

(vi) Which of the following does not show nuclear magnetic resonance?

- (a) ^1H (b) ^{13}C
(c) ^{16}O (d) ^{19}F

(vii) An electric vehicle uses

- (a) Li — ion battery (b) Lead acid battery
(c) Ni — Cd battery (d) dry cell

(viii) An example of biodegradable polymer is

- (a) starch (b) teflon
(c) PVC (d) none of the above

(ix) Formation of rust on iron is an example of

- (a) oxidation corrosion
(b) liquid metal corrosion
(c) electrochemical corrosion
(d) chemical corrosion

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(x) In which of the following, $n \rightarrow \pi^*$ transition is possible?

- (a) $\text{CR}_3\text{CH}=\text{CH}_2$ (b) $\text{C}_2\text{H}_5\text{OCH}_3$
(c) CH_3COCH_3 (d) none of the above

2. (a) Explain any two principles of green chemistry. (4)
(b) Draw the molecular orbital energy level diagram of NO molecule and find out its bond order and magnetic behaviour. (6)
(c) In a polymer, there are 100 molecules of molecular weight 100, 200 molecules of molecular weight 1000 and 300 molecules of molecular weight 10,000. Find the number average molecular weight (\bar{M}_n), weight average molecular weight (\bar{M}_w) and poly dispersity index (PDI) of the polymer. (5)
3. (a) Discuss the principle of UV — Visible spectroscopy? (4)
(b) What are primary and secondary cells? Give the charging and discharging reactions of a lead acid battery. (2+4)
(c) Why does metal show tendency to undergo corrosion? Explain sacrificial anodic protection method of controlling corrosion. (2+3)
4. (a) Discuss the conductivity of p — doped polyacetylene. (3)
(b) What is meant by functionality of a monomer? What is the functionality of ethylene molecule? (2+ 1)

- (c) Explain the following: (3 × 3 = 9)
- (i) significance of ψ and ψ^2 .
 - (ii) eigen function and eigen value
 - (iii) radial and angular wave functions
5. (a) Write short notes on (i) Fullerenes (ii) Carbon Nanotubes (3 + 3)
- (b) What are liquid crystals? What are their types? How does liquid crystal display take place? (5)
- (c) Predict the number of signals in the NMR spectrum of the following molecules
- (i) $\text{CH}_3\text{CH}_2\text{CH}_3$
 - (ii) CH_3COCH_3
 - (iii) Benzene (3)
- (d) What are Biopolymers? (1)
6. (a) Discuss the methods of solid waste disposal. (5)
- (b) Give reasons of the following: (2 + 2)
- (i) Impure metal corrodes faster than pure metal under identical conditions.
 - (ii) Corrosion of water filled steel tanks occurs below the water line.
- (c) Give the uses and disadvantages of Li – ion battery. (4)
- (d) Write two applications of IR spectroscopy. (2)
7. (a) What is electrochemical corrosion? Discuss the various factors influencing the rate of corrosion. (2+4)
- (b) What are carbon foot print and carbon sequestration? (4)
- (c) Discuss Bottom up approach for synthesis of Nanomaterial. (3)
- (d) Calculate the atom economy of formation of ethyl chloride in the following reaction
- $\text{CH}_3\text{CH}_2\text{OH} + \text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{CH}_3\text{CH}_2\text{Cl} + \text{NaHSO}_4 + \text{H}_2\text{O}$ (2)

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