RAMAKRISHNA MISSION VIDYAMANDIRA
(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, MARCH 2021
SECOND YEAR (BATCH 2019-22)

Date : 20/03/2021
Time : 11 am – 2 pm

STATISTICS (GENERAL)
Paper : III

Full Marks : 75

Unit – I (Theory)
Group – A

*Answer **any five** questions from question nos. 1 to 6*:   [5×5]

1. The correlation coefficient is the geometric mean of coefficients of regression. Is it true? If yes then prove it.   [5]

2. Why do we calculate in general, only the first four moments about mean of a distribution and not the higher moments?   [5]

3. Explain with suitable examples the term dispersion. Also explain the main difference between mean deviation and standard deviation.   [5]

4. A man travels by a car for 4 days. He travelled for 10 hours each day. He drove on the first day at the rate 45 km per hour, second day at 40 km per hour, third day at the rate of 38 km per hour and fourth day at the rate of 37 km per hour. Which average will give us his average speed? Why?   [5]

5. State in each case whether you would expect to find a positive correlation, a negative correlation or no correlation: [5]

    i)   The ages of husband and wives

    ii) Shoe size and intelligence

    iii) Insurance companies' profit and the number of claims they have to pay

    iv) years of education and income

    v)   Amount of rainfall and yield of crop

6. A variable assume values a, b, $\dfrac{a+b}{2}$ [(n-2) times]. Find its variance and standard deviation   [5]

Unit – I (Theory)
Group – B

*Answer **any five** questions from question nos. 7 to 12*:   [5×5]

7. There are N tickets numbered 1,2,…….,N of which n are taken at random and arranged in an increasing order of magnitude : $x_1 < x_2 < .... < x_n$. What is the probability that $x_m = M$?   [5]

8. Five random digits are chosen. What is the probability that at least three of them will be same?   [5]

9. What are the drawbacks of classical definition of probability? How are some of these overcome in the frequency definition of probability?   [2+3]

10. Let X be a random variable with $P\left(X_k = \pm m\right) = \dfrac{1}{2k}$, m = 1,2,…..,k. Find $E\left(X_k^2\right)$ [5]

11. Find the median and mode of the binomial $\left(4, \dfrac{1}{4}\right)$ variate.   [5]

12. The monthly income of a certain population is normally distributed with a mean of Rs. 15,000 and annual standard deviation of Rs 5000. What income is 90th percentile? [Given $\phi(1.28) = 0.90$]   [5]

Unit – II (Practical)
Group – C

*Answer **any three** questions from question nos. 13 to 16***:** [3×5]

13. The geometric mean of 10 observations on a certain variable was calculated as 16.2, it was later discovered that one of the observations was wrongly recorded as 12.9; in fact it was 21.9, Apply appropriate correction and calculate the correct geometric mean. [5]

14. Scores of two golfers for 24 rounds were as follows:

Golfer A	74, 75, 78, 72, 77, 79, 78, 78, 81, 76, 72, 72, 77, 74, 70, 78, 79, 80, 81, 74, 80, 75, 71, 73
Golfer B	86, 84, 80, 88, 89, 85, 86, 82, 82, 79, 86, 80, 82, 76, 86, 89, 87, 83, 80, 88, 86, 81, 81, 87

   Find which golfer may be considered to be more consistent player? [5]

15. The first four moments of a distribution about the value 4 of the variable are -1.5, 17, -30 and 108. Find the moments about mean, β_1 and β_2.

   Find also the moments about (i) the origin and (ii) the point x=2. [5]

16. For the variables x and y the equations of two regression lines are 4x-5y+33=0 and 20x-9y=107. Identify the regression line of y on x and that of x on y. What is the estimated value of y, when x=10? If this estimate is denoted by y_0, find the estimated value of x when $y=y_0$ [5]

Unit – II (Practical)
Group – D

*Answer **any one** question from question nos. 17 & 18***:** [1×10]

17. A card is drawn at random from a full pack of playing card, then replaced and after suffering another card is drawn at random. The process is repeated 10 times and the number of black cards is noted. The following table shows the results of 500 repetitions of the experiment :

No. of black cards	0	1	2	3	4	5	6	7	8	9	10
Frequency	1	4	23	58	105	122	104	59	20	4	0

   Fit a binomial distribution to the above data and comment on the goodness of fit. [10]

18. When the first proof of 200 pages of a book was read, the distribution of printing mistakes was found as given in the following table.

No. of mistakes in page	0	1	2	3	4	5	6 or above
No. of pages	114	61	19	4	1	1	0

   Fit a poisson distribution and comment on the goodness of fit. [10]

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