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Name.....................................

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FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Complementary Course (Statistics)

STS 1C 01—BASIC STATISTICS AND PROBABILITY

Time : Three Hours

Maximum : 80 Marks

Section A

Answer **all** *questions in* **one word**.
Each question carries 1 mark.

Fill up the blanks :

1. Let A and B be two events such that P (A) = 0.3 and P (A ∪ B) = 0.79. If A and B are independent events, then P (B) = ————.

2. The type of sampling in which each unit of the population has an equal chance of being included in the sample is called ————.

3. Let b_1 and b_2 are the regression coefficients, then the correlation coefficient is ————.

4. A coin is tossed three times in succession, the number of sample points in the sample space is ————.

5. When all the values are equal, the standard deviation would be ————.

Write True *or* False :

6. Mutually exclusive events are independent.

7. If F (x) be the cumulative distribution function of a random variable, then $0 \leq F(x) \leq 1$.

8. Mean lies between median and mode.

9. In a moderately asymmetrical distribution, the mean, median and mode are the same.

10. Correlation coefficient is independent of change of origin and scale.

(10 × 1 = 10 mark

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Section B

Answer **all** *questions in* **one sentence** *each.*
Each question carries 2 marks.

11. Define primary data.

12. Give the normal equations for fitting the straight line $y = a + bx$.

13. What do you mean by probability mass function ?

14. Define random experiment with an example.

15. How will you compute mode for a frequency distribution ?

16. Define Population.

17. How can the two regression lines be identified ?

($7 \times 2 = 14$ marks)

Section C

Answer any **three** *questions.*
Each question carries 4 marks.

18. The ranks of the same 10 students in two subjects A and B are given below :

    (3, 6), (5, 4), (8, 9), (4, 8), (7, 1), (10, 2), (2, 3), (1, 10), (6, 5) and (9, 7). Find the rank correlation coefficient.

19. Fit a straight line of the form $y = ax + b$ to the following data :

x	:	1	3	5	7	8	10
y	:	8	12	15	17	18	20

20. Explain the desirable properties of a good average.

21. Prove that for any discrete distribution, standard deviation is not less than mean deviation from the mean.

22. A discrete random variable has the following probability distribution :

X	:	0	1	2	3	4	5	6	7	8
$p(x)$	:	a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$

Find (i) the value of a ; and (ii) P (X < 3).

($3 \times 4 = 12$ mark

Section D

Answer any **four** *questions.*
Each question carries 6 *marks.*

23. From the following information obtain the correlation coefficient :

$$n = 12, \sum x = 30, \sum y = 5, \sum x^2 = 670, \sum y^2 = 285, \sum xy = 334.$$

24. Define coefficient of variation. Compute the same for the observations 7, 9, 10, 8, 6 and 5.

25. A man travels 600 km. by train at an average speed of 60 km/h. 300 km. by boat at an average speed of 15 km./h, 700 km. by plane at 350 km./h and 25 km. by a taxi at 50 km./h. Find the average speed of the whole journey.

26. If $p(x) = (0.1)\,x$; $x = 1, 2, 3, 4$. Find (i) $P[X = 1 \text{ or } 2]$; and (ii) $P\left[\frac{1}{2} < X < \frac{5}{2} \mid X > 1\right]$.

27. Two random variables X and Y have the following joint probability density function :

$$f(x, y) = \begin{cases} 2 - x - y; & 0 \le x \le 1, \quad 0 \le y \le 1 \\ 0; & \text{otherwise.} \end{cases}$$

Find (i) marginal density functions of X and Y ; and (ii) conditional density functions.

28. Define pairwise independence and mutual independence of events. Discuss the implication between them.

($4 \times 6 = 24$ marks)

Section E

Answer any **two** *questions.*
Each question carries 10 *marks.*

29. The following table gives the marks obtained by some students. Calculate mean, median and mode :

Marks	:	0–10	10–20	20–30	30–40	40–50
Frequency	:	3	13	18	12	5

30. From the following data of values of X and Y, find the regression equation of Y on X :

X	:	2	3	4	5	6
Y	:	3	5	4	8	9

31. (a) Give the axiomatic definition of probability.

(b) A committee of four has to be formed from among 3 economists, 4 engineers, 2 statisticians and 1 doctor.

(i) What is the probability that each of the four professions is represented on the committee ?

(ii) What is the probability that the committee consists of the doctor and atleast one economist ?

32. State Baye's Theorem. A machine part is produced by three factories A, B and C. Their proportion of production is 25, 35 and 40 per cent respectively. Also, the percentage defective manufactured by three factories are 5, 4 and 3 respectively. A part is taken at random and is found to be defective. Obtain the probability that the selected part belongs to factory B.

($2 \times 10 = 20$ marks)