ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE – 27

B.Sc STATISTICS – I SEMESTER

SEMESTER EXAMINATION – OCTOBER 2019

ST 118:INTRODUCTION TO PROBABILITY AND STATISTICS

Time: 2½hrs   **Max:70Marks**

This question paper has **TWO** printed pages and **THREE** parts

SECTION – A

I   Answer any FIVE of the following: **5x 3= 15**

1. Define statistics and give any two functions of it.

2. Define nominal data, ordinal data, and ratio scale.

3. Differentiate between univariate and bivariate data with examples

4. Mean weight of a lot of 10 apples is 123 gm. When two apples were added to the lot mean weight was reduced to 115 gm. Find the average weight of two apples added.

5. Give empirical definition of probability and state its limitations

6. For a random variable X, $P(X = -1) = 1/3$ and $P(X=1) = 2/3$, find
    a. E(X)   b. Var(X)

7. What do you mean by independence of two random variables?

SECTION – B

II   Answer any FIVE of the following: **5 x 7 = 35**

8. A) Differentiate between primary and secondary data   (2)

    B) Define central tendency and explain any two measures of it in detail   (5)

9. A) Define dispersion and explain any one measure in detail   (3)

    B) Show that standard deviation is independent of change of origin   (4)

10. A) Discuss on skewness and briefly explain any two measures of skewness   (5)

    B) Define kurtosis   (2)

11. A) For any two events A and B, prove that $P(A^c \cap B) = P(B) - P(A \cap B)$ (3)

    B) Three balls are drawn at random from an urn which contains 3 white, 4 blue and 3 black balls. Find the probability of

        i) Getting two white and one black ball   (1)

        ii) Not getting blue color balls   (3)

12. A) Explain the procedure for obtaining median graphically (4)

   B) Write down the formula for Spearman's Rank Correlation and explain all notations used in it (3)

13. A) Define mathematical expectation (2)

   B) Define a random variable and explain the different types of random variables with examples. (3)

   C) Define covariance between two random variables and mention the range for it (2)

14. A) For the probability distribution with pmf $p(x) = \begin{cases} kx^2 & ; & x = 1, 2, 3, 4, 5 \\ 0 & otherwise \end{cases}$ (4)

   Find   a) k   b) P(X = 3)   c) E(X)

   B) Let X and Y are two independent random variables with Var(X) = 4 and   (3)
        Var(3X – 2Y) = 64, then find Var(Y)

SECTION – C

III   Answer any TWO of the following: **2 x 10 = 20**

15. A) Define moments and explain its types (4)

   B) State and prove additive theorem of expectation. (4)

   C) Define sample space and give one example (2)

16. A) Define simple linear regression model. Derive and expression for estimates of parameters of SLR model by minimizing error sum of squares. (7)

   B) Following data is obtained from a class of 18 students about gender and mother tongue

Student no	1	2	3	4	5	6	7	8	9
Gender	Boy	Boy	Girl	Boy	Girl	Girl	Girl	Boy	Girl
Language	Hindi	Kannada	Hindi	Telugu	Hindi	Bengali	Kannada	Hindi	Telugu
Student no	10	11	12	13	14	15	16	17	18
Gender	Boy	Boy	Girl	Girl	Boy	Boy	Girl	Girl	Girl
Language	Hindi	Kannada	Kannada	Hindi	Hindi	Telugu	Kannada	Telugu	Hindi

   Construct contingency (frequency) table to represent gender and language (3)

17. A) Discuss about various methods used in correlation study (4)

   B) Two random variables X and Y have the following joint pdf (6)

$$f(x, y) = \begin{cases} K(4 - x - y), & 0 \le x \le 2, 0 \le y \le 2 \\ 0 & , \quad otherwise \end{cases}$$

   Find a) Constant K   b) E(X)

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