M.Sc. Semester—I (C.B.C.S. Scheme) Examination

BIOINFORMATICS

(Mathematics and Biostatistics)

Paper—I

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) Explain the terms definite and non-definite integrals. 4

(b) Evaluate $\int \sin^2\theta \, d\theta$. 4

(c) Explain the concept of partial differential formation with one variable. 4

(d) Discuss the terms series and logarithm. 4

OR

(p) Define limits and give its properties. 4

(q) Evaluate $\int_2^3 (6x^2 + 2x + 1)\, dx$. 4

(r) Explain the technique of solving ordinary differential equation. 4

(s) Evaluate $\lim_{\theta \to 0} \frac{\sin 3\theta}{\theta}$. 4

2. (a) What do you mean by 3D geometry ? Give the equations of circle and hyperbola. 8

(b) What are the properties of matrix ? If $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$ then find :—

(i) A – B

(ii) A + B. 8

OR

(p) Explain the fundamentals of Set Theory. Discuss Fourier transform with example. 8

(q) What do you mean by conjugate of matrix ? Obtain the transpose of A :

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

3. (a) What are the different types of diagrammatic presentation of data ? 4

(b) Obtain mean and median for following data :

x_i	2	5	9	11	7	5	3	1
f_i	8	10	13	14	12	10	7	5

4

(c) What do you mean by central tendency ? Give its measures. 4

(d) Obtain the standard deviation of following data :

x	3	4	6	9	11	10	7	5	3
f_i	01	05	07	13	05	04	03	02	01

4

OR

(p) Explain how would you construct Histogram. Give example. 4

(q) Obtain the first quartile of following data :

C.I.	10–20	20–30	30–40	40–50	50–60	60–70
f	7	11	15	9	6	3

4

(r) What are the measures of dispersion ? Explain how you would obtain percentile of grouped frequency distribution. 4

(s) What do you mean by mode ? How would you obtain it for grouped frequency distribution ? 4

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

x	11	13	16	21	25	26	30	32
y	13	15	17	19	28	30	32	33

8

(b) Define axiomatic probability. State and prove law of addition of probability. 8

OR

(p) Fit straight line regression line for following data line of Y on X : 8

x	2	3	4	5	6	7	8	9	10
y	13	17	19	20	23	25	29	32	38

(q) Two dice are thrown, write the sample space and obtain the following probability : 8

(i) Getting the number 6 on second die.

(ii) The sum of the two faces is less than ten.

5. (a) What do you mean by estimator and estimate ? Give example. 4

(b) Explain t-test for testing significance of mean of single sample. 4

(c) Explain F-test for testing variability of two samples. 4

(d) What do you mean by Analysis of variable ? 4

OR

(p) Explain the terms Hypothesis, Null hypothesis. 4

(q) Explain Chi-Square test of goodness of fit. 4

(r) Discuss the t-test for testing significance difference between two sample means. 4

(s) Explain linear model of one-way classification. 4

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