



Savitribai Phule Pune University

(Formerly University of Pune)

Four Year Graduate Degree Programme in Mathematics
(Faculty of Science & Technology)

New

Syllabi for

F. Y. B. A. / B. Sc. - Mathematics

**(For Colleges Affiliated to Savitribai Phule Pune University,
Pune)**

(As per National Education Policy- 2020)

To be implemented from the Academic Year 2024-2025

Syllabus for F.Y.B.Sc. as per NEP-2020
Subject: Mathematics
Semester - I

MTS 101-Algebra and Calculus I

Course type: Theory

No. of Credits: 02

Course Objectives: This course aims

1. To provide a first approach to Algebra, a basic pillars of mathematics.
2. To cover the basic knowledge of integers and polynomials.
3. To study the theory of integers and polynomials.
4. To establish the fundamental theorem and applications of single variable functions.
5. To understand real numbers and its properties.
6. To understand the concept of limiting process, and continuity in terms of limit.
7. To develop mathematical thinking and skills.

Course Outcomes: The student will able

1. To know the concept of divisibility in integers.
2. To find Greatest Common Divisor of integers using the Euclidean algorithm.
3. To understand the concept of Fermat's theorem and Euler's phi function.
4. To understand the method of finding roots of polynomials and relationship between roots and coefficients of a polynomial.
5. To classify real numbers and recognize various properties of real numbers.
6. To understand the concept of limit and continuity.
7. To draw the graphs of algebraic and transcendental functions considering limits and continuity.
8. To apply the concept of limit and continuity for advanced study of different mathematics courses, and in physical, chemical and biological sciences.

Course Content

Section I: Algebra

Unit 1: Integers

(09 Hours)

- 1.1 Well Ordering Principle and Principle of Mathematical Induction (First Principle).
- 1.2 Divisibility in integers ($\mathbb{Z}$) -Definition and elementary properties, Division algorithm, Greatest Common Divisor (GCD), Least Common Multiple (LCM) of integers, basic properties of GCD, Euclidean Algorithm, relatively prime integers.

- 1.3 Prime numbers- Definition, fundamental theorem of Arithmetic, Euclid's lemma, Theory of Congruences, basic properties, Fermat's theorem, Euler's phi function, Euler's theorem.

Unit 2: Polynomials

(06 Hours)

- 2.1 Definition of a polynomial, degree of a polynomial, algebra of polynomials, division algorithm (Statement only) and examples, Greatest Common Divisor (GCD) of two polynomials (Definition and examples).
- 2.2 Synthetic division, Remainder theorem, Factor theorem.
- 2.3 Relation between roots and co-efficient of a polynomial.

Reference Books:

1. Elementary Number Theory, David M. Burton, Tata McGraw Hill, Seventh Edition.
Chapter 1: Sec. 1.1, Chapter 2: Sec. 2.2, 2.3, 2.4, Chapter 3: Sec. 3.1, Chapter 4: Sec. 4.2, Chapter 5: Sec. 5.2 up to corollary on Theorem 5.1, Chapter 7: Sec. 7.2 only definition, Section 7.3, lemma and Theorem 7.5.
2. Theory of Equations, J. V. Uspensky, McGraw Hill Book Company.
Chapter 2, Chapter 3: Sec. 5
3. Textbook of Algebra, S. K. Shah and S. C. Garg, Vikas Publishing House Pvt. Ltd. Edition 2017.

Section II: Calculus

Unit 3: Real Numbers

(06 Hours)

- 3.1 Number system - $\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$, Algebraic and Order properties of $\mathbb{R}$.
- 3.2 Absolute Value of a real number, geometrical meaning, Absolute value properties of $\mathbb{R}$, triangle inequality, examples on absolute value of $\mathbb{R}$.
- 3.3 Boundedness of $\mathbb{R}$ - Neighborhood of a point on real line, Intervals, Lower bound, Upper bound and examples, Well Ordering Principle of $\mathbb{N}$, Supremum and Infimum of a subset of $\mathbb{R}$ and examples, Completeness property of $\mathbb{R}$.

