

PAPER –3: BUSINESS MATHEMATICS, LOGICAL REASONING AND STATISTICS

(One paper – Three hours – 100 Marks)

Objective:

- (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.