STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted from the academic year 2019-20 & thereafter)

B. Sc. DEGREE EXAMINATION, APRIL 2023
BRANCH I – MATHEMATICS
FOURTH SEMESTER

COURSE   : ALLIED CORE
PAPER   : MATHEMATICAL STATISTICS – II
TIME   : 3 HOURS   MAX. MARKS : 100

SECTION – A
ANSWER ANY TEN QUESTIONS: **(10×2=20)**

1. What is regression?
2. Write down any two mathematical properties of regression coefficients.
3. What is point estimate?
4. Define standard error.
5. Write down any two application of t- distribution.
6. Define degree of freedom.
7. What is ANOVA?
8. State the assumptions for ANOVA.
9. What is time series?
10. What are the components of time series?
11. Distinguish between parameter and estimator.
12. Define interval estimation.

SECTION – B
ANSWER ANY FIVE QUESTIONS: **(5×8=40)**

13. Given the following data, Calculate the expected value of Y when X =12.

	X	Y
Average	7.6	14.8
Standard Deviation	3.6	2.5
r = 0.99		

14. A coin is tossed 400 times and it turns up head 216 times. Discuss whether the coin may be an unbiased one and explain briefly the theoretical principles you would use for this purpose.

15. An examination was given to two classes consisting of 40 and 50 students respectively. In the first class the mean mark was 74 with a standard deviation of 8, while in the second class the mean mark was 78 with a standard deviation of 7. Is there a significant difference between the performance of the two classes at a level of significance of 0.05?

16. Write down the characteristics of chi-square test.

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17. A sample of size 900 has a mean 3.4cms and standard deviation 2.61cms. If the population is normal and its mean is unknown, find the (i) 95% (ii) 98% (iii)90% (iv) 99% confidential limits of the true mean.

18. In a sample of 8 observations, the sum of squared deviations of items from the mean was 94.5. In another sample of 10 observations, the value was found to be 101.7. Test whether the difference is significant at 5% level.

19. Fit a trend line to the following data by the method of semi-averages

Year	Sales of Firm A (thousand units)
1980	102
1981	105
1982	114
1983	110
1984	108
1985	116
1986	112

SECTION – C
ANSWER ANY TWO QUESTIONS: **(2×20=40)**

20. (a) Calculate the two regression equations of X on Y and Y on X from the data given below, taking deviations from actual means of X and Y

Price (Rs)	10	12	13	12	16	15
Amount demanded	40	38	43	45	37	43

Estimate the likely demand when the price is Rs.20.

(b) The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data:

Items	Life in ('000) hours
1	4.2
2	4.6
3	3.9
4	4.1
5	5.2
6	3.8
7	3.9
8	4.3
9	4.4
10	5.6

Can we accept the hypothesis that the average life time of bulbs is 4,000 hours.

21 (a) One thousand articles from a factory are examined and found to be 3% defective. Fifteen hundred similar articles from a second factory are found to be only 2% defective. Can it reasonably be concluded that the product of the first factory is inferior to the second?

(b) Out of 8,000 graduates in a town, 800 are females; out of 1,600 graduate employees 120 are female. Use chi- square to determine if any distinction is made in appointment on the basis of sex. Value of chi- square for 5% level for one degree of freedom is 3.84.

22 (a) To assess the significance of possible variation in performance in a certain test was given to a number of students taken at random from the senior fifth class of each of the four schools concerned. The results are given below. Make an analysis of the variance of the data.

Schools			
A	B	C	D
8	12	18	13
10	11	12	9
12	9	16	12
8	14	6	16
7	4	8	15

(b) Construct a 5- yearly moving averages of the number of students studying in a College given below.

Year	No. of students
1978	332
1979	317
1980	357
1981	392
1982	402
1983	405
1984	410
1985	417
1986	405
1987	431

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