

MATHEMATICS

Code: M 401

Contacts: 3L + 1T = 4

Credits: 4

Module I

Theory of Probability: Axiomatic definition of probability. Conditional probability. Independent events and related problems. Bayes theorem (Statement only) & its application. One dimensional random variable.

Probability distributions-discrete and continuous. Expectation. Binomial, Poisson, Uniform, Exponential, Normal distributions and related problems. t , χ^2 and F-distribution (Definition only). Transformation of random variables. Central Limit Theorem, Law of large numbers (statement only) and their applications. Tchebychev inequalities (statement only) and its application. **(14L)**

Module II

Sampling theory: Random sampling. Parameter, Statistic and its Sampling distribution. Standard error of statistic. Sampling distribution of sample mean and variance in random sampling from a normal distribution (statement only) and related problems.

Estimation of parameters: Unbiased and consistent estimators. Point estimation. Interval estimation. Maximum likelihood estimation of parameters (Binomial, Poisson and Normal). Confidence intervals and related problems. **(7L)**

Module III

Testing of Hypothesis: Simple and Composite hypothesis. Critical region. Level of significance. Type I and Type II errors. One sample and two sample tests for means and proportions. χ^2 - test for goodness of fit. **(5L)**

Module IV

Advanced Graph Theory: Planar and Dual Graphs. Kuratowski's graphs. Homeomorphic graphs. Eulers formula ($n - e + r = 2$) for connected planar graph and its generalisation for graphs with connected components. Detection of planarity. Graph colouring. Chromatic numbers of C_n , K_n , $K_{m,n}$ and other simple graphs. Simple applications of chromatic numbers. Upper bounds of chromatic numbers (Statements only). Chromatic polynomial. Statement of four and five colour theorems. **(10L)**

Module V

Algebraic Structures: Group, Subgroup, Cyclic group, Permutation group, Symmetric group (S_3), Coset, Normal subgroup, Quotient group, Homomorphism & Isomorphism (Elementary properties only).

Definition of Ring, Field, Integral Domain and simple related problems. **(12L)**