

MATHEMATICS

Teaching Hours: 75

Full Marks: 50

Pass Marks: 20

I. Introduction

This course in Mathematics is designed to provide students with sufficient understanding and knowledge of the fundamental Mathematics contents as per equivalent to Higher Secondary Level. The course demands emphasis on conceptual understanding of the mathematical phenomena. This will involve the proper utilization of suitable mathematical models and equations. The nature of the course is theoretical.

II. General Objective

On completion of this course, the students will be able to acquire the desirable background in mathematics for higher studies in medical and other institutions.

III. Specific Objectives

On completion of this course, the students will be able to:

- a) define, graphically represent and deduce basic laws of inverse trigonometric functions,
- b) use trigonometric relations in establishing properties of triangles, and functions,
- c) solve linear programming problems,
- d) state complex numbers as an extension of real numbers and verify their properties,
- e) define polynomial equations and discuss the roots,
- f) state the remainder theorem, the factor theorem and the fundamental theorem of Algebra,
- g) form quadratic equations with the help of given roots or using the relations of the roots.
- h) establish continuity as a condition for differentiability,
- i) find derivation in intermediate forms and apply derivation in expansion of functions,
- j) state standard integrals use simple partial fractions to integrate rational functions, and
- k) define differential equations and solve them using different forms.

IV. Course Contents

Unit 1. Trigonometric Functions and their Properties (20 Periods)

1.1 Trigonometric Functions and their Inverses

- a) Inverse trigonometric functions
- b) Graphs of inverse trigonometric functions
- c) Basic properties of inverse trigonometric functions

1.2 Trigonometric Equations

- a) Basic trigonometric equations
- b) General solutions of simple trigonometric equations

1.3 Properties of Triangle

- a) Elements of triangle
- b) Laws relating sides and angles of a triangle (Sine Law, Cosine Laws, Tangent Laws and Projection Laws)
- c) Solutions of a triangle (Simple Cases Only)

Unit 2. Linear Programming (8 Periods)

- a) System of linear inequalities in two variables
- b) optimum solutions of LPP by Graphical Methods

Unit 3. Complex Numbers (8 Periods)

- a) Complex number as an extension of real number
- b) Definition of a complex number
- c) Algebraic properties of complex numbers (Verification Only)
- d) Conjugate, Absolute value of a complex number

Unit 4. Polynomial Equations (9 Periods)

- a) Polynomial equations and their roots
- b) Remainder theorem, factor theorem and fundamental theorem of Algebra (Without their proofs)
- c) Quadratic equation, nature of roots, relations between roots and coefficients, formation of a Quadratic equation with given roots

Unit 5. Calculus (30 Periods)

5.1 Derivative and its applications

- a) Relationship between continuity and differentiability
- b) Intermediate value theorem (without proof)
- c) Rolle's theorem (without proof)
- d) Mean value theorem (without proof)
- e) Simple problems to explain the significance of Rolle's and Mean value theorem

f) dy/dx as rate measure.

5.2 Antiderivative and Differential equations

- a) Antiderivatives
- b) Standard integrals & integrals reducible to standard integrals forms
- c) Integration of rational functions by resolving into partial fractions (simple cases only)
- d) Definition, order and degree of differential equation
- f) Solution of first order and first degree differential equations- separation of variable, Linear and exact form.

V. Evaluation Schemes

- Theory 100%
- Written Examination
- Pass Marks 40%

S.N.	Type of Questions	Unit 1	Unit 2	Unit 3	Unit 4
1	Long Question	1 (5 marks)	1 (5marks)	–	2 (5 marks each)
2	Short Questions	5 (2 marks each)		3 (2marks each)	2 (2marks each)

VI. Instructional Materials

OHP, Computer, Graph Boards, Graph Sheets.

VII. Textbook

(Forthcoming under the supervision of subject committee of mathematics)

VIII. Reference Books

1. Bajracharya, D.R. & et al. (2064). *Higher Secondary Level Basic Mathematics*, Vol I and II, Kathmandu: Sukunda Pustak Bhawan.
2. Koirala, S.P. & et al. (2062). *Fundamentals of mathematics Vol I*, Kathmandu: Sahitya Prakashan.
3. Upreti, K.N. and et al. (2063). *Foundations of Mathematics XI*, Kathmandu : Kitab Ghar
4. Bajracharya, P.M & Basnet, G.B. (2064). *Foundation of Mathematics XI*, Kathmandu : Buddha Academic Publishers and Distributors Pvt. Ltd.