

## **MACEC 1.2 QUANTITATIVE METHODS IN ECONOMIC ANALYSIS**

### **Module I : Mathematical Methods 1:**

Introduction – Quantitative Techniques in Economic Analysis - Uses and Limitations - Concept of Function and Types of Functions - Linear and Non Linear - Logarithmic, Exponential and Power Functions - Graphical Representation - Applications to Economic Analysis - Demand and Supply, Market Equilibrium, Taxation, P.T. Curve, Pareto's Law of Distribution of Income - Interest Compounding and Discounting - Equilibrium - National Income analysis.

### **Module II : Mathematical Methods 2**

Elementary Matrix Algebra - Determinants - Solution of Simultaneous Equations - Cramer's rule and Matrix Inversion - Input Output Analysis- Input Output table - Matrix of Technical Co-Efficients – Simple Applications to Economics.

### **Module III : Mathematical Methods 3**

Calculus - Limit Continuity and Derivative - Differentiation - Rules of Differentiation - Higher Order Derivatives - Partial and Complete Differentiation - Maxima and Minima - Constrained Maximization and Minimization - Applications in Economic Analysis in the Field of Elasticity, Consumer Behaviour, Production Functions, Cost Analysis, Market Structure - Simple Problems of Market Equilibrium - Monopoly and Discriminating Monopoly. Integral Calculus - Definite and Indefinite Integration - Applications to Economics - Consumer's Surplus - Producer's Surplus - Linear Programming - the Dual - Shadow Prices - Graphic and Simple Methods of Solution - Application to Economics.

### **Module IV: Statistical Methods 1**

Introduction - Nature and Scope of Statistics - Uses and Limitations in Economic Analysis - Collection of Data - Presentation - Tabulation - Frequencies Distribution - Visual Aids - Diagrammatic and Graphic Representation - Analysis of Data - Measures of Central Tendency - Dispersion - Variance - Simple Correlation - Linear Regression.

## **Module V : Statistical Methods 2**

Elements of Probability Theory - Total Probability and Conditional Probability - Mathematical Expectation - Simple Models of Frequency Distribution - Normal Binomial and Poisson Distributions and their Applications.

## **Module VI : Statistical Methods 3**

Concepts and Methods of Estimation - Concept of Sampling - Random and Non Random Sampling - Stratified and Cluster Sampling - Probability Proportional to Size - Multi Stage Random Sampling and their Applications - Sampling from Normal Distribution - Desirable Properties of an Estimator - Point and Interval Estimation - Confidence limits - Hypothesis Testing - Type I and Type II Errors - Testing based on  $Z$ ,  $t$  and  $X^2$  (Chi-Square) Tests - Time Series Analysis - Components of Time Series - Trend Analysis - Curve Fitting - Index Numbers - Simple and Weighted Index Numbers - Fisher's Index Numbers - Cost of Living Index Numbers.

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- Chiang, Alpha C, Fundamental Methods of Mathematical Economics, McGraw-Hill, Kogakusha Ltd., Tokyo, 1974.
- Chou.Y. (1975), Statistical Analysis, Holt, Reinhart and Winston, New York.
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