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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: II - 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

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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 $3.8^{\circ}C$ 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