Unit 4: Limits and Continuity

(09 Hours)

- 4.1 Limit of Real valued function-Definitions and examples, Algebra of limits and examples.
- 4.2 Limit theorems- Squeeze theorem and some results, one sided limits and limits at infinity and examples.
- 4.3 Continuity - Definition of deleted neighborhood of a point, Continuity of a function at a point - Definitions and examples, Algebra of continuous functions, properties, Continuity on an interval - Definition and examples, Bounded function, Boundedness theorem (Statement only), Absolute maximum and minimum of a function - definition, Maximum-Minimum theorem (statement only), Location of roots theorem statement only), Bolzano's theorem (statement only) the intermediate value theorem

Text Books:

1. Calculus, Vol. I: One Variable Calculus with an Introduction to Linear Algebra- Tom M. Apostol, Second Edition, Reprint 2011, Wiley Students Edition, John Wiley and Sons Inc., U.K

- (a) Introduction Part 3: 1.3.1, 1.3.2, 1.3.4, 1.3.7, 1.3.8, 1.3.13 (without Theorem 1.3.5), 1.4.3, 1.4.8 (Theorem 1.3.8, Theorem 1.3.9, Theorem 1.4.0)
- (b) Chapter 3: 3.2, 3.3, 3.4, 3.5 - Theorem 3.2, Theorem 3.3, Theorem 3.4, Theorem 3.6, Theorem 3.7, Theorem 3.8, Theorem 3.10, Theorem 3.11 (without proof), Theorem 3.12.

Reference Books:

1. Introduction to Real Analysis - R. G. Bartle and D. R. Sherbert, Third Edition, John Wiley and Sons, Inc.
 - (a) Chapter 1: Section 1.2 - 1.2.1, 1.2.2, 1.2.3.
 - (b) Chapter 2: Section 2.1: 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7 Theorem), 2.1.8 (Theorem), 2.1.9 (Statement only), 2.1.10 (Theorem), 2.1.11, 2.1.12, 2.1.13. Section 2.3: 2.3.1, 2.3.2, 2.3.3, 2.3.6, 2.4.3, 2.4.8, 2.4.9.
2. Differential Calculus- Shantinayayan Tenth Revised Edition
3. Introduction to Real Analysis - William F. Trench, Free Edition, 2010.
4. Calculus of single Variable - Ron Larson, Bruce Edwards, Tenth Edition.
5. Elementary analysis: the theory of Calculus - Kenneth A. Ross, Second Edition, Springer Publication.

MTS 102 - Practicals based on MTS-101 (Algebra and Calculus I)

Course type: Practical

No. of Credits: 02

IKS 101 MTS: Generic IKS

Course type: IKS

No. of Credits: 02

SEC-101 MTS: Python-I

Course type: SEC

No. of Credits: 02

Course Objectives: This course aims

1. To know about python IDE.
2. To write, test, and debug simple Python programs.
3. To implement Python programs with conditionals and loops statements.
4. To understand the syntax of strings in Python.
5. To understand the concept of function.
6. To understand the concept of list, tuples and its operation.

Course Outcomes: The student will able

1. To write python programs and develop a small application.
2. To develop logic for problem solving.
3. To be familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc.
4. To be familiar with string and its operation.
5. To develop basic concepts of function and terminology.
6. To determine the methods to create and develop Python programs by utilizing the data structures like lists and tuples.

Course Content

Unit 1: : Python Basics and IDE

(04 Hours)

- 1.1 Introduction of Python.
- 1.2 Installing Python
- 1.3 Running Simple Program.
- 1.4 Removing Keys.
- 1.5 Traversing a Dictionary

- Practical 1 based on unit 1.

Unit 2: Basics of Python

(08 Hours)

- 2.1 Data type of Python.
- 2.2 Variable declaration rule.
- 2.3 Python Identifier and reserved words.
- 2.4 Input Output Function.

2.5 Operator of Python.

2.6 Advanced Python operator(Membership and identity).

2.7 Comments in Python.

2.8 Line and Indentation.

- Practical 2, Practical 3 based on unit 2.

Unit 3: Conditional structure

(08 Hours)

3.1 if Statements

3.2 if -else and statement

3.3 Nested if

3.4 if-elif-else ladder

- Practical 4 and Practical 5 based on unit 3.

Unit 4: Iteration statement

(12 Hours)

4.1 Loop Control Structure.

4.1.1 While loop

4.1.2 For loop

4.2 Nested loop

4.3 Break Statement

4.4 Continue Statement

4.5 Pass Statement

- Practical 6, Practical 7 and Practical 8 based on unit 4.

