MA2001D MATHEMATICS III

Pre-requisites: Nil

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3	1	0	3

Total hours: 39

Course Outcomes:
CO1: Handle application problems involving random variables and functions of random variables.
CO2: Identify statistical problems and make use of statistical inference while handling stochastic systems.
CO3: Apply regression and correlation analysis for studying relationship between variables.
CO4: Identify situations where analysis of variance is appropriate and apply it.
CO5: Use probabilistic and statistical analysis in various applications of engineering.

Module 1: (15 hours)

Probability distributions, Random variables, Expectation of a function of a random variable, Mean, Variance and Moment generating function of a probability distribution, Chebyshev's theorem, Binomial distribution, Poisson distribution, Geometric distribution, Hyper- geometric distribution, Normal Distribution, Uniform distribution, Gamma distribution, Beta distribution and Weibull distribution. Transformation of a random variable, Probability distribution of a function of a random variable, Jointly distributed random variables, Marginal and conditional distributions, Bi-variate Normal distribution, Joint probability distribution of functions of random variables.

Module 2: (14 hours)

Population and samples, The sampling distribution of the mean (σ known and σ unknown), Sampling distribution of the variance, Point estimation, Maximum likelihood estimation, Method of moments, Interval estimation, Point estimation and interval estimation of mean and variance. Tests of hypothesis, Hypothesis tests concerning one mean and two means. Hypothesis tests concerning one variance and two variances, Estimation of proportions, Hypothesis tests concerning one proportion and several proportions, Analysis of $r \times c$ contingency tables, Chi – square test for goodness of fit.

Module 3: (10 hours)

Analysis of variance, General principles, Completely randomized designs, Randomized block design. Curve fitting, Method of least squares, Estimation of simple regression models and hypotheses concerning regression coefficients, Correlation coefficient- Estimation of correlation coefficient, Hypothesis concerning correlation coefficient. Estimation of curvilinear regression models.

References:

1. R. A. Johnson, Miller and Freund's, *Probability and Statistics for Engineers*, 8th ed, PHI New Delhi, 2011.
2. W. W. Hines, D. C. Montgomery, D. M. Goldsman and C. M. Borror, *Probability and Statistics in Engineering*, 4th ed, John Wiley & Sons Inc., 2003.
3. S. M. Ross, *Introduction to Probability and statistics for Engineers and Scientists*, 5th ed., Academic Press (Elsevier) New Delhi, 2014.