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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 - SEPTEMBER 2022

Subject: Engineering Chemistry

Time: 3 Hours

Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 marker & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. 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. Which stage of vehicle emission norms presently applicable in India in Internal combustion engine? (CO1) 1

(a) Bharat Stage III

(b) Bharat Stage V

(c) Bharat Stage VI

(d) Bharat Stage IV

1-b. The requirements for combustion is/are (CO1) 1

(a) Fuel

(b) oxygen

(c) heat

(d) all of these

1-c. The presence of bicarbonates of calcium and magnesium cause (CO 2) 1

(a) Temporary Hardness

(b) Permanent hardness

(c) Total hardness

(d) none of these

1-d. Which of the following method is also known as Deionization / demineralization process? (CO 2) 1

(a) Calgon Process

(b) Zeolite Process

(c) Ion Exchange Process

(d) Reverse Osmosis

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

(a) Positive polarity

(b) Negative polarity

(c) No polarity

(d) Neutral

1-f. Select the incorrect statement from the following option: (CO 3) 1

(a) Fuel cells have high efficiency

(b) The emission levels of fuel cells are far below the permissible limits

(c) Fuel cells are modular

(d) The noise levels of fuel cells are high

1 The functionality of ethylene glycol is ----------. (CO4) 1

(a) 3

(b) 4

(c) 2

(d) 5

1 The repeating units or building blocks from which polymer is made up of is known as: (CO 4) 1

(a) Resins

(b) Plastics

(c) Blocks

(d) Monomers

1-i. Beer Lambert's law gives the relation between which of the following (CO 5) 1

(a) Reflected radiation and concentration

(b) Scattered radiation and concentration

(c) Energy absorption and concentration

(d) Energy absorption and reflected radiation

1-j. For a particular vibrational mode to appear in the Raman spectrum, what must change? (CO 5) 1

(a) Frequency of radiation

(b) Intensity of radiation

(c) Molecule's shape

(d) Molecule's polarizability

2. Attempt all parts:-

2.a. What is fuel? Define combustion. (CO1) 2

2.b. What is hardness of water? (CO 2) 2

2.c. What are the factors which affect corrosion?(CO 3) 2

2.d. What are thermosetting and thermoplastic polymers? Give examples for each. (CO4) 2

2.e. In C_{60} molecule there are ___ hexagons and ___ pentagons. (CO 5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. In an experiment in a bomb calorimeter, a solid of 0.90 g is burnt. It is observed that increase of temperature is 3.8 ^{o}C of 4000 g of water. The fuel contains 1% of H. Calculate the H.C.V. and L.C.V. value (Water equivalent of calorimeter = 385g, latent heat of steam = 587cal/g). (CO1) 6

3-b. Differentiate between HCV and LCV and write the relationship between both. (CO1) 6

3-c. Why $CaCO_3$ is taken as standard in calculating hardness of water? (CO2) 6

3-d. Calculate temporary hardness and total hardness of a sample of water containing: $Mg(HCO_3)_2$ = 7.5 mg/L; $Ca(HCO_3)_2$ = 16 mg/L; $MgCl_2$ = 9 mg/L; $CaSO_4$ = 13.6 mg/L (CO 2) 6

3.e. Distinguish between Nematic and Smectic liquid crystals. (CO3) 6

3.f. Write the characteristics of polymer blends. (CO 4) 6

3.g. How many molecular vibration are found in linear and non-linear molecules? Give types of Bending vibrations in IR spectroscopy. (CO 5) 6

SECTION C 50

4. Answer any one of the following:-

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

4 What do you understand by proximate and ultimate analysis of coal. (CO1) 10

5. Answer any one of the following:-

5-a.	Draw neat and labeled phase diagram of water system and explain it (CO2)	10
5-b.	State the Zeolite process for the removal of hardness of water. Discuss its merits and demerits. (CO2)	10

6. Answer any one of the following:-

6	What is corrosion? Discuss in brief the electrochemical theory of corrosion. (CO3)	10
6	Explain sacrificial anodic and impressed cathodic current protection method for prevention of corrosion. (CO3)	10

7. Answer any one of the following:-

7	Write the preparation and uses of following polymers: Buna-N, Terylene, Nylon 6,6. (CO4)	10
7	Describe in brief about conducting and biodegradable polymers with their applications. (CO4)	10

8. Answer any one of the following:-

8-a.	Write the short note on: Schottky Defect and Frenkel Defect. (CO5)	10
8-b.	How many types of electronic transition shown by the molecule in UV-visible spectroscopy? (CO5)	10