RBC-002

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

RBC-002 : BIOSTATISTICS AND BIOINFORMATICS

Time : 3 hours   *Maximum Marks : 100*

*Note : This question paper consists of **three** sections – A, B and C. Answer **all** the sections. Scientific non-programmable calculator is allowed.*

SECTION A

*Answer **all** questions.*

1. Do as directed :

   (a) Name two ways for the measurement of variation. *2*

   (b) Which out of the following four options are the two fundamental statistical indicators ? *2*

   (i) Mean

   (ii) Median

   (iii) Variance

   (iv) Standard Deviation

(c) Which of the following tests are parametric tests ? *2*

    (i) ANOVA

    (ii) Student

    (iii) Wilcoxon

    (iv) Kruskal-Wallis

(d) The value of correlation coefficient lies between "0" and "1". (True or False) *2*

(e) Mode is defined as _____, while Mean is defined as _____. (Fill in the blanks) *2*

2. Define in 1 – 2 sentences : *5×2=10*

    (a) Database

    (b) Consensus sequence

    (c) Internet

    (d) Web server

    (e) Search engine

SECTION B

*Answer any **five** questions.*

3. Percentage of genes involved in physiological processes are given below. Draw a pie-chart.   *6*

S.No.	Process	Percentage
1	Digestive	50
2	Muscular	10
3	Nervous	10
4	Respiration	10
5	Excretion	05
6	Reproduction	10
7	Cardiovascular	05

4. Calculate the Mean Deviation from the following data :   *6*

Class Interval	Frequency
0 – 4	4
4 – 8	6
8 – 12	8
12 – 16	5
16 – 20	2

5. (a) A dice is rolled. What will be the probability that the number appearing on the upper face is more than 3 ?

   (b) When two children are born one after the other, find the chances of getting two male children.   *6*

6. Which types of databases are used in bioinformatics ? Distinguish between them.   *6*

7. Outline the levels of organization of protein structure.   *6*

8. Illustrate the role of computer hardware and software. How can e-Resources be accessed ?   *6*

SECTION C

*Answer any **five** questions.*

9. What is the rationale behind homology modelling ? Discuss the various steps involved in the same.   *10*

10. Explain the major features of Protein Data Bank (PDB) and GenBank ?   *10*

11. What are optimal alignment methods ? Explain substitution scores and gap penalties.   *10*

12. Name any five docking programs. Explain their usage and applications in detail.   *10*

13. From the following regression equations, calculate (i) the mean values of X and $\overline{\overline{Y}}$; and (ii) the coefficient of correlation between X and Y :   *10*

$$4Y - 5X = 0$$

$$5Y - X - 63 = 0$$

14. Hearing levels in two groups of school children with normal hearing in the frequency of 500 cycles per second was found to be as follows :

	Children	Hearing Threshold	Standard Deviation
Group I	62	15·5 decibels	6·5 decibels
Group II	76	20 decibels	7·1 decibels

Test if there is any difference between the hearing levels recorded in the two groups.   *10*

15. In a cross between tall (TT) and dwarf (tt), 1574 tall and 554 dwarf plants were obtained. Suggest if a ratio of 3 : 1 is suitable or not.   *10*

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