

M.Sc. (Part—I) Semester—I (C.B.C.S. Scheme) Examination
BIOINFORMATICS
Paper—I
(Mathematics and Biostatistics)

Time : Three Hours]

[Maximum Marks : 80

- Note :—** (1) **ALL** questions are compulsory.
(2) Draw well labelled diagram wherever necessary.
(3) Only non-programmable calculators are allowed.
(4) All questions carry equal marks.

1. (a) Define Limits and give its properties. 4
(b) Evaluate $\int_1^2 (4x^2 + 3x + 2)dx$. 4
(c) Explain techniques for solving partial differential equation. 4
(d) Evaluate $\lim_{\theta \rightarrow 0} \frac{\cos 3\theta}{\theta}$. 4

OR

- (p) Explain the terms definite and non-definite integrals. 4
(q) Evaluate $\int_1^2 (6x^2 + 1)dx$. 4
(r) Discuss the concept of partial differential formation, with one variable. 4
(s) Evaluate $\int \sin^2 \theta d\theta$. 4
2. (a) Explain the terms 2D and 3D geometry. Give the equations of circles and hyperbola. 8

- (b) What do you mean by conjugate of matrix ? If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 4 \\ 3 & 1 \end{bmatrix}$, then
find :
(i) $A - B$
(ii) $A + B$. 8

OR

- (p) Discuss the Fourier and Laplace transform. Give examples. 8
(q) Define matrix and give its properties. Obtain the transpose of matrix A :

$$A = \begin{bmatrix} 2 & 3 & 1 \\ 4 & 2 & 3 \\ 1 & 4 & 2 \end{bmatrix} \quad 8$$

3. (a) Explain how would you construct divided bar diagram. Give example. 4
 (b) What are the measures of central tendency ? Define mode for grouped frequency data. 4
 (c) Obtain the median for the following data :

x_i	:	3	5	6	9	11	5	4	3	2
f_i	:	7	9	11	12	13	8	7	6	4

 4
 (d) Define the variance of grouped frequency distribution and coefficient of variation. 4

OR

- (p) What do you mean by frequency polygon and frequency curve ? Give example. 4
 (q) Define the mean for grouped frequency distribution. 4
 (r) Obtain the third quartile for the following data :

C.I.	:	10—20	20—30	30—40	40—50	50—60
f_i	:	7	9	10	6	4

 4

- (s) What do you mean by deciles ? Obtain second decile for the following data :

x_i	:	3	4	6	7	9	8	10	12
f_i	:	2	3	5	7	10	6	4	3

 4

4. (a) Obtain correlation coefficient for the following data :

X	:	13	15	16	19	20	21	19	22	23
Y	:	19	20	22	20	21	23	20	21	18

 8

- (b) Define classical probability. State and prove addition law of probability. Obtain the probability of getting two heads when two coins are tossed. 8

OR

- (p) What do you mean by regression ? Obtain linear regression line of Y on X for the following data :

X	:	7	8	9	10	11	12	13
Y	:	12	14	15	17	19	20	21

 8

- (q) What do you mean by discrete random variable ? Give example. Define binomial distribution and give its properties. 8

5. (a) What are the properties of estimator ? 4
 (b) Explain chi-square test of testing independence of two attributes. 4
 (c) Discuss t-test for testing significance of single sample mean. 4
 (d) What are the assumptions of analysis of variance ? 4

OR

- (p) What do you mean by Hypothesis ? Define null hypothesis. 4
 (q) Explain t-test for testing difference of means of two samples. 4
 (r) Explain F-test for testing significance difference of variances of two samples. 4
 (s) What do you mean by analysis of variance ? Give assumptions. 4