Total marks :60   **(2 ½ Hours)**

NB : All questions are compulsory
    All questions carry equal marks

Q.1 **Attempt any two of the following**   **[12]**
   i The average molecular weight of an amino acid residue is 120. The average density of a soluble protein is 1.33 g/cm^3. Calculate (I) the specific volume of an average soluble protein. (II) the weight of a single molecule of a protein containing 270 amino acids, and (III) the volume occupied by a single molecule of this protein.
   ii Discuss about frequently used methods of cell disruption for extraction of biomolecules.
   iii How would you precipitate proteins using organic solvents?
   iv Write short note on any three methods of qualitative analysis of carbohydrates.

Q.2 **Attempt any two of the following**   **12**
   i Derive equation of Michaelis Menten reaction Comment on Haldane relationship in kinetics of enzyme catalysed reactions
   ii Explain thermodynamic aspects of the enzyme-catalysed reaction with reference to transition state.
   iii Explain the mechanism of enzyme catalysis of Ribonuclease A.
   iv Describe briefly enzyme regulation mediated through reversible covalent modifications. Elaborate your answer with specific example.

Q.3 **Attempt any two of the following**   **12**
   i Describe the signaling systems which control luminescence in *Vibrio harveyi.*
   ii The availability of ammonia regulates the Ntr regulon in enteric bacteria, Justify.
   iii Comment on the catabolite repression system of *Escherichia coli* that does not involve camp
   iv Explain signal transduction during chemotaxis in *Salmonella typhimurium.*

Q.4 **Attempt any two of the following**   **12**
   i With the help of structure and enzymes describe degradation of naphthalene to catechol.
   ii Give an account of oxidation of propane by microorganisms.
   iii Describe degradation of aromatic compounds through anaerobic photometabolism and nitrate respiration.
   iv Discuss degradation of aliphatic hydrocarbon through cytochrome P450 dependent enzymatic system.

Q.5(a) **Explain (any two)**   **04**
   i Basis of separation of biomolecules in gel filtration technique
   ii Transition state analogues
   iii Competence in *Bacillus subtilis*
   iv Diterminal oxidation of hydrocarbons

TURN OVER

Q.5(b) **Give significance/function of (any two)** **04**
  i Edman degradation
  ii Mixed inhibitor
  iii RapA phosphatase
  iv Rubridoxin

Q.5(c) **Give one example of (any four)** **04**
  i Stationary phases used in HPLC
  ii Chromatography derivatization agents
  iii Irreversible enzyme inhibitors
  iv Major types of drug design
  v Genes induced by *bvg* gene product
  vi Cytoplasmic histidine kinase
  vii Products of phenanthrene degradation
  viii End product of orthocleavage of catechol by microorganisms

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