

Ph. D. IN BIOCHEMISTRY (PHDBC)

Term-End Examination

December, 2024

**RBC-002 : BIOSTATISTICS AND
BIOINFORMATICS**

Time : 3 Hours

Maximum Marks : 100

Note : *Question paper consists of **three** Sections A, B and C. Answer all the Sections. Scientific non-programmable calculator is allowed.*

Section—A

1. Do as directed : 2 each
 - (i) Write the formulae of any *two* measurements of central tendency.
 - (ii) If the probability of left-handedness in a certain group of people is 0.05, what is the probability of right-handedness (presuming no ambidexterity) ?

- (iii) Allotment of licence plates to different car comes under which scale of measurement and why ?
 - (iv) Define null and alternative hypothesis.
 - (v) Draw positive skewed and negative skewed curve.
2. (i) Name *two* docking programmes. 2
- (ii) What is conserved sequence and consensus sequence ? 2
- (iii) Name *two* output devices of computers. 2
- (iv) Differentiate between hardware and software. 2
- (v) Name *two* e-resources of bioinformatics. 2

Section—B

Note : Answer any *five* questions.

3. What is dot-matrix model or dot-plot method ?
Explain gap penalties. 6
4. Explain the significance and application of Chou-Fasman rules. 6

5. Outline levels of organization of protein structure. Explain major features of protein data bank. 6
6. A healthcare company is started by four persons A, B, C and D and they distribute profit between them in proportion of 4 : 3 : 2 : 1. In the year 2010 company earned a profit of ₹ 14,400. Represent the shares of their profits in a pie chart. 6
7. The pulse rate of eight contestants in a 100 metre race checked immediately after the race were 99, 78, 96, 89, 98, 85, 107, 102. Determine : (i) The range, and (ii) The 25 percentile. 2+4
8. Compute mean and variance of the data given below : 6

Class Interval	No. of Fields
31—35	2
36—40	3
41—45	8
46—50	12
51—55	16
56—60	5
61—65	2
66—70	2

Section—C

Note : Answer any *five* questions.

9. A hospital specialises in heart surgery. During the year 2010-11, 2,000 patients were admitted for treatment. Average payment made by a patient was ₹ 1,20,000 with a standard deviation of ₹ 25,000. Assuming the distribution of payments to be normal, find : 10

(i) The number of patients who paid between ₹ 1,00,000 and ₹ 1,75,000.

(ii) The probability that a patient bill exceeds ₹ 75,000.

(iii) The maximum amount paid by the lowest paying one third patient.

10. Aquarius Health Club has been advertising a rigorous programme for body conditioning. The

club claims that after one month in the programme, the average participant should be able to do at least eight more push-ups in 2 minutes than he or she do at the start. Does the random sample of ten programme participants given below support the club claim ? Use 0.025 level of significance :

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Participant	Before	After
1	38	45
2	11	24
3	34	41
4	25	39
5	17	30
6	38	44
7	12	30
8	27	39
9	32	40
10	29	41

11. A new drug was being studied to see if it helped prevent heart attacks. Researchers had obtained the following information on heart-related deaths : 10

Types of Death	Treatment Group		
	Active drug	Placebo	Total
'Sudden Death' Heart Attack	87	39	126
Myocardial infarction	36	27	63
Other heart complication	9	6	15
	132	72	204

- (a) Calculate the χ^2 statistic for these data.
- (b) Based on the result you obtained in (a), would you conclude that the distribution of heart-related deaths among the three categories differed depending on treatment ?
12. What is multiple sequence alignment ? Discuss its advantages, scoring matrices along with Markov model. 8+2

13. Explain any *two* of the following : 5+5

(i) Secondary structure prediction

(ii) FASTA

(iii) E-Resources

14. Illustrate phylogenetic tree construction methods and programmes. 10

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