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(May/June)

BIOCHEMISTRY

(Honours)

(Thermodynamics, Membrane Biophysics and Biostatistics)

(BCHEM–201)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

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

PART—A

1. *(a)* How does the first law of thermo-dynamics apply to biological systems? 6

   (b) Do biological systems follow second law of thermodynamics? Discuss. 8

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

(*Turn Over*)

(2)

(b) Using an example, define and explain heat of reaction. 6

3. (a) Explain with the help of specific examples, the oxidation-reduction reactions. How are they important in biological systems? 8

(b) What are simultaneous equilibria? Discuss. 6

4. (a) Describe the fluid mosaic model. 8

(b) In relation to membrane transport, what do the following terms signify? 2×3=6

(i) Uniport

(ii) Active transport

(iii) Passive transport

PART—B

5. (a) What are the methods of collection of primary data? 5

(b) Describe briefly a sample and population with examples. Differentiate between finite and infinite population. 5

(c) Write a note on simple random sampling mentioning its different types. 4

(3)

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

Marks	No. of Students
20–30	2
30–40	5
40–50	7
50–60	34
60–70	22
70–80	3

(b) What are the merits and demerits of standard deviation? 4

(c) Compute the mean and standard deviation of the data given in Question No. 6(a). 6

7. (a) Obtain Pearson's correlation coefficient for the following data : 5

X	Y
8	6
6	4
11	11
12	13
17	14
19	16
22	19

(b) Obtain the regression coefficient of *Y* on *X* and interpret the result :   5

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

(c) Write a note on regression analysis highlighting its uses.   4

8. *(a)* Write notes on the applications of—

     (i) chi-square statistics;

     (ii) *t*-test.   4

(b) A bag contains 8 white balls and 4 red balls. One ball is drawn from the bag and it is replaced after noting its colour. In the second draw, again one ball is drawn and the colour noted. What is the probability that both balls drawn are of different colours?   6

(c) Mention the conditions under which binomial distribution is used.   4

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