U130

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

Reg. No..............................

First Semester Degree External Examination Dec/Jan 2015-16

(2015 Admission)

CC15UST1C01-BASIC STATISTICS AND PROBABILITY (Complementary)

Time: 3 Hours Maximum Marks: 80

Section A - (Answer all questions in one word each)

1. Second quartile is same as-------.
2. The average that is used for finding rate of growth is------.
3. The set of all outcomes of a random experiment is called-----.
4. If A and B are two disjoint events, then $P(A \cap B')$ is------.
5. The sum of squares of deviations of observations is a minimum when the deviations are taken from-------.

Write true or false:

6. Median is a positional average.
7. Linear correlation coefficient between X and Y equal to zero implies that they are independent.
8. If $P(A) < P(B)$, then $P(A/B) < P(B/A)$.
9. Standard deviation is not affected by a change of origin.
10. Distribution function of a random variable F(x) ranges from 0 to ∞ .

$(10 \times 1 = 10)$

Section B – (Answer all questions in one sentence each)

11. Define coefficient of variation.
12. Define percentiles.
13. Define probability space.
14. Distinguish between apriori probability and posteriori probability.
15. Define distribution function of a random variable.
16. What is the correlation coefficient if the two regression coefficients are $\frac{-1}{4}$ and $\frac{-1}{9}$.
17. Distinguish between population and sample.

$(7\times 2 = 14)$

Section C - (Answer any three questions)

18. Find the mean and standard deviation of the first 'n' natural numbers.
19. Derive the normal equations for fitting a straight line $y = mx + c$.
20. Define conditional probability and show that it satisfies the axioms of probability.
21. X is a continuous random variable with p.d.f $f(x) = k\frac{1}{1+x^2}$, $-\infty < x < \infty$. Determine the value of k and the distribution function of X.
22. If a random variable X has the p.d.f $f(x) = 1$, $0 < x < 1$, find the p.d.f of $Y = -2\ \log X$.

$(3\times 4 = 12)$

Section D - (Answer any four questions)

23. What are the characteristics of an ideal measure of dispersion. Discuss "standard deviation" with reference to these properties.
24. The two regression lines are $4x - 5y + 33 = 0$ and $20x - 9y = 107$. Find the mean values of X and Y. Also compute the correlation coefficient between X and Y.
25. Prove or disprove the statement: " Pair-wise independence implies mutual independence".
26. Given $P(A) = P(B) = P(C) = 0.4$, $P(A \cap B) = P(A \cap C) = P(B \cap C) = 0.2$ and $P(A \cap B \cap C) = 0.1$. Find the probabilities of the following events
    (a) at least one of the events.
    (b) exactly one of the events.
    (c) exactly two of the events.
27. Derive the distribution function of a random variable having the density function

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

28. A continuous random variable X has the probability density function,

$$f(x) = \begin{cases} ke^{\frac{-x}{2}}, & 0 < x < \infty \\ 0, & otherwise \end{cases}$$

Find the value of the constant ' k' and show that for any two positive numbers s and t $P(X > s + t \,/\, X > s) = P(X > t)$.

(4× 6 = 24)

Section E - (Answer any two questions)

29. (a) Distinguish between absolute and relative measures of dispersion.
    (b) The runs scored by two batsmen A and B in five innings are given below.
    A: 30 24 46 17 53
    B: 71 54 19 86 71
    Find who is the more consistent batsman.
30. Explain the principle of least squares. Describe how an exponential curve of the form $y = a.$ can be fitted.
31. State and prove Baye's theorem for a finite number of events.
32. If $A_1, A_2, A_3, \dots A_n$ are n events in a sample space S, show that
    (1) $P(\cap_{i=1}^{n} A_i) \ge \sum_{i=1}^{n} P(A_i) - (n-1)$
    (2) $P(\cup_{i=1}^{n} A_i) \le \sum_{i=1}^{n} P(A_i)$

(2× 10 = 20)

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