Unit 5: String and Function

(12 Hours)

5.1 String Basics.

5.2 Accessing and updating String.

5.3 Built-in String Methods.

5.4 Function in Python.

5.5 Declaration and Calling function.

5.6 Function Argument

5.7 Anonymous Functions

- Practical 9, Practical 10 and Practical 11 based on unit 5.

Unit 6: List and Tuple

(16 Hours)

6.1 Python Lists.

6.2 Accessing and updating List.

6.3 Basic List Operation.

6.4 Built-in List Methods.

6.5 Python Tuple.

6.6 Accessing and updating tuple.

6.7 Basic tuple operation.

6.8 Built-in tuple Method.

- Practical 12 to Practical 15 based on unit 6.

Reference Books:

1. Fundamentals of Python first programs, 2nd Edition, Kenneth A. Lambert.
2. Beginning Python from Novice to Professional, Third Edition, Magnus Lie Hetland.
3. Python for Science and Engineering, Hans-Petter Halvorsen.
4. Python Programming: An Introduction to Computer Science, Third Edition, John Zelle.
5. Introduction to Scientific Computing in Python, Continuum Analytics and Robert Johansson.

Semester - II

MTS-151:Algebra and Calculus II

Course type: Theory

No. of Credits: 02

Course Objectives:

1. To study matrix properties, algebraic properties, and methods for finding the inverse of a matrix.
2. To explore the solution of systems of linear equations and evaluate determinants by row reduction.
3. To learn the properties of determinants and study the applications of matrices and determinants.
4. To learn how to find the derivative of a function using limits, and understand the geometrical and physical significance of derivatives.
5. To explore methods to find the n^{th} derivatives of functions.
6. To generalize the comprehensive study of combined algebra and calculus.

Course Outcomes: The successful completion of these course students will able to:

1. Understand the various types of matrices, their properties, and how to convert matrices to echelon form using elementary row operations.
2. Learn methods to solve systems of linear equations, understand the concept of determinants, evaluate determinants by different methods, and solve problems using properties of determinants.
3. Apply the concept of matrices and determinant to the problems in chemistry, electronics, cryptography, etc.
4. Understand differentiation and fundamental theorem in differentiation.
5. Apply Mean Value Theorems and it's applications
6. Explore the combined application of algebra and calculus to various mathematical problems.

Course Content

Unit 1 : Systems of Linear Equations and Matrices: (08 Hours) Section I: Matrix Algebra

- 1.1 Matrices and Matrix Operations.
- 1.2 Inverses; Algebraic Properties of Matrices
- 1.3 Elementary Matrices and a Method for Finding A^{-1}
- 1.4 Matrix, Matrix Notation and Size of Matrix.

- 1.5 Diagonal, Triangular, and Symmetric Matrices [Definitions and examples only]
- 1.6 More on Linear Systems and Invertible Matrices
- 1.7 Introduction to Systems of Linear Equations
- 1.8 Gaussian Elimination Method.

Note: Theorems 1.4.1,1.4.3,1.4.8,1.5.3,1.6.1-1.6.4,1.7.1 are without proof.

Unit 2: Determinants (07 Hours)

- 2.1 Determinants by Cofactor Expansion.
- 2.2 Evaluating Determinants by Row Reduction.
- 2.3 Properties of Determinants; Cramer's Rule (Without Proof).
- 2.4 Applications towards Balancing Chemical Equations.
- 2.5 Applications in Cryptography.

Note: Theorems 2.1.1, 2.1.2, 2.2.3, 2.2.4, 2.3.1, 2.3.6, 2.3.8 are without proof

Recommended book:

1. Elementary Linear Algebra by Howard Anton, Chris Rorres, 11th Edition [Applications Version] Unit 1: Section 1.1 to 1.7 , Unit 2: Section 2.1 to 2.3, 2.4 [1.10 Balancing Chemical Equations]

Reference Books:

1. Matrix and Linear Algebra by K. B. Datta, Prentice Hall India Pvt., Limited, 2004.
2. Fundamentals of Matrix Algebra, (3rd Edition) by G. Hartman
3. Linear Algebra and its Applications, David Lay, Third Edition, Pearson Publications.

