Tribhuvan University
Institute of Science and Technology
Bachelor of Science in Computer Science and Information Technology

Course Title: Mathematics I
Course no: MTH112
Semester: I
Nature of course: Theory
Full Marks: 80 + 20
Pass Marks: 32 + 8
Credit Hours: 3

Course Description : This course covers the concepts of functions, limit, continuity, differentiation, integration of function of one variable; logarithmic, exponential, applications of derivatives and antiderivatives, differential equations, vector and applications, partial derivatives and multiple integration

Course Objective : The objective of this course is to make student able to understand and formulate real world problems into mathematical statements, develop solutions to mathematical problems at the level appropriate to the course and describe mathematical solutions either numerically or graphically

Course Contents:

Unit 1. Function of One Variable **5 Hrs.**

Representing function of one variables, Polynomial, Trigonometric, Exponential and Logarithmic functions, Range and domain of functions and their graphs.

Unit 2. Limits and Continuity **4 Hrs.**

Precise definition of Limits and Continuity, Limits at infinity, Continuity, Horizontal asymptotes, Vertical and Slant asymptotes

Unit 3. Derivatives **4 Hrs.**

Tangents and velocity, Rate of change, Review of Derivative, Differentiability of a function, Mean value theorem, Indeterminate forms and L-Hospital Rule

Unit 4. Applications of Derivatives **4 Hrs.**

Curve sketching, Review of maxima and minima of one variable, Optimization problems, Newton's method

Unit 5. Antiderivatives **5 Hrs.**

Review of Antiderivatives, Rectilinear motion, Indefinite integrals and Net change, Definite integral, The fundamental theorem of calculus, Improper integrals

Unit 6. Applications of Antiderivatives **5 Hrs.**

Areas between the curves, Volume of cylindrical cells, Approximate Integrations, Arc length, Area of surface of revolution

Unit 7. Ordinary Differential Equations **6 Hrs.**

Introduction, Introduction to first order equations separable equations, Linear equations, Second Order linear differential equations, Non-homogenous linear equations, Method of undetermined coefficients

Unit 8. Infinite Sequence and Series **5 Hrs.**

Infinite Sequence and Series, Convergence tests and power series, Taylor's and Maclaurin's series

Unit 9. Plain and Space Vectors **4 Hrs.**

Introduction, Applications, Dot product and cross Product, Equations of lines and Planes, Derivatives and integrals of vector functions, Arc length and curvature, Normal and binomial vectors, Motion in space

Unit 10. Partial Derivatives and Multiple Integration **3 Hrs.**

Limit and Continuity, Partial Derivatives, Tangent planes, Maximum and minimum values, Multiple integrals

Text Books:

- Calculus Early Transcendentals, James Stewart, 7E, CENGAGE Learning

Reference Books:

- Calculus Early Transcendentals, Thomas, 12th Editions, Addison Wesley