FIVE YEAR INTEGRATED M.Sc., EXAMINATION 2023

SEMESTER - I

Paper LS-1-1-1

Life Science: Molecules and their Interaction Relevant to Biology

Time: Three Hours Full Marks: 60

Questions are of value as indicated in the margin.

Group A. Answer *any ten* (10) questions from the following: 2 x 10 = 20

1. Name two sulphur containing aminoacids.
2. Differentiate between glycogen and starch.
3. Write the structure of maltose.
4. Write the structure of cholesterol.
5. Name one saturated and one unsaturated fatty acid.
6. Name two fat soluble and two water soluble vitamins.
7. F_0F_1 particle – write short notes.
8. What is hydrophobic effect in stabilizing the protein structure?
9. Explain the co-factors and prosthetic groups with suitable example.
10. An enzyme reaches maximum rate at high substrate concentration because it has a fixed number of active sites where substrate binds. Comment.
11. What is turnover number? Higher concentrations of enzyme give rise to a higher turnover number. Comment.
12. Draw the structures of Adenine and Uracil.

Group B. Answer *any two* of the following: 5 x 2 = 10

1. Explain the binding change model (rotary model) for ATP generation.
2. What is the effect of change in pH on enzyme catalytic reactions? Discuss with a suitable diagram.
3. Write the initial rate equation for enzyme catalyzed reaction and hence establish the Lineweaver-Burk equation. Write the importance of the Lineweaver-Burk equation.

Group C. Answer *any three* of the following: 10 x 3 = 30

1. a) What is oxidative phosphorylation and substrate level phosphorylation. (2)
   b) Explain the mechanism of oxidative phosphorylation (chemiosmotic hypothesis). (8)

2. a) What is glycolysis? (1)
   b) Explain the mechanism of glycolysis (preparatory phase and pay off phase). (3+6=9)

3. a) What is Feedback inhibition? (2)
   b) Differentiate between competitive and non-competitive inhibitions. Discuss with suitable reaction mechanisms. (6)
   c) How can you eliminate the reversible inhibition so that the maximum velocity of the catalytic reaction remains the same? (2)

4. a) Write about any four supersecondary structures of proteins. (5)
   b) Write short notes on B form of DNA. (5)

5. a) Drawing the structure of DNA describe hydrogen bonding patterns in the base pairs defined by Watson and Crick. (4)
   b) Write about miRNAs and its processing in the cell. (2+4=6)
