

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

## SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

### FOURTH SEMESTER INTEGRATED M.C.A DEGREE EXAMINATION (R), JULY 2022 (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. Define Positive correlation with an example.
2. If the relation between two random variables  $x$  and  $y$  is  $2x + 3y = 4$ , then find the correlation coefficient between  $x$  and  $y$ .
3. Define the two lines of regression.
4. The line of regression of a bivariate population are:  $8x - 10y + 66 = 0$ ,  $40x - 18y = 214$ . Find the mean values of  $x$  and  $y$ .
5. Differentiate between probabilistic and non-probabilistic sampling methods with suitable examples.
6. Write a short note on statistical estimation. Give the statistic for 95% confidence interval for mean of a large sample.
7. Write the test statistic for testing of two large proportions. What happened to the test statistics, when the sample proportions are equal?
8. Consider a case of opinion taking. 300 student's representatives are assembled in the seminar hall. The Principal asked *how many of you are willing to write an additional examination?* 20% are ready for it. Can you take it as the opinion of the entire students? If no how can you generalize it? Substantiate your reasoning .
9. What are the assumptions for difference of Mean Test in small samples?
10. What are the assumptions of F-test?

#### PART B

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

#### MODULE I

11. Calculate the coefficient of correlation for the ages of husbands and wives:

Age of Husband (Years):	23, 27, 28, 29, 30, 31, 33, 35, 36, 39
Age of Wife (Years):	18, 22, 23, 24, 25, 26, 28, 29, 30, 32

(6)

OR

12. The ranks of the same 15 students in two subjects Statistics and Accountancy are given below, the two numbers within the brackets denoting the ranks of the same students in Statistics and Accountancy respectively. (1,10), (2,7), (3,2), (4,6), (5,4), (6,8), (7,3), (8,1), (9,11), (10,15), (11,9), (12,5), (13,14), (14,12), (15,13). Use Spearman's formula to find the rank correlation coefficient. (6)

### MODULE II

13. From the following data, obtain the two regression equations
- |            |    |    |     |     |    |     |    |    |     |    |  |
|------------|----|----|-----|-----|----|-----|----|----|-----|----|--|
| Sales:     | 91 | 97 | 108 | 121 | 67 | 124 | 51 | 73 | 111 | 57 |  |
| Purchases: | 71 | 75 | 69  | 97  | 70 | 91  | 39 | 61 | 80  | 47 |  |
- (6)

### OR

14. The adjoining table shows the number of motor registrations in a certain territory for a term of 5 years and the sale of motor tyres by a firm in that territory for the same period.

Year	Motor registration	No. of Tyres Sold
1	600	1250
2	630	1100
3	720	1300
4	750	1350
5	800	1500

(6)

Find the regression equation to estimate the sale of Tyres when motor registration is known. Estimate sale of Tyres when registration is 850.

### MODULE III

15. Discuss the Stratified sampling technique with respective merits and demerits. (6)

### OR

16. Let  $p$  be the proportion of defective items produced by a machine.  $n$  items produced by the machine are examined and a random variable  $x_1$  is defined by the machine are examined and a random variable  $x_i$  is defined as follows:  $x_i = 1$  if the  $i$ th item examined is defective and  $x_i = 0$  if it is not defective. If  $t = \sum_{i=1}^n x_i$  then show that (6)

(i).  $\frac{t}{n}$  is an unbiased estimate of  $p$ .

(ii).  $\frac{t(t-1)}{n(n-1)}$  is an unbiased estimate of  $p^2$ .

### MODULE IV

17. In two large populations there are 30% and 25% respectively of fair haired people. Is this difference likely be hidden in samples of 1200 and 900 respectively from the two populations. (6)

### OR

18. The mean height of 500 male students who showed above average participation in college athletics was 75.2 inches with a standard deviation of 2.3 inches; while 500 male students who showed no interest in such participation had mean height of 68.5 (6)

inches with a standard deviation 2.9 inches. Test the hypothesis that male students who participate in college athletics are taller than other male students.

**MODULE V**

19. The number of scooter accidents per month in a certain town were as follows 12, 8, 20, 2, 14, 10, 15, 6, 9, 4 . Are these frequencies in agreement with the belief that accident conditions were the same during this ten month period. (6)

**OR**

20. 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

(6)

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

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