STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2023 – 2024)
M. Sc. DEGREE EXAMINATION, NOVEMBER 2023
BIOINFORMATICS
FIRST SEMESTER

COURSE : ELECTIVE
PAPER : BIOMATHEMATICS AND BIOSTATISTICS
SUBJECT CODE : 23BI/PE/BS15
TIME : 3 HOURS **MAX. MARKS: 100**

Q. No.	SECTION A (20 x 1=20 marks) All questions to be answered	CO	KL
1	Define singleton set.	CO1	K1
2	Name the symbols (a) A ⊆ B; (b) Φ	CO1	K1
3	When is Scalar Triple Product Zero?	CO1	K1
4	What does A ∩ B mean?	CO1	K1
5	Define Horizontal Matrix	CO1	K1
6	Which matrices are singular?	CO1	K1
7	What is a linear function?	CO1	K1
8	What is the degree of zero and constant polynomial?	CO1	K1
9	In binomial distribution, successive trials are _____	CO1	K1
10	Which of the following is the correct representation of permutation? (a)rPn (b)P (n,r) (c) (n, r) (d) nCr	CO1	K1
11	What is the formula for nCr?	CO2	K2
12	Define Addition law of probability	CO2	K2
13	Define Relative frequency	CO2	K2
14	Define Ordinal Data	CO2	K2
15	What are quantitative data collection methods?	CO2	K2
16	Calculate the mean from the data showing marks of students in a class in a test: 40, 50, 55, 78, 58.	CO2	K2
17	What is ANOVA test used for?	CO2	K2
18	Define Hardy–Weinberg principle	CO2	K2
19	Write the Formula for chi square test.	CO2	K2
20	Outline the elements of regression equation X on Y.	CO2	K2

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Q. No.	SECTION B (10 x 2= 20 marks) PART-A (Answer any TEN questions)	CO	KL
21	State De Morgan's Law of Intersection.	CO3	K3
22	If A and B are two sets such that n(A) = 17 and n(B) = 23 and n(A ∪ B) = 38 then find n(A ∩ B).	CO3	K3
23	Explain the Properties of Matrices Inverse	CO3	K3
24	Define Square Matrix	CO3	K3
25	Organize the Formula for binomial probability	CO3	K3
26	State the two basic laws of probability?	CO3	K3
27	Find the median of 8, 13, 16, 7, 21, 9, 5, and 11.	CO4	K4
28	Compare Simple bar and multiple bar diagram	CO4	K4
29	How will you utilize Coefficient of variation to compare two or more data sets?	CO4	K4
30	How will you make use of Convenience sampling for research?	CO4	K4
31	List out the important properties of the chi-square test	CO4	K4
32	What are two regression equations?	CO4	K4
Q. No.	**SECTION B (10 x 2= 20 marks)** **PART-B (Answer any TEN questions)**	**CO**	**KL**
33	How will you identify the Symmetric difference between two sets in Venn Diagram?	CO3	K3
34	Organize the Venn Diagram Symbols.	CO3	K3
35	What is the Multiplication Property of the Transpose Matrix?	CO3	K3
36	Compare commutative law and associative law.	CO3	K3
37	Write the key characteristics of Normal distributions?	CO3	K3
38	Define Poisson distribution.	CO3	K3
39	What is tabulation of data?	CO4	K4
40	Define quantitative classification.	CO4	K4
41	Define variable.	CO4	K4
42	Write about types of Regression Models?	CO4	K4

43	List out the importance Linear correlation.	CO4	K4
44	What is student t test?	CO4	K4
Q. No.	**SECTION C (4 x 5=20 marks)** **PART-A (Answer FOUR questions with internal choice)**	**CO**	**KL**
45	a) Find (a) $\vec{u}+\vec{v}$ and (b) $\vec{u}-\vec{v}$ if $\vec{u}=\langle 3,4\rangle$ and $\vec{v}=\langle 5,-1\rangle$. **OR** b) Given that U = {1, 4, 6, 8, 9}, A = {1, 9} and B = {4, 6, 9}. Prove De Morgan's First Law.	CO5	K5
46	a) Solve for the matrix X $X = X-\begin{bmatrix}-9 & -3\\ 6 & 0\end{bmatrix} = \begin{bmatrix}-4 & 0\\ 12 & 10\end{bmatrix}$ **OR** b) A bag consists of 3 red balls, 5 blue balls, and 8 green balls. A ball is selected at random. Find the probability of (i) Getting a red ball; (ii) Getting a green ball; (iii) Not getting a blue ball.	CO5	K5
47	a) What is the Multiplication Rule of Probability? **OR** b) Explain the various methods of classification of data.	CO5	K5
48	a) Using the actual mean method, calculate the standard deviation for the data 3, 2, 5, and 6. **OR** b) Compare the types of sampling methods.	CO5	K5
Q. No.	**SECTION C (2 x 10=20 marks)** **PART-B (Answer any TWO questions)**	**CO**	**KL**
49	Elaborate in detail about various types of Set Operations and Properties of Sets.	CO5	K6
50	Discuss in detail about probability distributions.	CO5	K6

<table>
<tr><td>51</td><td>Predict the mode of the following data distribution:
<table><tr><td>Classes</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td></tr><tr><td>Frequency</td><td>12</td><td>14</td><td>10</td><td>13</td><td>14</td><td>18</td><td>10</td></tr></table></td><td>CO5</td><td>K6</td></tr>
<tr><td>52</td><td>Calculate the Correlation coefficient of the following data.
<table><tr><th>Pupil</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th><th>H</th><th>I</th><th>J</th></tr><tr><td>Maths mark (out of 30) x</td><td>20</td><td>23</td><td>8</td><td>29</td><td>14</td><td>11</td><td>11</td><td>20</td><td>17</td><td>17</td></tr><tr><td>Physics mark (out of 40) y</td><td>30</td><td>35</td><td>21</td><td>33</td><td>33</td><td>26</td><td>22</td><td>31</td><td>33</td><td>36</td></tr></table></td><td>CO5</td><td>K6</td></tr>
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