14STP04

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018
(First Semester)

Branch - STATISTICS

PROBABILITY THEORY

Time: Three Hours Maximum: 75 Marks

Answer ALL questions
ALL questions carry EQUAL marks (5 x 15 = 75)

1 a If $Y_n, Z_n, \lim x_n, \lim x_n$ are extended random variables, then prove that $\lim x_n$ is also an extended r.v, when it exists.

OR

b i) If $E|x|^r < oo$, then prove that $E|x|^s < oo$ for $0<s<r$ and assume that Ex^k exists and is finite for $k<r$, k is an integer.,

ii) State and prove Holder's Inequality.

2 a i) State Bodmer's theorem.

ii)Find the probability function to the characteristic **function**

$$Q(t) = \begin{matrix} -|t|, & |t|<l \\ 0, & t > f \end{matrix}$$

OR

b i) State and prove the levy continuity theorem,

ii) For a distribution, $K_r = n > 0$, find the characteristic function. Here K_r is the r^{th} cumulant.

3 a i) Define class of Independent events.

ii) Prove that subclasses of Independent classes are independent.

iii) Let P(Wi) = X, i=l,2,3,4. If $A=\{W_b W_2\}$, $B=\{W_b W_3\}$ and $0\{W,,W_4\}$, then show that A,B and C are pairwise independent but not mutual independent.

OR

b i) State and prove the Borel-Cenelli lemma.

ii) If xj,s are independent and X_n -»0(a.s) then prove that $X^P[|^X n|^{\wedge C}]^{<G^o>}$ whatever be c>0.

4 a i) If x_n ——»x and x_n ——> x^1, then show that x and x^1 are equivalent.

ii) Prove that "x_n ——>0 iff $E(\frac{\wedge}{1+|x_n|})$ -> 0 as n -> oo.

OR

b i) Define "Convergence Almost Surely".

ii) Prove that "A sequence of random variables converges almost sures to a random variable iff the sequence converges mutually a.s".

5 a i) State and prove the Kolmogorov Inequality.

OR

h B State and nrove the Kolmogorov SLLN for iid random variables.