

## **Paper IV : ADV. STATISTICS**

### **Unit 1 : Compound Interest and Annuities (20%)**

Different types of interest rates, concept of present value and amount of a sum, Types of annuities, present value and amount of an annuity, including in the case of continuous compounding, valuation of simple loans and debentures, problems relating to sinking funds.

### **Unit 2 : (20%)**

#### **1. Multiple and Partial correlation and Regression :**

Definition and concept of partial and multiple correlation involving three variables only - Derivation of  $r_{12.3}$ ,  $r_{23.1}$ ,  $r_{31.2}$ ,  $b_{12.3}$ ,  $b_{13.2}$ ,  $R_{1.23}$ ,  $n_{1.23}$  Coefficient of multiple determination - Derivation for the line of regression of  $x_1$ , on  $x_2$  and  $x_3$  - Tests of significance for multiple and partial correlation coefficients - Numerical examples.

#### **2. Non-linear regression :**

Fitting a polynomial trend up to third degree - Fitting of the curves like (i)  $y = ab^x$  (ii)  $y = ae^x$  (iii)  $\log y = a + bx$  (iv)  $y = a + b \log x$ . Fitting of Gompertz and Logistic curves.

### **Unit 3 : (20%)**

#### **1. Analysis of Variance :**

ANOVA techniques for one way and two way classification with simple illustrations.

#### **2. Elements of Design of Experiments :**

Concepts of randomisation and local control - Complete Randomised Design - Randomised Block Design - Latin Square design - Analysis of CRD, RBD and LSD when one observation is missing - Efficiency of RBD over CRD Efficiency of LSD over CRD and RBD.

### **Unit 4 : (20%)**

#### **1. Non-Parametric Tests**

Meating - Importance of NP test - Sign test, Median Test, Run Test, Mann-Whitney's test - Wilcoxon's test - (study of these test without derivation) - Simple illustrative examples.

#### **2. Sequential Probability Ratio test**

Concept - Method of SPR test - O. C. function, O. C. curve, ASN

function, ASN curve, (Without derivation) Application of SPR test for Binomial, Poisson and Normal distributions only.

### **Unit 5 : (20%)**

Preliminary concepts of algorithm, flowcharts and their execution, general introduction of computers : elementary idea about compiler and operating systems. Representation for characters and numbers.

Introduction to BASIC language : Constants and variables, arithmetic expressions, I/O statements, control statement subscripted variables. Simples on programming.