

- (v) Name any two solid lubricants.
 - (vi) Where the electrochemical corrosion takes place?
 - (vii) Which constituent of cement causes its initial setting?
 - (viii) Name two green solvents.
 - (ix) What type of excitation can take place in CH_3COCH_3 at 280nm and 190nm in uv-spectroscopy.
 - (x) Give two examples of biopolymer.
2. (a) Write schrodinger wave equation for hydrogen atom and explain the different terms involved in it. (3)
- (b) Draw the radial probability distribution curves of electron at different radial distance r from the nucleus for $n = 1, l = 0$ and $n = 2, l = 0$ orbitals. (4)
- (c) Draw the molecular orbital diagram of CO molecule and calculate the bond order. (4)
- (d) The bond order of N_2^+ ion is less than that of N_2 whereas the bond order of O_2^+ is greater than that of O_2 . Explain with the help of molecular orbital theory. (4)
3. (a) Explain addition and condensation polymerisation with suitable examples and state the differences between these polymerisation. (6)
- (b) Give reasons
- (i) PVC is soft and flexible
 - (ii) Natural rubber need vulcanization. (4)

- (c) Give two examples of commercially prepared conducting polymer. How conductivity of a polymer can be increased by doping method? (2+3=5)
4. (a) What are different types of carbon nano-tubes? Write down the important characteristics and applications of carbon nano-tubes. (5)
- (b) Write down the applications of nanomaterials in the field of
- (i) medicine
- (ii) Catalysis. (5)
- (c) State Beer-Lambert law. Explain the following terms in respect of UV-vis spectroscopy with example. (i) Chromophore (ii) Auxochrome (2+3=5)
5. (a) Write down the major applications of the following (any two)
- (i) Infrared spectroscopy
- (ii) NMR spectroscopy
- (iii) Mass spectroscopy. (4)
- (b) What are alternative solvents? Write a note on the following:
- (i) Properties of Ionic liquids.
- (ii) Advantage of supercritical CO_2 fluid. (6)
- (c) What do you mean by
- (i) Carbon footprinting.
- (ii) Carbon sequestration. (2)

- (d) How the solid waste effect the public health of an urban area? (3)
6. (a) What is corrosion? Explain rusting of iron with the help of electrochemical theory of corrosion. (2+4=6)
- (b) Describe two methods for protection of a metal from corrosion. (5)
- (c) What is Galvenic series? How does it differ from electrochemical series. (4)
7. (a) Give the average chemical composition of portland cement. Explain the setting and hardening of portland cement with chemical reactions involved in it. (2+5=7)
- (b) Write characteristic of a good lubricating oil. Name the additive used to improve the following desired quality of lubricating oil. (5)
- (i) to prevent rusting
- (ii) to improve viscosity index
- (iii) to prevent oxidation
- (c) What are the refractories? Give two essential properties of a good refractory material. (3)
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