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(July)

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, selecting **two** from each Part

PART—A

(**Thermodynamics and Membrane Biophysics**)

1. (a) Derive the Gibbs-Helmholtz equation for free energy. Discuss its significance in relation to biological systems. 7
- (b) Using an example, define and explain heat of reaction. 7

2. (a) What is molecular basis of entropy? 4
- (b) How is ΔG measured? 4
- (c) Briefly explain the second law of thermodynamics. 6

3. Write notes on any *two* of the following :

7×2=14

- (a) Standard electrode potential
- (b) Coupled reactions
- (c) Phosphate group transfer potential

4. Describe the 'fluid mosaic model' of the plasma membrane. On the basis of this model, explain different functions of the plasma membrane.

7+7=14

PART—B

(**Biostatistics**)

5. (a) Mentioning some of the sources of biological data, distinguish between primary and secondary data.
- (b) What are the objectives of classification of biological data?

(3)

- (c) Explain the following terms :
- (i) Frequency distribution
 - (ii) Class interval and class limits
- (d) The following are the wing lengths (in cm) for a sample of 22 butterflies from a given population :
- 3·3, 3·5, 3·6, 3·6, 3·7, 3·8, 3·8, 3·8,
3·9, 4·0, 4·0, 4·0, 4·0, 4·1, 4·1,
4·2, 4·2, 4·3, 4·3, 4·4, 4·5
- Prepare a frequency distribution table with class interval width as 0·1 cm. Also calculate the mean and median of the distribution. 3+2+3+6=14

6. (a) The mean and standard deviation for a group of 100 observations are found to be 65 and 12 respectively. Later it was found that one observation was taken as 29 instead of 39. Find the correct values of the mean and the standard deviation.
- (b) What are the requirements of a good sample? Describe briefly the methods of obtaining a stratified sample.
- (c) Describe briefly how you test the significance of difference between two sample means. 6+4+4=14

(4)

7. (a) In a group of 10 students, there are 6 boys and 4 girls. From this group 3 students are selected at random. What are the probabilities that the selected sample contains (i) 2 girls and (ii) at least 2 girls?
- (b) What is a Poisson distribution? What is its use in biology?
- (c) Given the following data :

	Yield (in kg)	Rainfall (in cm)
Mean	508·4	26·7
Standard deviation	36·8	4·6

The coefficient of correlation between yield and rainfall is 0·52. Obtain the two regression equations. 5+3+6=14