Section II: Calculus

Unit 3: Differentiation (06 Hours)

- 3.1 The Derivative as a Function.
- 3.2 Differentiation Rules
- 3.3 The Derivative as a Rate of Change
- 3.4 Derivatives of Trigonometric Functions
- 3.5 The Chain Rule
- 3.6 Applications

Unit 4: Mean Value Theorems (09 Hours)

- 4.1 Extreme Values of Functions.
- 4.2 The Mean Value Theorem
- 4.3 L'Hospital's Rule (without proof)

4.4 Cauchy's Mean Value Theorem

Recommended book:

1. Applied Finite Mathematics by R. Sekhon and R. Bloom, Libre Texts. Unit 2 (2.5): Section 2.5
2. Thomas Calculus: EARLY TRANSCENDENTALS (12th Edition), Pearson Education
Unit 3: Section 3.2 - 3.6 and 3.10 Unit 4: Section 4.1 - 4.2 and 4.5

Reference Books:

1. Calculus Volume I (Second Edition) Wiley Student Edition, T. M. Apostol, John Wiley, New Delhi.
2. Elements of Real Analysis, Shanti Narayan, M. D. Raisinghaniya (Revised Edition 2012), S. Chand and Company Ltd.

MTS 152 - Practicals based on MTS-151 (Algebra and Calculus II)

Course type: Practical

No. of Credits: 02

SEC-151 MTS Python-II

Course type: SEC

No. of Credits: 02(P)

Course Objectives:

1. To give students an advanced introduction to Programming.
2. To learn and understand Python programming and paradigm.
3. To implement python program with dictionary and turtle
4. To understand the concept of 2D graphics
5. To understand the concept of files
6. To prepare the program for matrix and operations on it.

Course Outcomes:

1. To write python program and develop maps using dictionary
2. To develop logic for 2D graphics.
3. Demonstrate the use of Python in mathematics such as matrix algebra
4. To be familiar about basic math built in functions such as sine, cosine, etc.
5. To be familiar with complex numbers
6. To write Python programs to handle matrices and vectors using NumPy.

Course Content

Unit 1: Dictionaries

(08 Hours)

- 1.1 Dictionary Literals
- 1.2 Adding Keys and Replacing Values
- 1.3 Accessing Values
- 1.4 Removing Keys
- 1.5 Traversing a Dictionary

-Practical 1 and Practical 2 based on unit 1.

Unit 2: Simple Graphics

(12 Hours)

- 2.1 Overview of Turtle graphics
- 2.2 Turtle operations
- 2.3 Setting up a turtle.cfg file and running IDLE.
- 2.4 Object instantiation and the turtle module
- 2.5 Drawing two dimensional shapes

2.6 Examining an object's attributes

2.7 Manipulating a Turtle's screen

2.8 Taking a random walk

2.9 Colours and the RGB system

-Practical 3, Practical 4 and Practical 5 based on unit 2.

Unit 3: Complex Numbers in Python

(08 Hours)

3.1 Introduction to complex numbers

3.2 Complex numbers with Python

-Practical 6 and Practical 7 based on unit 3.

Unit 4: File Handling

(08 Hours)

4.1 Opening Files: File Modes

4.2 The basic file methods

4.2.1 Reading and Writing

4.2.2 Piping output

4.2.3 Reading and writing lines

4.2.4 Closing files

4.2.5 Using the basic files methods

4.3 Iterating over file content

4.3.1 One character at a time

4.3.2 One line at a time

4.3.3 Reading everything

4.3.4 Lazy line iteration with file input

4.3.5 File iterators

-Practical 8 and Practical 9 based on unit 4.

Unit 5: NumPy

(12 Hours)

5.1 NumPy basics

5.2 NumPy arrays

5.3 Copying / Sorting

5.4 Array manipulation.

5.5 Mathematics

5.6 Basic Statistics

-Practical 10, Practical 11 and Practical 12 based on unit 5.

Unit 6: Matrix Algebra in Python

(12 Hours)

6.1 Vectors

6.2 Matrices

6.3 Linear Algebra

6.4 Matrix addition

6.5 Matrix subtraction

6.6 Matrix multiplication

6.7 Transpose of a matrix.

6.8 Determinant.

6.9 Inverse matrix

- Practical 13 and Practical 14 based on unit 6.

- Practical 15 is based on unit 5 and 6.

Reference Books:

1. Fundamentals of Python first programs, 2nd Edition, Kenneth A. Lambert.
2. Beginning Python from Novice to Professional, Third Edition, Magnus Lie Hetland.
3. Python for Science and Engineering, Hans-Petter Halvorsen.
4. Python Programming: An Introduction to Computer Science, Third Edition, John Zelle.
5. Introduction to Scientific Computing in Python, Continuum Analytics and Robert Johansson.

