Register No.: ………………………………   Name: …………………………………………………

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER INTEGRATED MCA DEGREE EXAMINATION (R), MAY 2023

(2020 SCHEME)

Course Code: 20IMCAT204

Course Name: Statistical Applications

Max. Marks: 60   **Duration: 3 Hours**

Statistical tables and non-programmable Scientific calculators up to Casio Fx991ESPlus may be permitted in the examination hall

PART A
(Answer all questions. Each question carries 3 marks)

1. Distinguish between positive and negative correlation.
2. The coefficient of correlation between two variables X and Y is 0.48. The covariance is 36. The variance of X is 16. Find the standard deviation of Y.
3. For two variables x and y with the same mean, the regression equations are $y = x + a$ and $x = 3y + b$. Then find $\frac{a}{b}$.
4. If the regression equations of y on x and x on y are: $y = \frac{4}{5} + 0.3x$ and $x = \frac{1}{6} + 0.5y$, find the coefficient of correlation between x and y.
5. Define (i) Parameter and (ii) Statistic.
6. Suppose that X is a random variable with mean μ and variance σ^2. Let $X_1, X_2, \dots, X_n$ be a random sample of size n from the population represented by X. Show that sample mean $\bar{X}$ is an unbiased estimator of the population mean μ.
7. Define (i) Null hypothesis and (ii) Alternative hypothesis.
8. In order to test whether a coin is perfect, it is tossed 5 times. The null hypothesis of perfectness is rejected if and only if more than 4 heads are obtained. Find the probability of type I error.
9. Write down the three assumptions for Student's t test.
10. What are the conditions for the validity of chi-square test?

PART B
(Answer one full question from each module, each question carries 6 marks)

MODULE I

11. Calculate the Karl Pearson's coefficient of correlation between expenditure on advertising and sales from the data given below

(6)

Advertising expenses ('000 Rs)	40	66	63	91	83	76	26	99	37	79
Sales (Lakh Rs)	46	52	57	85	61	67	59	90	50	83

OR

12. Two judges in a beauty competition rank the 12 entries as follows: (6)

X	1	2	3	4	5	6	7	8	9	10	11	12
Y	12	9	6	10	3	5	4	7	8	2	11	1

What degree of agreement is there between the two judges.

MODULE II

13. For 50 students of a class, the regression equation of marks in Statistics (y) on the marks in Accountancy (x) is $4y - 5x - 8 = 0$. Average marks in Accountancy are 40. The ratio of the standard deviations $\sigma_y : \sigma_x$ is $5:2$. Find the average marks in Statistics and the coefficient of correlation between the marks in two subjects.   (6)

OR

14. From the following data, obtain the two regression equations: (6)

x	90	96	107	120	66	123	50	72	110	56
y	72	76	70	98	71	92	40	62	81	48

MODULE III

15. Distinguish between simple random sampling and stratified random sampling.   (6)

OR

16. Find the maximum likelihood estimate for variance of normal distribution.   (6)

MODULE IV

17. It is claimed that a random sample of 100 tyres with a mean life of 15269 kms is drawn from a population of tyres which has a mean life of 15200 kms and a standard deviation of 1248 kms. Test the validity of the claim at 5% level of significance.   (6)

OR

18. A machine puts out 16 imperfect articles in a sample of 500. After the machine is overhauled, it puts out 3 imperfect articles in a batch of 100. Has the machine improved?   (6)

MODULE V

19. Ten cartons are taken at random from an automatic filling machine. The mean net weight of the 10 cartons is 11.8 oz. and standard deviation is 0.15 oz. Does the sample mean differ significantly from the intended weight of 12 oz at 5% level of significance?   (6)

OR

20. It is known that the mean diameters of rivets produced by two firms A and B are practically the same but the standard deviations may differ. For 22 rivets produced by firm A, the standard deviation is 2.9 mm while for 16 rivets manufactured by firm B, the standard deviation is 3.8 mm. Test whether the products of firm A have the same variability as those of firm B at 5% level of significance. (6)

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