

## **ST2 C07: ADVANCED PROBABILITY THEORY**

### **UNIT I**

Signed measure, Hahn and Jordan Decomposition theorems. Statement and applications of Radon – Nikodym Theorem (without proof), Lebesgue decomposition, Fubini's theorem (without proof), Probability space induced by a random variable, by a random vector, conditional expectation of a random variable, martingales, submartingales, super martingales, simple Properties of Martingales.

### **UNIT II**

Characteristic function of a random variable, properties, uniform continuity and non-negative definiteness, statement of Bochner's Theorem, continuity and inversion theorems of characteristic functions, convex combinations of characteristic functions and distribution functions, characteristic function of a vector random variable.

### **UNIT III**

Law of Large numbers, Weak Law of Large numbers of Bernoulli, Chebychev, Poisson and Khinchine, Kolmogorov strong law of large numbers for independent random variables- for i.i.d random variables, necessary and sufficient condition for weak law of large numbers.

### **UNIT IV**

Central limit theorem, Demoivre-Laplace CLT, Lindberg -Levy and Liapounov CLT, Lindberg- Feller CLT (Without proof), domain of attraction and stable distributions.

### **Reference Books:**

1. Bhat B.R (1981) Modern Probability theory, Wiley Eastern Ltd, New Delhi.
2. Rohatgi V.K (1990) An introduction to probability theory and Mathematical statistics, Wiley Eastern ltd.
3. Billingsley P (1985) Probability and Measure, Wiley Eastern Ltd.
4. Ash R.B (1972) Real Analysis and Probability, Academic press.
5. Laha R.G and Rohatgi V.K (1979) Probability theory, Van Nostrand.
6. Luckas E (1970) Characteristic functions, 2nd Edition, Hofna NewYork.
7. Parthasarathy K.R (1973) Introduction to Probability and Measure, Mac Millian.