CO 5)	6

SECTION C **50**

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

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4-a. What do you understand with Emission Standards? What are advantages of BS-VI Over BS-IV? (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. Calculate the amount of lime and soda required to soften 10,000 litres of water containing the following ions per litre : Mg^{2+} =4.8 mg Ca^{2+} = 16.0 mg; HCO_3^- = 73.2 mg. (CO2) 10

5-b. Calculate the amount of lime (84% pure) and soda (92% pure) required for treatment of 20,000 litres of water, whose analysis is as follows: $Ca(HCO_3)_2$ 40.5 ppm; $Mg(HCO_3)_2$ = 36.5 ppm; $MgSO_4$ = 30.0 ppm; $CaSO_4$ = 34.0 ppm; $CaCl_2$ = 27.75 ppm; and NaCl = 10.00 ppm. Also calculate the temporary & permanent hardness of water sample. (CO2) 10

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

6-a. What are liquid crystals? Briefly describe the different types of liquid crystals. (CO 3) 10

6-b. 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

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

7-a. What are the Biodegradable Polymers. Describe with their applications? (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. Define IR spectroscopy? Describe the various molecular vibrations in the technique and also comment on Fingerprint Region in IR? (CO 5) 10

8-b. Describe the Principle of UV-Visible Spectroscopy. What are the different types of Absorption Intensity Shifts in UV-Visible Region, explain with appropriate examples.? (CO 5) 10