

00482

Ph.D. IN BIOCHEMISTRY
(PHDBC)

Term-End Examination

December, 2018

RBC-002 : BIOSTATISTICS AND
BIOINFORMATICS

Time : 3 hours

Maximum Marks : 100

-
- Note :* (i) Question paper consists of two sections.
(ii) Section A and B. Answer all the sections.
(iii) Calculators are allowed.
-

SECTION - A

1. Match the following : 5
- | Group - A | | Group - B | |
|--------------------|-------------------------|-----------|--|
| (a) PDB | (i) Protein modelling | | |
| (b) Web Cam | (ii) Binding affinity | | |
| (c) Swiss modellar | (iii) Protein structure | | |
| (d) Google | (iv) Search engine | | |
| (e) Docking | (v) Input | | |
2. Distinguish between **any two** of the following with suitable examples, if needed : 2x2.5=5
- (a) Mean and Mode
(b) Compiler and assembler
(c) Internet and Intranet

3. Define **any four** of the following terms : $4 \times 2.5 = 10$
- Bit and Byte
 - Multiple sequence alignment
 - ANOVA
 - FASTA
 - Standard deviation

SECTION - B

- Answer **any eight** of the following : $8 \times 10 = 80$
4. Construct a continuous frequency distribution for the following heights (in cm) of 50 students in a class by taking class intervals as 145-150, 150-155,..... $5 + 5 = 10$
- 146 156 152 167 178 180 172 162 148 153
 161 173 163 174 147 179 148 151 168 172
 165 173 172 180 175 145 153 154 162 164
 170 172 160 161 158 152 163 165 170 168
 158 149 155 160 150 149 167 176 169 159
- Also draw its frequency polygon.

5. A population of size 10,000 is divided into 4 Strata. Their sizes and standard deviations are given as below : 10

Strata				
	I	II	III	IV
N _i = Size	5000	1000	2000	2000
S _i = Standard deviation	25	10	15	20

A stratified random sample of size 500 is to be drawn from this population. Determine the sizes of samples from these strata, in case of :

- Proportional allocation
- Neyman's optimum allocation

6. For two firms A and B, belonging to the same industry, the following details are available : 3+7=10

Number of employees	Firms - A	Firms - B
		100
Average wages	₹ 240	₹ 170
Standard Deviation of wages	₹ 6	₹ 8

- (a) Which firm pays a larger amount as weekly wages ?
- (b) Which firm shows greater variability in the distribution of the wages ?

7. The two lines of regression are given by $X + 2Y - 5 = 0$ and $2X + 3Y - 8 = 0$. Find (a) the mean values of X and Y, (b) the correlation coefficient between X and Y and (c) the value of standard deviation of 'Y' if variance of 'X' is 12.

3+4+3

8. 1000 students of college level were graded according to their IQ level and the economic condition of their parents, as follows : 10

Economic condition	IQ level		Total
	High	Low	
Rich	230	170	400
Poor	470	130	600
Total	700	300	1000

Test the hypothesis that the IQ levels are independent of the economic conditions at 1% level of significance.

[You may like to use the following values :

$$\chi_1^2(0.01) = 6.64, \chi_3^2(0.01) = 11.35]$$

9. (a) What is clustal omega ? Write its applications in protein structure prediction. 5+5
(b) Illustrate the steps involved in identifying new members of protein families.
10. A researcher is interested in knowing primary protein structure of Human salivary amylase. Explain him/her about any two databases that can be used to obtain the desired structure. 5+5
11. Write about significance of evolutionary trees. Explain about different types of evolutionary trees. 4+6
12. Explain the significance and applications of the following : 5+5
(a) Ramachandran plot
(b) Chou-Fasman rules
13. A researcher isolated a new protein with 142 amino acid residues. Describe the steps involved in developing a 3-D model for this protein with the help of a flow chart. 10
-