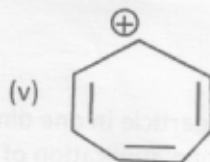
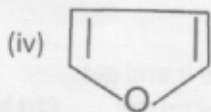
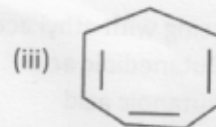
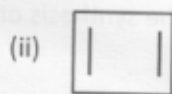
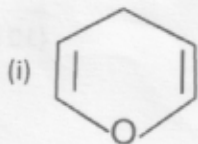


Total Number of Questions : 32

Time : 3.00 Hours

Max. Marks : 200

1. A solution of $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green, but a solution of $[\text{Ni}(\text{CN})_4]^{2-}$ is colourless. Suggest an explanation. (2 Marks)
2. Which of the following has smaller bond angle – NH_3 or NF_3 ? Explain the reason. (2 Marks)
3. What do you mean by Hamiltonian operator in quantum mechanics? (2 Marks)
4. The half life ($t_{1/2}$) of a reaction is halved as the initial concentration of the reactant is doubled. What is the order of the reaction? (2 Marks)
5. Glycine exist as $^+\text{NH}_3 - \text{CH}_2 - \text{COO}^-$, Zwitter ion, but anthranilic acid does not exist as a Zwitter ion. Why? (2 Marks)
6. What are sulpha drugs? Give the structure of any one of the sulpha drugs. Explain their mode of action. (4 Marks)
7. Explain why the powder diffraction pattern of KCl is different from that of NaCl. (4 Marks)
8. How can you separate alumina from bauxite ore associated with silica? (4 Marks)
9. How many ^1H NMR signals do you expect for 1-bromopropane and 2-bromopropane? Give their splitting pattern. (4 Marks)
10. Prove the existence of intramolecular mechanism when allyl phenyl ether on heating yields o-allyl phenol. (4 Marks)
11. Sodium lauryl sulphate can decrease the surface tension of water, but sodium chloride increases the surface tension of water. Explain. (5 Marks)
12. What do you mean by electrical double layer and zeta potential in colloidal solutions? Give two consequences of these concepts. (5 Marks)
13. What are hot bands and overtones in IR spectroscopy? How they can be distinguished? (5 Marks)
14. State and explain Fajan's rules to explain covalent character in ionic compounds. (5 Marks)
15. Classify the following as aromatic, non-aromatic and antiaromatic. Give reasons. (5 Marks)



16. What do you understand by the term trans effect? Discuss any two applications of it. (5 Marks)
17. Discuss the importance of solubility product and common ion effect in qualitative analysis. (5 Marks)
18. Write a note on liquid crystals with special reference to their classification, characteristics and important applications. (7 Marks)
19. Explain the principle of thin layer chromatography. What are its advantages? (7 Marks)
20. Discuss the splitting of d orbitals in octahedral field according to crystal field theory. How will you explain the colour on the basis of this theory? (7 Marks)
21. Discuss any seven applications of tracer (radioisotopes) techniques. (7 Marks)
22. Write a method for preparing a tertiary alcohol containing two identical alkyl groups. Write one method for distinguishing primary, secondary and tertiary alcohols. (7 Marks)
23. Explain the co-operative effect of haemoglobin during oxygen transport. (10 Marks)
24. Derive Langmuir's adsorption isotherm and explain how it could be used for determination of surface area of an adsorbent. (10 Marks)
25. The Bohr model for single electron atom predicts that the energy of the allowed orbits are given by
- $$E_n = -2.18 \times 10^{-18} \times \frac{z^2}{n^2} \text{ Joule.}$$
- (i) Calculate the minimum energy in Joules required to ionize an electron in the $n = 2$ state of hydrogen atom. (5 Marks)
- (ii) Calculate the wavelength (in nm) of the photon emitted by an electron in making the transition from $n = 3$ to $n = 1$ level of Li^{2+} . (5 Marks)
26. Distinguish between DNA and RNA with regard to their structure, location in cells and functions. (10 Marks)
27. Discuss the significance of the terms chemical shift and spin-spin splitting in NMR spectroscopy with illustrative examples. (10 Marks)
28. Discuss lanthanide contraction, its consequences and significance in the separation of individual lanthanides. (10 Marks)
29. What different techniques are employed for purification or refining of metals? (10 Marks)
30. What are semiconductors? Explain N-type and P-type semiconductors. Discuss the effect of temperature on the conductivity of semiconductors. (10 Marks)
31. Commencing with ethyl acetoacetate, outline the synthesis of : (10 Marks)
- Butanedioic acid
 - Butanoic acid
 - Hexane - 2, 5 - dione
 - 4 - Methyl uracil
 - Crotonic acid.
32. Set up the Schrodinger wave equation for a particle in one dimensional box, solve it and get expression for the energy of electron. Give one application of the particle in a box model. (10 Marks)