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

B. Sc. DEGREE EXAMINATION, APRIL 2024
BRANCH I – MATHEMATICS
FOURTH SEMESTER

COURSE : ALLIED CORE
PAPER : MATHEMATICAL STATISTICS – II
SUBJECT CODE : 19MT/AC/ST45
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A

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

1. Find the correlation coefficient, given $b_{xy} = 0.85, b_{yx} = 0.89$.
2. Define regression.
3. Define standard error.
4. What is Type I and Type II error?
5. Write down the characteristic of good estimators.
6. State any two uses of χ^2 test.
7. Write the number of degrees of freedom of a $r \times s$ contingency table.
8. What is meant by Analysis of Variance.
9. Write down the assumptions in F-test.
10. Define confidence interval.
11. Explain the term time series.
12. List the components of time series.

SECTION – B

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

13. Find the mean of variables X and Y and the correlation coefficient from the following equations:
$$2Y - X = 50, 3Y - 2X = 10$$
14. In a sample of 500 people from a village in Rajasthan, 280 are found to be to be rice eaters and the rest wheat eaters. Can we assume that both the food articles are equally popular?
15. The following results are obtained from a sample of 10 boxes of biscuits:
Mean weight of the contents= 490 gms.
Standard deviation of the weight = 9 gms.
Could the sample come from a population having a mean of 500 gms.

16. The number of parts for a particular spare part in a factory was found to vary from day to day. In a sample study the following information was obtained.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
Number of parts demanded	1124	1125	1110	1120	1126	1115	6720

Test the hypothesis that the number of parts demanded does depend on the day of the week.

17. For a given sample of 200 items drawn from a large population, the mean is 65 and the standard deviation is 8. Find the 95 percent confidence limits for the population means.

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18. In a sample of 8 observations, the sum of the 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. Calculate three yearly moving average of the following data

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of Students	15	18	17	20	23	25	29	33	36	40

SECTION – C

ANSWER ANY TWO QUESTIONS: (2×20=40)

20. (a) The following table gives the various values of two variables.

X	42	44	58	55	89	98	66
Y	56	49	53	58	65	76	58

Determine the regression equations for the above data and calculate its coefficient of correlation.

(b) An IQ test was administered to 5 persons before and after they were trained. The results are given below

Candidate	1	2	3	4	5
IQ before training	110	120	123	132	125
IQ after training	120	118	125	136	121

Test whether there is any change in IQ after the training program.

21. (a) A certain drug was administrated to 500 people. Out of a total of 800 included in the sample to test its efficiency against typhoid. The results are given below:

	Typhoid	No Typhoid	Total
Drug	200	300	500
No Drug	280	20	300
Total	480	320	800

On the basis of these data, can it be concluded that the drug is effective in preventing typhoid? (Given $\chi^2_{0.05} = 3.84$ for 1 d.f)

(b) A random sample of 16 items from a normal population showed a mean of 53 and a sum of squares of deviation from this mean equal to 150. Can this sample be regarded as taken from the population having 56 as mean. Obtain 95% and 99% confidence limits of mean of the population.

22. (a) Perform a two-way ANOVA on the data given below

Plots of land	Treatment			
	A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	42

(b) Fit a straight-line trend by the method of least squares for the following data. Also calculate its trend value

Year	2009	2010	2011	2012	2013	2014	2015
Production	12	10	14	11	13	15	16