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RBC-002

Ph. D. IN BIOCHEMISTRY (PHDBC)
Term-End Examination
December, 2022

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. Match the following : 5

	Group–A		Group–B
(a)	Docking	(i)	Search engine
(b)	Systems biology	(ii)	Sequence alignment
(c)	Google	(iii)	Biological interactions network
(d)	BLAST	(iv)	Software
(e)	MS-Word	(v)	Protein modelling

2. Distinguish between the following : $2\frac{1}{2}$ each

   (a) Internet and Intranet

   (b) Primary and Secondary data

3. Define in 1-2 sentences : 2 each

   (i) Conserved sequence

   (ii) Random sampling

   (iii) Skewness

   (iv) Class and class interval

   (v) Bar diagram

Section—B

Note : Answer any *five* questions.

4. Draw a histogram for the following frequency distribution : 6

Class	Frequency
0—10	20
10—20	32
20—30	8
30—40	2
40—70	60
70—80	35
80—100	10

5. Oral surgery unit of dental college performed the following number of operations each month. Find the range and calculate the mean and S.D. of monthly operation : 2+2+2

   15, 18, 25, 40, 25, 18, 25, 21, 30, 33, 25

6. Suppose A represents the event that a randomly selected person has an AB blood type and suppose B represents the event that a randomly selected person has an Rh negative blood type, where P(A) = P(AB type) = 0.02 and P(B) = P (Rh negative) = 0.15. Find the probability that a randomly selected person has both AB and Rh negative blood type (assuming blood types are independent). 6

7. Explain the significance of the Ramachandran plot. 6

8. Illustrate the steps involved in identifying new members of protein families. 6

9. Explain genome mapping and gene ontology. 6

Section—C

Note : Answer any *five* questions.

10. Illustrate phylogenetic tree construction methods. 10

11. Distinguish between BLAST and FASTA. 10

12. What is the rationale behind protein structure prediction and homology modeling ? Discuss the various steps involved in the same. 10

13. The three samples below have been obtained from the normal populations with equal variances. Test the hypothesis at 5% level of significance that the population means are equal : 10

A	B	C
8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

(The table value of F at 5% significance for $V_1 = 2$ and $V_2 = 12$ is 3.88).

14. The menstrual cycle in woman following normal distribution has a mean of 28 days and S. D. of 2 days. How frequently would you expect a menstrual cycle of : 10

    (i) More than 30 days ?

    (ii) Less than 22 days ?

15. A gynecologist recorded the blood pressures of her patients and collected the following data : 10

Age (in years)	**Lower limit of BP**
23	65
24	60
25	62
26	70
28	70
29	73
31	75
35	83
40	90

Calculate two regression equations.