 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**M.Sc.** DEGREE EXAMINATION - **STATISTICS**

FIRST SEMESTER – **APRIL 2012**

# ST 1814/1809 - MEASURE AND PROBABILITY

Date : 25-04-2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

**SECTION - A**

**Answer all the questions (10x2=20)**

1. Define Increasing and Decreasing sequence of sets
2. Define Field
3. Define Monotone class
4. Define Borel σ-field
5. Define Measure
6. Define Random variable
7. State Chebyshev’s Inequality
8. State Minkowski’s Inequality
9. Establish: E[log(X)]≤log[E(X)]
10. Define Convergence in Distribution

**SECTION B**

**Answer any five questions (5x8=40)**

1. i) Establish: If A1,A2,A3,. . . , An be subsets of Ω, then

ii) If {An, n ≥1} is an increasing sequence of subsets of Ω then 

1. State and Establish Cauchy-Schwartz Inequality
2. Establish: Every σ-field is a field but the converse is not true
3. Establish: If  and  then 
4. Prove by an Example: X2 and Y2 are independent need not imply X and Y are independent
5. i) Establish: If E[h(X)] exist then E[h(X)] = E[E{h(X)|y}] (6)

ii) Define Jenson’s Inequality (2)

1. Find the density function of a distribution whose characteristic function is given below



1. State Lindeberg-Feller Central limit theorem and hence prove Liapounov’s Central Limit therorem

**SECTION C**

**Answer any two questions (2x20=40)**

1. State and prove Basic Integration theorem
2. i) State and Prove Monotone Convergence Theorem (10)

ii) The Minimal σ-field generated by the class of all open intervals is a Borel σ-field (10)

1. i) State and Establish Minkowski’s Inequality (10)

ii) Let µ be a finitely additive set function on a field F of subsets of Ω. Further let µ is

continuous from above at Φ F , then µ is countably additive on F (10)

1. i) State and prove Inversion theorem on characteristic function (10)

ii) State and Establish Lindeberg-Levy Central limit theorem (10)

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