

# MCC: 305 PROBABILITY AND STATISTICS

## Module 1 (13 hours)

Probability: Introduction, Probability of an event, additive rule & multiplication rule, conditional probability Bayes' rule, random variable, discrete and continuous probability distribution, Joint probability distribution, Mathematical expectation, Variance and co-variance of random variables, Mean and co-variance of linear combination of random variables, Chebyshev theorem, Binomial & Multinomial, Hypo-geometric, Geometric, Poisson distribution.

## Module 2 (13 hours)

Uniform, Normal, Exponential Distribution, Weibull's Distribution, Chi-square distribution, Sampling Distribution: Sampling distribution of  $S^2$ , t- distribution, F-distribution

Estimation of parameter: methods of estimation, Estimating the mean of a single sample, Standard error, Prediction interval, Tolerance limits, Estimating the difference between means of two samples, Estimating proportion and variance of a single sample, Estimating the difference between two proportions and variances of two samples, maximum likelihood estimation.

## Module 3 (14 hours)

Test of hypothesis: one and two tailed test, test on a single mean when variance is known & variance is unknown. Test on two means, test on a single mean population and test on two populations. One and two sample test for variance.  $\chi^2$  test for goodness of fit and test for independence.

Introduction to linear regression: Simple regression models, Method of least square, Properties of least square estimators, Inferences concerning the regression coefficients, Coefficients of determination and its application.

Statistical quality control (Simple idea only)

### Text Book:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers & Keying Ye, "Probability & Statistics for Engineers & Scientists", Eighth Edition, 2007, Pearson Education Inc., New Delhi.
2. Jay L. Devore, "Probability and Statistics for Engineering and Sciences", Seventh Edition, Thomson/CENGAGE Learning India Pvt. Ltd

### Reference Books:

1. William Mendenhall, Robert J. Beaver & Barbara M. Beaver, "Introduction to Probability and Statistics", 13th Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. Arnold Allen, "Probability Statistics and Queuing Theory with Computer Science Applications", Second Edition, 2005, Elsevier India Pvt. Ltd., New Delhi.
3. Levin and Rubin, "Statistics for Management", PHI
4. T. Veerarajan, "Probability, Statistics and Random Processes", Tata McGraw Hill
5. Ronald Deep, "Probability and Statistics", Academic Press