[Open Electives for the Students other than Faculty of Science]
OE-101 MTS : Basic Mathematics- I

Course type: OE(T)

No. of Credits: 02

Course Objectives:

1. To understand basic concepts of Mathematics.
2. To be able to use the language, symbols, and notation of Mathematics.
3. To develop Mathematical curiosity and acquire skills in problem solving.
4. To develop an appropriate understanding of how to use mathematics in real-world problems.
5. To cultivate the right understanding and regain numerical aptitude.
6. To develop a logical approach toward analytical approach data.

Course Outcomes: The student will able

1. To understand the concepts of numbers and integers and able to develop skills in basic operations of integers to cultivate the right understanding and regain numerical aptitude.
2. To understand concepts of H.C.F. and L.C.M. of numbers, square root and cube Root and ability to apply in real-world problems.
3. To understand concepts of ratio, proportion, percentage and be able to cultivate the right understanding regaining numerical aptitude.
4. To understand concepts of average, profit and loss develop a logical approach toward analytical approach to real-world problems
5. To provide a platform for the students to build the fundamentals of Basic Mathematics for competitive examination preparation strategy
6. To establish a framework for the students to help acquire the knowledge and expertise necessary to secure employment opportunities in the government sector

Course Content

Unit 1: Integers

(12 Hours)

- 1.1 Introduction to number system, Basic operations of integers
- 1.2 Highest Common Factor (H.C.F.) and Least Common Multiple (L.C.M.)
- 1.3 Square root and cube Root

Unit 2: Ratio, Proportion and Percentage

(08 Hours)

- 2.1 Introduction to ratio and proportion
- 2.2 Finding ratio and proportion
- 2.3 Types of ratios

Unit 3: Average**(04 Hours)**

3.1 Introduction to average

3.2 Finding the average

Unit 4: Profit and Loss**(06 Hours)**

4.1 Introduction to profit and loss

4.2 Finding profit and loss

Reference Book:

Quantitative Aptitude for Competitive Examination by Dinesh Khattar, Pearson India Education Services Pvt. Ltd., Fourth Edition.

OE-102 MTS: Applied Mathematics - I**Course type: OE(P)****No. of Credits: 02(P)**

Course Objectives:

1. To develop a strong understanding of Geometry.
2. To become Master of basic operations on numbers in different way.
3. To gain proficiency in working with Profit and loss.
4. To acquire a solid foundation of trigonometry.
5. To learn the simulation of data.
6. To develop problem-solving skills by applying operations.

Course Outcomes: The student will be able to

1. Enhance mathematical reasoning and critical thinking.
2. Easily present the data graphically.
3. Have the knowledge of geometrical shapes and their equations.
4. Have Skills of comparison through diagrams and charts.
5. Got the business ability.
6. Achieve the techniques of finding area and volume.

Course Content

Unit 1: Mensuration (08 Hours)

Perimeter of circle, triangle, square and rectangle. Area of circle, square, rectangle and triangles. Surface area of cylinder, sphere, cube and cuboid. Volume of cube, cuboid, sphere, hemisphere, cylinder and cone.

Unit 2: Trigonometry (08 Hours)

Degree and radian, Trigonometric ratios and identities, Angle of elevation and depression, Height and distance problems.

Unit 3: Arithmetic (08 Hours)

Arithmetic Mean, Geometric Mean, Harmonic Mean, Ratio, Proportion, Percentage, Profit and Loss, Partnership, Brokerage, (True) Discount, Simple and Compound Interest, Time and Work, Distance

Unit 4: Data Interpretation (06 Hours)

Tabulation, missing data problem. Graphs and Charts - Table, Line, Bar and Pie.

Reference Books:

1. Objective Arithmetic, R S Aggarwal, S. Chand & Company Ltd.
2. Business Mathematics, S. K. Sharma and G. Kaur, Sultan Chand & Sons.
3. Business Mathematics-II Edition Q. Zameerddin, V. K. Khanna, S K Bhambri.

OE-151 MTS: Basic Mathematics - II

Course type: OE(T)

No. of Credits: 02

Course Objectives:

1. To be able to use the language, symbols and notation of Mathematics.
2. To develop Mathematical curiosity.
3. To help them acquire skills in solving problems.
4. To develop an appropriate understanding of how to use mathematics in real-world problems.
5. To cultivate the right understanding and regain numerical aptitude.
6. To develop a logical approach toward analytical approach data.

