Course No.	Course Name	L-T-P - Credits	Year of Introduction
MA206	Probability & Statistics and Numerical Methods	3-1-0-4	2016

Prerequisite: Nil

Course Objectives

- To introduce the modern theory of probability, statistics, numerical methods and its applications to modelling and analysis of stochastic systems.
- To understand the important models of discrete and continuous probability distributions and widely used models of sampling distributions.
- To know important applications of probability and statistics in engineering as indispensable tools in decision analysis**.**
- To introduce numerical methods with an objective to solve various Engineering problems.

Syllabus

Discrete Random variable and Discrete Probability Distribution. Continuous Random variable and Continuous Probability Distribution. Sampling distributions Inference concerning Mean and Variance. Testing of Hypothesis.

Numerical methods-Solution of Algebraic and Transcendental Equations, Interpolation.

Solution of linear system of equations.

Numerical Integration, Numerical solution of first order ODE.

Expected outcome .

After the completion of course a student is expected to have

(i) concept of Discrete and continuous probability density functions and special probability distributions.

(ii) learnt sampling distributions and their applications in practical situations.

(ii) understood the concepts of Numerical Methods and their application in solving engineering problems.

Text Book:

1. Miller and Freund's Probability and statistics for Engineers, Eighth Edition (Pearson education).
2. Erwin Kreyszig: Advanced Engineering Mathematics, 10th ed. Wiley.

References:

1.Steven C. Chapra and Raymond P. Canale, "Numerical Methods for Engineers"-Sixth Edition

2.V. Sundarapandian, "Probability, Statistics and Queuing theory", PHI Learning, 2009.

3.C. Ray Wylie and Louis C. Barrett, "Advanced Engineering Mathematics"-Sixth Edition.

4. Jay L. Devore, "Probability and Statistics for Engineering and Science"-Eight Edition.

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	**Discrete Probability Distributions:** (Relevant topics in section 4.1,4.2,4.4,4.6 Text1) Introduction to discrete random variables, Probability distribution function, Cumulative distribution function. Mean and variance of discrete random variables.	2 2	15%

	Mean and variance of Binomial Distribution (proof). Poisson Approximation to The Binomial Distribution (proof), Mean and variance of Poisson Distribution (proof).	2 2	
II	**Continuous Probability Distributions:** (Relevant topics in section 5.1,5.2,5.5,5.7 Text1) Continuous random variables, Probability density function, Cumulative distribution function, Mean and Variance. Normal probability distribution, Standard normal distribution, Calculation of probabilities using normal distribution. Uniform distribution, Mean and variance (proof). Exponential distribution, Mean and variance (proof).	 3 3 4	15%
FIRST INTERNAL EXAMINATION			
III	**Sampling Distributions:** (Relevant topics in section 6.1, 6.2, 6.3,6.4,7.1,7.2 Text1) Population, Sample, Parameter and statistic. Sampling distribution of Mean (σ Known proof).Central Limit theorem (statement only). Sampling distribution of Mean (σ Unknown without proof), Sampling distribution of the variance (without proof). Point Estimation, Interval Estimation, Interval estimation of mean (confidence interval).	 1 3 3 3	15%
IV	**Test Of Hypothesis:** (Relevant topics in section 7.4,7.5,7.6,8.2,8.3 Text1) Introduction to testing a hypothesis, Null and Alternate hypothesis, Type I and Type II error, Level of significance. Hypothesis concerning one Mean (small and large sample), P-value. Test of significance in difference between means of two independent large samples. Test of significance in difference between means of two independent small samples.	 2 3 4	15%
SECOND INTERNAL EXAMINATION			
V	**Numerical Techniques**: (Relevant topics in section.19.1,19.2,19.3 Text2) Solution Of equations by Iteration-Newton- Raphson Method. Interpolation of Unequal intervals-Lagrange's Interpolation formula. Interpolation of Equal intervals-Newton's forward difference formula, Newton's Backward difference formula.	 2 3 4	20%

VI	**Numerical Techniques**: (Relevant topics in section 19.5,20.1,20.3, 21.1 Text2) Solution to linear System- Gauss Elimination, Gauss Seidal Iteration Method. Numeric Integration-Trapezoidal Rule, Simpson's 1/3 Rule, Numerical solution of first order ODE-Euler method, Runge-Kutta Method (fourth order).	3 3 4	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks : 100 Exam Duration: 3 hours

The question paper will consist of 3 parts.

Part A will have 3 questions of 15 marks each uniformly covering modules I and II. Each question may have two sub questions.

Part B will have 3 questions of 15 marks each uniformly covering modules III and IV. Each question may have two sub questions.

Part C will have 3 questions of 20 marks each uniformly covering modules V and VI. Each question may have three sub questions.

Any two questions from each part have to be answered.