STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2019 – 2020 & thereafter)

SUBJECT CODE: 19BI/PE/BS15

M. Sc. DEGREE EXAMINATION, NOVEMBER 2021
BIOINFORMATICS
FIRST SEMESTER

COURSE: ELECTIVE
PAPER : BIOMATHEMATICS AND BIOSTATISTICS
TIME : 3 HOURS **MAX. MARKS: 100**

SECTION - A

ANSWER ALL THE QUESTIONS **(10 x 2 = 20** MARKS**)**

1. If A = $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ Find AB and BA.

2. The mean of four numbers is 71.5. If three of the numbers are 58, 76, and 88, what is the value of the fourth number?

a.64 b.60 c.76 d.82

3. Find the standard deviation of the average temperatures recorded over a five-day period last winter: 18, 22, 19, 25, 12

4. Given the relation {(2,1), (-1,7), (0,-2)} find the domain and range.

5. State the addition theorem of probability with an example.

6. What is t-test?

7. List the types of sets.

8. Represent the set G = {2, 4, 6, 8, 10} in set builder form.

9. Distinguish null hypothesis and alternate hypothesis.

10. Write the significance of Chi square test and write the formula to calculate.

..2

Subject Code: 19BI/PE/BS15

SECTION - B

ANSWER ANY TWO QUESTIONS. EACH ANSWER SHOULD NOT EXCEED 500 WORDS. ALL QUESTIONS CARRY EQUAL MARKS. DRAW DIAGRAMS WHEREVER NECESSARY (2 x 20 = 40 MARKS)

11. a. Find the inverse, if it exists, of the matrix. $A = \begin{bmatrix} 0 & -2 & -3 \\ 1 & 3 & 3 \\ -1 & -2 & -2 \end{bmatrix}$.

Prove that $A \cdot adj(A) = \det(A) I_3$.

b. Prove the following by Venn diagram
i) A ∪ (B ∩ C) = (A ∪ B) ∩ (A ∪ C)
ii) A ∩ (B ∪ C) = (A ∩ B) ∪ (A ∩ C)

12. a. If f(x) = 2x + 4, complete a table using the domain {-2,-1, 0, 1, 2}.

b. Find the coefficient based on age vs. glucose level from the following table from a pre-diabetic study of 6 participants:

Subject	Age x	Glucose Level y
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87
6	59	81

13. a. Elaborate on Normal, Binomial and Poisson distribution with examples.

b. Calculate the mode for the following frequency distribution.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	8	7	12	28	20	10	10

14. a. Write in detail about different sampling methods.

b. Calculate the median for the following frequency distribution.

Class Interval	0-8	8-16	16-24	24-32	32-40	40-48
Frequency	8	10	16	24	15	7

Subject Code: 19BI/PE/BS15

SECTION - C

ANSWER ANY ONE QUESTION. EACH ANSWER SHOULD NOT EXCEED 1200 WORDS. ALL QUESTIONS CARRY EQUAL MARKS. DRAW DIAGRAMS WHEREVER NECESSARY (1 x 40 = 40 MARKS)

15. a. Calculate the mean, variance and standard deviation for the following data:

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	27	10	7	5	4	2

b. Three coins are tossed simultaneously Find the probability that

(i) no head (ii) one head ii) two heads (iii) atleast two heads iv) two tails

16. a. Solve the following if

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$$ then show that A satisfies the equation $A^3 - 6A^2 + 5A - 11I = O$.

b. Write short notes on the following:

i. Hardy-Weinberg Principle

ii. ANOVA

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