



14. a) What are quantum numbers ? Give their significance.  
b) State Hund's rule of maximum multiplicity. (4+2)
15. a) Derive de-Broglie's equation. Mention the terms involved in it.  
b) Find the energy of a photon whose wavelength is 380 nm [ $h = 6.6 \times 10^{-34}$  Js]. (4+2)
16. a) What is  $SP^3$  hybridization ? Explain the structure of methane molecule on the basis of hybridization.  
b) What is meant by lattice energy ? Give an example. (4+2)
17. a) State any four postulates of valency bond theory.  
b) Mention any two difference between Sigma and Pi bond. (4+2)
18. a) Give any four properties of  
a)  $\alpha$ -particles b)  $\beta$ -particles  
b) Mention any two applications of  $I^{131}$  radioisotope. (4+2)
19. a) Explain the preparation of copper ferrocyanide semipermeable membrane.  
b) Give any two applications of Henry's law. (4+2)
20. a) What are galvanic cells ? How do you represent Daniel cell and write the cell reaction.  
b) Mention the limitations of SHE. (4+2)
21. a) Explain the construction and working principle of glass electrode.  
b) What are reversible electrodes ? (4+2)
22. a) Derive Henderson-Hasselbalch equation for an acidic buffer.  
b) What are amphoteric substances ? Give an example. (4+2)
23. a) Explain the molecular orbital diagram for the formation of oxygen molecule.  
b) Define bond angle. (4+2)
24. a) What is electrochemical series ? Mention the applications.  
b) What is molal depression constant ? (4+2)
25. a) Explain the experimental procedure for the determine of viscosity by Ostwald's viscometer.  
b) What are surfactants ? Give an example. (4+2)