PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 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 i) If X and Y are simple random variables then prove that
$E(X \pm Y) = E(X) \pm E(Y)$.

ii) If two non-deereasing sequences of non-negative simple function $\{X_n\}$ and $\{Y_n\}$ have the same limit X, then $\lim E(X_n) = \text{lint } E(Y_n) = E(X)$.

OR

b State and prove :
i) CR Inequality and (ii) Markov's inequality

2 a i) Define characteristic function.

ii) State and prove any three properties of characteristic function.

OR

b Prove the second limit theorem.

3 a i) Define Glass of Independent Events,

ii) If A and B are independent events, then (A and B), (A and B) are independent.

OR

b i) Prove the Kolmogorov 0-1- law.

ii) If X_n's are independent and X_n —>0 (a. s), then)TP[jX_nj > c]< oc,

4 a If $X_n \xrightarrow{P} X$, $Y_n \xrightarrow{P} Y$, then prove that a $X_n \xrightarrow{P}$ ->a x (a is real number). $X_n + Y_n$ —^->X + Y, $X_n Y_n$ -~^->XY and $\frac{X_n}{Y_n} \xrightarrow{P} \frac{X}{Y}$ when P (Y_n = 0) = 0 Vn and P(Y = 0) = 0.

OR

b i) Define convergence in r mean,

ii) If $X_n \xrightarrow{r} X$, then $E|X_n|^r$

5 a State and prove the Kolomogorov strong law of large numbers for i. i. d case.

OR

b i) State,and prove Lindeberg - Levy theorem

ii) State the Liaponov's theorem.

z-z-z END