

## **PAPER –3: BUSINESS MATHEMATICS, LOGICAL REASONING AND STATISTICS**

*(One paper – Three hours – 100 Marks)*

### **Objectives:**

- (a) To develop an understanding of the basic mathematical and statistical tools and their application in Business, Finance and Economics.
- (b) To develop logical reasoning skills and apply the same in simple problem solving.

### **Contents:**

#### **Part – A. Business Mathematics (40 Marks)**

##### **1. Ratio and Proportion, Indices and Logarithms**

Ratio and Proportion (Business Applications related to Ration and Proportion) Laws of Indices, Exponents and Logarithms and Anti Logarithms.

##### **2. Equations and Matrices**

- (i) Equations: Simultaneous linear equations up to three variables, Quadratic and Cubic equations in one variable.
- (ii) Matrices: Algebra of Matrices, Inverse of a Matrix and determinants, solving system of equations by Cramer's Rule (involving not more than three variables).

##### **3. Linear Inequalities with Objective Functions and Optimization w.r.t. objective function.**

##### **4. Time value of Money**

- (i) Simple Interest
- (ii) Compound interest
- (iii) Depreciation
- (iv) Effective Rate of Interest
- (v) Present Value
- (vi) Net Present Value
- (vii) Future Value
- (viii) Perpetuity
- (ix) Annuities

- (x) Sinking Funds
- (xi) Valuation of Bonds
- (xii) Calculating of EMI
- (xiii) Calculations of Returns:
  - a) Nominal Rate of Return
  - b) Effective Rate of Return
  - c) Compound Annual growth rate (CAGR)

**5. Permutations and Combinations**

Basic concepts of Permutations and Combinations: Introduction, the Factorial, Permutations, results, Circular Permutations, Permutations with restrictions, Combinations with standard results.

**6. Sequence and Series**

Introduction Sequences, Series, Arithmetic and Geometric progression, Relationship between AM and GM and Sum of n terms of special series

**7. Sets, Relations and Functions**

**8. Basic applications of Differential and Integral calculus** (Excluding the trigonometric applications), Applications of Marginal Cost and Marginal Revenue etc.,

**Part – B: Logical Reasoning (20 Marks)**

1. Number series, Coding and Decoding and odd man out.
2. Direction Tests
3. Seating Arrangements
4. Blood Relations
5. Syllogism

## **Part – C: Statistics (40 Marks)**

### **1. Statistical description of Data**

Statistical Representation of Data, Diagrammatic representation of data, Frequency distribution, Graphical representation of Frequency Distribution – Histogram, Frequency Polygon, Ogive, Pie-chart.

### **2. Measures of Central tendency and Dispersion**

Measures of Central Tendency and Dispersion: Mean Median, Mode, Mean Deviation, Quartiles and Quartile Deviation, Standard Deviation, Co-efficient of Variation, Coefficient of Quartile Deviation.

### **3. Probability**

Probability: Independent and dependent events; mutually exclusive events. Total and Compound Probability and Mathematical Expectation.

### **4. Theoretical Distributions**

Theoretical Distributions: Binomial Distribution, Poisson distribution – Basic application and Normal Distribution – Basic applications.

### **5. Correlation and Regression**

Correlation and Regression: Scatter diagram, Karl Pearson's Coefficient of Correlation Rank Correlation, Probable Error and Probable limits. Regression lines, Regression equations, Regression coefficients.

### **6. Index Numbers and Time Series**

- (i) **Index Numbers:** Uses of Index Numbers, Problems involved in construction of Index Numbers, Methods of construction of Index Numbers.
- (ii) **Time Series Analysis** – Components of Time Series and Calculation of Trend by Moving Average Method.