

Answer five questions in which Q.No. 1 is compulsory.

1. Explain any four of the following :
 - (a) de Broglie equation is significant only to microscopic systems.
 - (b) M/10 aqueous solution of urea is not isotonic with M/10 solution of NaCl.
 - (c) Carbon monoxide possesses finite value of entropy even at absolute zero.
 - (d) Carbon tetrachloride is non-polar molecule.
 - (e) UV radiation is essential for electronic excitation in molecules.
2.
 - (a) Discuss the postulates of transition state theory of reaction rates.
 - (b) Obtain an expression for rate constant related with thermodynamic parameters.
 - (c) Explain the significance of entropy of activation.
3.
 - (a) State and explain third law of thermodynamics.
 - (b) Discuss quantitatively the method of determination of absolute entropy of systems at particular temperature.
4.
 - (a) Find out expressions for eigen functions and eigen values of a particle confined to one dimensional box.
 - (b) Prove that these Eigen functions are orthonormal.
5.
 - (a) Discuss and derive Gibbs adsorption isotherm thermodynamically to deal with adsorption of a solute at the surface of a liquid.
 - (b) Explain surface active and surface inactive substance.
6.
 - (a) State and explain Heisenberg's uncertainty principle and its significance.
 - (b) Explain the state of Microsystems and significance of ψ .
 - (c) Define quantum mechanical operators. Illustrate with examples.
7. What are concentration cells ? Derive an expression for the emf of concentration cell with transference.
8. Write notes on any three of the following :
 - (a) Franck Condon Principle
 - (b) Black Body Radiation
 - (c) Theory of Indicators
 - (d) Clausius Mossotti Equation
9.
 - (a) What do you mean by microwave active and infra red active molecules ?
 - (b) Discuss different types of electronic transitions in ethanal.
 - (c) What are the selection rules of IR spectra ? Which of the following are IR active? (i) H_2 (ii) HCl (iii) CO_2 (iv) H_2O