SEMESTER-II

Course Title	Mathematical Tools for Real World Problems	**Maximum Marks**	100
Course Code	Mathematics – 201	**University Examination**	60
Credits	4	**Sessional Assessment**	40
		Duration of Exam.	3 HOURS

Objectives …..................... The aim of this course is to make students aware of elementary mathematical tools for real world problems so that they can appreciate the importance of Mathematics to real world and at the same time learn some basic mathematical tools that they may be using in the course of study of their main subject.

UNIT 01 — Functions and Models
The concept of a function; elementary functions – constant, identity, polynomial, rational, square root, greatest integer, exponential and logarithmic; functions as models–cost function, revenue function, demand function, population growth etc; graph of a function; sum, difference, product and quotient of two functions.

UNIT 02 — Matrices, Archaeology and Population movement
Definition and examples of a matrix; various types of matrices; addition, subtraction and multiplication of matrices; transpose of a matrix; various results connected to above concepts (statements only); Role of matrices played in determining the chronological order of graves and artifacts; stochastic matrix and its role in population movement models.

UNIT 03 — Determinants, Cryptography and Google search engine
Determinant of a Matrix(up to 3×3 order); various properties of determinants(statements only); inverse of a matrix; applications to find solution of a system of n $(= 2$ or $3)$ linear equations in n variables – Cramer's rule; applications to Cryptography; eigen values and eigen vectors of a matrix; role of eigen values and eigen vectors in Google search engine.

UNIT 04 — Prediction Analysis and Measures of central tendency/dispersion
Data – ungrouped and grouped; mean, mode and median; range, standard deviation, and variance; coefficient of relative variations; linear interpolation; Wald method for linear prediction.

UNIT 05 — The Fascinating World of Derivatives
The concept of limit of a function; method of substitution of limit of a function; the concept of continuity and derivative of a function; basic formulas (statements only); simple applications to Business, economics, bio sciences and industry.

COURSE OUCOMES

On successful completion of this course, we expect that a student

1.   should be able to explain the concepts of function and its various examples and be able to appreciate the importance of functions in real life models.

2.   should be able to explain the concepts of matrices, determinants with their elementary properties and applications to solve equations.

3.   should be able to explain the concepts of mean, mode , medium, standard deviation, variance and appreciate their relevance in dealing with real world problems.

4.   should be able to appreciate the importance of matrices and determinants in understudy the Archaeological problems, Cryptography and Google search engine.

5.   should be able to explain the concepts of derivates and be able to appreciate their role in studying problems of business, economics, bio sciences & industry

Note for Paper Setting

The question paper will be divided into two sections. Section A will be compulsory and will contain 10 very short answer type questions eliciting answers not exceeding 20 words/ multiple choice questions/ fill in the blanks, each carrying one mark equally distributed from all units. Section B will contain 10 long answer type questions, two from each unit and the candidate will be required to answer one from each unit. Each question carries 10 marks.

BOOKS RECOMMENDED

TEXT BOOKS

1. **Johnson, C. M., (2015),** Exploring Mathematics: Investigations with functions, **Jones and Bartlett Learning.**

2. **Williams, G. (2014),** Linear Algebra with applications, 8th edition, **Jones and Bartlett Learning.**

REFERENCE BOOKS

1. **Barnett, A. R., Ziegler, M. R. and Byleen, K. E. (2006),** Calculus: For business, economics, life sciences and social sciences, 12th edition, **Prentice Hall.**

2. **Aryrous, G., (2011),** Statistics for Research, **With a guide to SPSS, 3rd edition, SAGE.**

3. **Strang, G., (2006),** Linear Algebra and its Applications, 4th edition, **CENGAGE learning.**