AMSW01 ADVANCE ENGINEERING MATHEMATICS

UNIT-1 PROBABILITY

1.1 Random Experiment;
1.2 Sample space; Random Events;
1.3 Probability of events.
1.4 Axiomatic definition of probability;
1.5 Frequency Definition of probability;
1.6 Finite sample spaces and equiprobable measure as special cases;
1.7 Probability of Non-disjoint events (Theorems).
1.8 Counting techniques applied to probability problems;
1.9 Conditional probability;
1.10 General Multiplication Theorem;
1.11 Independent events; Bayes' theorem and related problems.

UNIT-2 RANDOM VARIABLES (DISCRETE AND CONTINUOUS)

2.1 Probability mass function;
2.2 Probability density function and distribution function.
2.3 Distributions: Binomial, Poisson, Uniform, Exponential, Normal, t and $\chi 2$.
2.4 Expectation and Variance (t and $\chi 2$ excluded);
2.5 Moment generating function;
2.6 Reproductive Property of Binomial;
2.7 Poisson and Normal Distribution (proof not required).
2.8 Transformation of random variables (One variable);
2.9 Chebychev inequality (statement) and problems.

UNIT-3 BINOMIAL

3.1 Binomial approximation to Poisson distribution and Binomial approximation to Normal distribution (statement only);
3.2 Central Limit Theorem (statement);
3.3 Law of large numbers (Weak law);
3.4 Simple applications.

UNIT-4 STATISTICS

4.1 Population; Sample; Statistic;
4.2 Estimation of parameters (consistent and unbiased);
4.3 Sampling distribution of sample mean and sample variance (proof not required).
4.4 Point estimate: Maximum likelihood estimate of statistical parameters (Binomial, Poisson and Normal distribution).
4.5 Interval estimation.

UNIT-5 TESTING OF HYPOTHESIS

5.1 Simple and Composite hypothesis;

5.2 Critical Region;
5.3 Level of Significance; Type I and Type II Errors;
5.4 Best Critical Region; Neyman-Pearson Theorem (proof not required);
5.5 Application to Normal Population;
5.6 Likelihood Ratio Test (proof not required);
5.7 Comparison of Binomial Populations;
5.8 Normal Populations;
5.9 Testing of Equality of Means; χ 2—Test of Goodness of Fit (application only).

UNIT-6 SIMPLE IDEA OF BIVARIATE DISTRIBUTION

6.1 Correlation and Regression; and simple problems.

Reference Books:

1. Conditional Independence in Applied Probability" by P Pfeiffer
2. Probability and computing: Randomized Algorithms and Probabilistic Analysis" by Mitzenmacher and E Upfal
3. Introduction to Probability" by D Bertsekas and J Tsitsiklis
4. Probability, Random Variables, and Random Processes" by John J Shynk