

WEST BENGAL STATE UNIVERSITY
CBCS General 2nd Semester Examinations, 2018
STSHGEC02T/ STSGCOR02T- STATISTICS (GE2/DSC2)
Introduction to Probability

Time Alloted: 2 Hours

Full Marks : 40

Answer any *four* questions from the following:

$5 \times 4 = 20$

- (1) For two random variables X and Y , $E(X) = 8$, $E(Y) = 6$, $var(Y) = 36$ and $r_{XY} = 0.5$. Find i) $E(XY)$, ii) $cov(X, X + Y)$, iii) $var(2X - 2Y)$
- (2) Define probability density function of a random variable X . Is the following a probability density function?
- $$\begin{aligned} f(x) &= x/2, & 0 < x \leq 1 \\ &= \frac{1}{2}, & 1 < x \leq 2 \\ &= \frac{3-x}{2}, & 2 < x \leq 3 \\ &= 0, & \text{otherwise} \end{aligned}$$
- (3) Suppose $P(A) = p_1$, $P(B) = p_2$ and $P(A \cap B) = p_3$. Show that $P(A^c \cap B^c) = 1 - p_1 - p_2 + p_3$.
- (4) State Weak Law of Large Numbers (WLLN). Determine whether it holds for the following sequence of independent random variables: $P(x_n = +1) = \frac{1}{2}(1 - 2^{-n}) = P(x_n = -1)$.
- (5) For a Binomial distribution with parameters n and p , establish the following relationship

$$\mu_{r+1} = pq(nr\mu_{r-1} + \frac{d\mu_r}{dp})$$

(6)

Answer any *two* from the following questions:

$2 \times 10 = 20$

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