Rajarshi Janak University
Faculty of Management

Level: Bachelor **Credit: 3**
Program: BBA **Semester: First**
Course: Business Mathematics **Lecture Hours: 48**
Course Code: MTH 101

Course Description

This course of Business Mathematics is designed to provide students with the mathematical tools and techniques essential for analyzing and making decisions in economics and business. The course focuses on algebra, calculus, financial mathematics with applications tailored to economics, finance and decision sciences.

Course Objectives

- Develop an understanding of key mathematical concepts relevant to business and economics.
- Apply mathematical methods to solve business and economic problems.
- Enhance quantitative skills for business applications: financial analysis, inventory management and decision-making.

Learning outcomes

On completion of this course, students should be able to:-

- Translate problems in management and business into mathematical form and solve them.
- Apply quantitative skills in business applications: financial analysis, inventory management and decision-making.
- Use mathematical concepts in management and business enterprises in a competitive environment.

Course Contents

Unit 1 Basics of Algebra and Matrices **LH 6**

Review of Real Number System only, Linear Inequalities and properties (with verifications only), Modulus of a real number and its properties (with verifications only); Identity and Equation, System of Linear Equations in two and three variables, Quadratic Equations, Applications of Linear Equations and Quadratic Equations to Economics and Commerce;

Review of matrices, notations and types; Algebra of matrices: addition, scalar multiplication, subtraction and matrix multiplication; Applications of algebra of matrices to solve commercial problems.

Unit 2 Determinant and System of Linear Equations **LH 6**

Determinant of square matrices; Minors and Cofactors, evaluation of determinants by method of expansion: Laplace expansion and Sarrus rule (up to 3×3 order); Transpose of matrix; Adjoint and Inverse of square matrices; Singular and Non-singular matrices; Conditions for systems to have unique solution, no solution and infinite number of solutions; Applications of Cramer's rule, Inverse matrix method, Gauss- Jordan method to solve commercial problems.

Unit 3 Mathematics for Finance **LH 6**

Simple and Compound interests; Nominal and effective rates; Depreciations; Annuities; Amortization of loans; Sinking funds; Perpetuities; Net present value and internal rate of return.

Unit 4 Functions and Graphs **LH 6**

Review of functions only; Algebraic real valued functions: Identity, Constant, Linear, Quadratic, Polynomial functions and their graphs; Exponential and Logarithmic Functions and their graphs; Properties of logarithmic functions; Applications of Exponential and Logarithmic functions in Economics and Management; Budget and Cost constraints, Concepts of Demand, Supply, Cost, Revenue and Profit functions; Analysis of Equilibrium and Break-even situations; Elasticity of Demand, Supply and Income.

Unit 5 Limit and Continuity **LH 6**

Meanings of symbols of +ve and –ve infinites; Extended set of real numbers and its properties; Indeterminate forms; Concepts of Limit of a function, Properties of limits (without proof), Limit at infinity; left and right hand limits, Conditions for existence of finite limit at a point, Concept of continuity and discontinuity of a function at a point; Related problems involving algebraic, exponential and logarithmic functions only.

Unit 6 Derivative and its Applications **LH 9**

Concept of Derivative, Derivative as slope of the curve and Rate of Change; Rules of differentiations: Constant rule, Constant multiple rule, Power rule, Sum rule, Product rule, Division rule, Chain rule, General power rule and Implicit rule; Derivatives of algebraic, Logarithmic, Exponential Functions; Higher ordered derivatives; Elasticity of Demand and supply; Applications of derivatives to Economics and Commerce.

Global and Local Extrema; Monotonicity and Concavity of curves of functions; Stationary, Critical and Inflectional points; Conditions for a function to have Local Extrema; Applications of Extrema to economic and commercial problems.

Unit 7 Antiderivative, Differential Equations and their Applications **LH 9**

Indefinite Integral, Integration Formulas, Rules and Techniques of Integration; Definite Integral; Applications of definite integrals to solve economic and commercial problems; Consumers' and Producers' Surplus.

Differential Equations: First order Linear differential equations with constant coefficient and constant term, Differential equation for limited and unlimited growth, Dynamics of Market price: Economic applications, First order Linear differential equations with variable coefficient and variable term, Bernoulli's equation.

References

Monga, G. S. (2001). ***Mathematics for Management and Economics***, New Delhi: Vikas Publishing House Pvt. Ltd.

Haeussler E F, Paul R S and Wood R (2005). ***Introductory Mathematical Analysis***, USA: Pearson Prentice Hall.

Rosser, Mike (2003). ***Basic Mathematics for Economists***, London and New York: Routledge Taylors & Francis Group.