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

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

FIRST SEMESTER B.Sc DEGREE EXAMINATION, NOVEMBER 2016

(Regular/Suppliementary/Improvement)

(CUCBCSS-UG)

CC15UST1C01-BASIC STATISTICS AND PROBABILITY

(Statistics-Complementary Course)

(2015 Admission onwards)

Time: 3 Hours Maximum Marks: 80

Section A- Answer all questions

1. If A and B are two mutually exclusive events, then $P(A \cap B) =$ -----.
2. If A and B are two independent events then $P(A/B') =$ -----.
3. The range of variation of the distribution function $F_X(x)$ is----.
4. Formula for the geometric mean of n observations, $x_1,\ x_2, \ldots, x_n$ is -----.
5. If $F(x)$ is the d.f of a random variable then $F(+\infty) - F(-\infty)$ is-----.

Write true or false:

6. If A and B are disjoint events, A' and B' are also disjoint events.
7. If $P(A) > P(B)$, then $P(A/B) > P(B/A)$.
8. Median is a positional average.
9. If 'r' is the correlation coefficient, then $|r| \leq 1$.
10. Distribution function of a random variable is always non-decreasing.

$(10 \times 1 = 10)$

Section B - Answer all questions

11. Define Probability density function.
12. Define a Borel field.
13. What are equally likely events?
14. Define a random variable.
15. What is the probability of drawing a black queen from a well shuffled deck of cards.
16. Define sample space of a random experiment.
17. State De-Morgan's law.

$(7 \times 2 = 14)$

Section C- Answer any three questions

18. Show that sum of squares of deviations of observations about the arithmetic mean is minimum.
19. What are the axioms of probability. Using these axioms establish $P(A') = 1 - P(A)$.
20. Define distribution function of a random variable and state its properties.
21. If X is a continuous random variable with p.d.f $f(x) = k.\frac{1}{1+x^2}$, $-\infty < x < \infty$, show that $k = \frac{1}{\pi}$.
22. If a random variable X has the p.d.f $f(x) = e^{-x}$, $x \geq 0$, find the p.d.f of $Y = e^{-x}$.

$(3 \times 4 = 12)$

Section D- Answer any four questions

23. What are the merits and demerits of median as a measure of central tendency.
24. State and prove addition theorem of probability.
25. Distinguish between classical and empirical definitions of probability.
26. Distinguish between pair-wise independence and mutual independence. Show that pair-wise independence does not imply mutual independence.
27. Let $f(x) = \begin{cases} \frac{x}{15}, & x = 1,2,3,4,5 \\ 0, & otherwise \end{cases}$.

    Find (i) $P(X = 1 \; or \; 2)$ (ii) $P\left[\left(\frac{1}{2} < X < \frac{5}{2}\right)/(X > 1)\right]$.

28. Derive the distribution function of a random variable having the density function

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

$(4\times 6 = 24)$

Section E- Answer any two questions

29. Explain "rank correlation". Derive the formula for Spearman's rank correlation coefficient.
30. If A and B are any two events in a sample space, show that $P(A \cap B) \le P(A) \le P(A \cup B) \le P(A) + P(B)$.
31. State and establish Baye's theorem for finite number of events.
32. Let X be a continuous random variable with p.d.f $f(x) = ke^{\frac{-x^2}{2}}, -\infty < x < +\infty$. Evaluate the constant k and find the p.d.f of $Y = X^2$.

$(2\times 10 = 20)$

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