2 0 1 8

(April)

BIOCHEMISTRY

(Honours)

SECOND PAPER

(**Thermodynamics, Membrane Biophysics and Biostatistics**)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **four** questions, selecting **two** from each Part

PART—A

(**Thermodynamics and Membrane Biophysics**)

1. *(a)* Derive Gibbs-Helmholtz equation for free energy. Discuss how it holds good for biological systems.   8

   (b) How does the first law of thermo-dynamics apply to biological systems?   6

(Turn Over)

2. (a) What are coupled reactions? Using suitable examples, explain the importance of coupled reactions in biology.   7

(b) What is meant by the term 'phosphate-group transfer potential'? Discuss its significance in biological systems.   7

3. Describe the different ways in which solutes can be transported across the cell membrane. Illustrate your answer using suitable diagrams.   14

4. Write short notes on any *four* of the following :   3½×4=14

   (a) Redox reactions in biology

   (b) Standard reduction potential

   (c) Hydrogen electrode

   (d) Steady-state equilibrium

   (e) Measurement of ΔG

PART—B

(Biostatistics)

5. (a) Distinguish between primary data and secondary data.   5

(b) Describe the importance of classification and tabulation of data.   2½+2½=5

(c) Write a short note on stratified sampling.   4

6. (a) Find the mode of the following data :   4

Marks	No. of Students
0–15	1
15–30	4
30–45	9
45–60	16
60–75	11
75–90	3

(b) Give a concise comparison between mean and mode.   3

(c) What is standard deviation? Write down its merits and demerits.   1+3+3=7

7. (a) Find the Karl Pearson's correlation coefficient between X and Y for the following data : 5

X	Y
12	7
14	8
17	11
21	13
26	14
29	16
31	19

(b) Write a short note on regression analysis and its uses. 5

(c) A problem in Mathematics is given to three students A, B and C whose probabilities of solving it independently are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved? 4

8. (a) What are the conditions under which binomial distribution is used? 4

(b) It is found that out of 1000 people in a certain city, 20 of them has diabetes. If 150 people from the city are selected at random, find the probability that exactly 5 of them have diabetes. $[e^{-3} = 0.0498$ (approx)] 4

(c) Write down three different applications of—

(i) t-test;

(ii) χ^2-test. 3+3=6

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