

M.Sc. DEGREE EXAMINATION, NOVEMBER 2017.

FIRST SEMESTER

Statistics

Paper I – PROBABILITY AND DISTRIBUTIONS

Time : Three hours

Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. Explain the concept of minimal sigma field and Borel field.
2. Define Extension of measure and give its example.
3. Define almost sure convergence and convergence in probability.
4. Define characteristic function and its properties.
5. State and prove Jensen's inequality.
6. State Lindberg-levy central limit theorem and discuss its applications.
7. Explain the concept of order statistics and its uses.
8. Define partial and multiple correlation coefficients. Give their important properties.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. Define limit Infimum, limit Suprimum and limit of sequence of random variable $\{X_n\}$. Show that $\liminf \{X_n\} \leq \limsup \{X_n\}$.

Or

10. Define Lebesgue and Lebesgue – Stieltjes measures in R^k . State under what conditions Lebesgue – Stieltjes measure will become Lebesgue measure.

11. State and prove Liapounove central limit theorem and its applications.

Or

12. Prove or disprove the following :

(a) $X_n \xrightarrow{a.s} X \Rightarrow X_n \xrightarrow{p} X$

(b) $X_n \xrightarrow{a.s} X \Rightarrow X_n \xrightarrow{ms} X.$

13. State and Prove Holder's Inequality and its application.

Or

14. Define Weibul distribution. Find mean and variance of standard Weibul distribution and obtain their m.g.f.

15. Derive the distribution of non central t-distribution.

Or

16. If all the correlation co-efficients of zero order in a set of P variate are equal to ρ . Then show

that $1 - R_{1,2,3, \dots, P}^2 = (1 - \rho) \left[\frac{1 + (\rho - 1)\rho}{1 + (\rho + 2)\rho} \right]$

