

## Unit - 1.

### 1. Function

Concept of a function of a single variable, (Linear, quadratic and exponential functions only.) Domain, co-domain and range of a function. Types of function. Equal functions, Real function Concept and determination of break even point. Examples

### 2. Limit and Continuity

Concept of limit & continuity of function, Rules of limit (Without Proof) Examples of limit & continuity of  $f(x)$ , where  $f(x)$  is a polynomial of  $x$ , rational function of two polynomials of  $x$ .

### 3. Differentiation.

Definition of a derivative of a function. Derivative of functions  $1/x$ ,  $\sqrt{x}$ ,  $ax+b$ ,  $ax+bx+c$ , etc. by definition. Rules of derivative (Without Proof) Derivatives of function of the type  $x^n$ ,  $e^x$ ,  $a^x$ , and  $\log x$  (Without Proof).

## Unit - 2.

### 1. Permutations and Combinations

Basic idea of permutations and combinations with simple illustrations. Formulae for  $nPr$ , and  $nCr$ , (Without Proof) with examples, Use of results  $nCr + nCr-1 = n+1Cr$  and  $r[nCr] = n \cdot [n-1Cr-1]$  in examples.

### 2. Mathematical Induction and Binomial theorem.

Simple illustrative problems based only on principal of mathematical induction. Binomial theorem and its proof using mathematical induction. Binomial expansion of  $(x \pm a)^n$  where  $n$  is a positive integer; Characteristics of Binomial Expansion, its application in simple examples.

## Unit - 3.

### 1. Probability Theory.

Definitions of Random Experiment, Sample space (With simple illustrations), Events, Mutually exclusive events, Equally likely events, Exhaustive events, Dependent events, Mathematical, Statistical and Axiomatic definitions of probability Theorems and corollaries of addition and multiplication laws of probability (Without Proof). Simple numerical examples of probability. Bayes theorem (Without Proof). Simple numerical examples of probability. Bayes theorem (Without Proof) and examples up to 3 events.

### 2. Mathematical Expectation

Concept of a discrete random variable, Probability mass function of a discrete random variable and its properties, Definition of Mathematical expectation of a discrete random variable, Definition of mathematical expectation of a discrete random variable,

Mathematical expectations of sum and product of two independent and dependent random variables and its properties. Definition of raw and central moments of a discrete random variable upto order four. the relationship of raw moment (Without Proof) Numerical examples.

#### **Unit - 4.**

##### **1. Probability Distributions**

Poisson and Hypergeometric distributions properties and application of these distributions, Derivation of mean and variance of these distributions. Simple numerical examples. (the value of  $e$  should be given.)

##### **2. Quadratic Equations**

Solutions of a quadratic equation  $ax+bx+c=0$  where  $a \neq 0$ , sum and product of the roots of the equation; Nature of roots from the value of discriminant  $\Delta$  Examples.

#### **Unit - 5.**

##### **1. Decision Theory.**

Meaning and Basic Structure of decision theory, classical basic of pay-off-matrix models, pay-off matrix under conditions of risk, Expected value, Maxi-mini, Maxi-max, horwitch and laplace criteria to decide best strategy, Expected Monetary value (E.M.V), Expected Value of Perfect Information (E.V.P.I.), Examples.

##### **2. PERT and CPM**

Meaning and characteristics of PERT, PERT chart with explanation of Activities and Events, D.R. Fulkerson's rule for numbering the events, Dummy activity, Expected activity time expected and cummulative expected time, Earliest Start Time (EST), Earliest Finish Time (EFT), Latest Start Time (LST), Latest Finish Time (LFT), Float Time. Meaning of Critical Path Method (CPM), Difference between PERT and CPM, uses and limitations of PERT and CPM Examples.

#### **References Books:**

1. Goon, Gupta, Dasgupta : "An outline of Statistical Theory" Vol-I and II, World Prees, Calcutta (1980)
2. Sancheti & Kapoor : Business Statistics, Sultan Chand & Sons, New Delhi.
3. Sancheti & Kapoor : Business Mathematics, Sultan Chand & Sons, New Delhi.
4. J.K.Sharma : "O.R. Theory and Applications" Macmillan India Ltd. 2nd edition (2003)
5. D.N.Elhance : Fundamentals of Statistics.
6. Kapoor V.K. : Business Mathematics; Sultan Chand & Sons, Delhi.

7. Levin and Rubin : "Statistics for Management", Prentice Hall of India Pvt. Ltd. New Delhi, (7th edition)
8. Parimal Mukhopadhyay : "Mathematical Statistics" Books & Allied (P) Ltd. (2nd edition)2002