Course Outcomes: The student be will able

1. To understand the concepts of Time, Work and Wages also be able to logical approach towards analytical approach data of real word problem
2. To understand concepts of Linear Equations and ability to solve examples in finding Age in past and future.
3. To understand concepts of Simple and Compound Interest and to develop Mathematical Competence.

4. To understand concepts of Mensuration and able to develop Mathematical competence in solving Problems.
5. To provide a platform for the students to build the fundamentals of Basic Mathematics for competitive examination preparation strategy.
6. To establish a framework for the students to help acquire the knowledge and expertise necessary to secure employment opportunities in the government sector.

Course Content

Unit 1: Time, Work and Wages (12 Hours)

- 1.1 Introduction to Time, Work and Wages
- 1.2 Finding Time and Amount of Work
- 1.3 Finding Speed, Distance and Time
- 1.4 Finding Speed of Boats and Stream

Unit 2: Problems on Ages (06 Hours)

- 2.1 Introduction to Linear Equations
- 2.2 Finding Age Some Years Ago, Present Age and Age Some Years hence

Unit 3: Simple Interest and Compound Interest (06 Hours)

- 3.1 Introduction to Simple Interest and Compound Interest
- 3.2 Finding Simple Interest
- 3.3 Finding Compound Interest

Unit 4: Mensuration (06 Hours)

- 4.1 Introduction to the Concept of Mensuration
- 4.2 Finding Area, Perimeter, and Some Basic Facts
- 4.3 Introduction to Solids and Cubes
- 4.4 Finding Surface Area and Volume

Reference Book:

Quantitative Aptitude for Competitive Examination by Dinesh Khattar, Pearson India Education Services Pvt. Ltd., Fourth Edition.

OE-152 MTS: Applied Mathematics - II

Title : Introduction to MS Excel

Course type: OE(P)

No. of Credits: 02(P)

Course Objectives: This course aims on

1. Basic Essential Computing skills companies are looking for.
2. Hands-on Practical Knowledge.
3. Boosting their resume.
4. Providing an edge over other applicants in the competitive job market.
5. Providing valuable experience and confidence.
6. Heightening their earning potential.

Course Outcomes: The student will be able to

1. Create, save and print worksheets
2. Create formulas
3. Use functions for SUM, AVERAGE, MIN, and MAX
4. Use the function for IF
5. Format cells using many of the formatting tools
6. Present the Data Graphically

Course Content

Practical 1: The Excel environment

Navigating a worksheet
Spreadsheet terminology
Getting help

Practical 2: Entering and editing data

Entering and editing text and values
Entering and editing formulas
Saving and updating workbooks

Practical 3: Modifying a worksheet

Moving and copying data
Moving and copying formulas
Inserting and deleting ranges, rows, and columns
Cell comments

Practical 4: Using functions

Entering functions
AutoSum
Other common functions

Practical 5: Formatting

Text formatting
Row and column formatting
Number formatting
Conditional formatting
Additional formatting options

Practical 6: Printing

Preparing to print
Page Setup options
Printing worksheets

Practical 7: Charts

Chart basics
Column Chart
Pie Chart
Bar Chart
Pai Chart
Line Chart

Practical 8: Case Study

Modifying existing worksheet
Use shortcut keys
Create and email worksheet

Practical 9: Review Basics

Downloading from Account Reconciliation
The Excel environment
The Sparkline
The Trendline

Practical 10: Subtotal Functions

Create an outline and consolidate data
Create subtotals in a list
Use multiple subtotal functions- SUBTOTAL, SUMIF
Create custom views to save different sets of worksheet display and print settings

Practical 11: Range names and Filter date

Define and apply cell and range names
Use names in Formulas
Filter data based on complex criteria
Use conditional filters
Copy filtered results to another range

Practical 12: Pivot Tables

Prepare data in a table format and name the table
Create a PivotTable for analysing
Use the Download Actuals page in Account Reconciliation as example
Modify or re-arrange fields

Practical 13: Selected Functions

Using IF and SUMIF functions to calculate a value based on specified criteria

Use ROUND function to round off numbers

Use VLOOKUP to find values in worksheet data

Use HLOOKUP

Practical 14: Simulation

Scatter

Area

Stock

Surface

Radar

Practical 15: Applications

Applications of Ms-excel

business analysis

data entry and storage

data analysis

accounting and budgeting

Reference Book:

Beginning Excel 2019 by Noreen Brown; Barbara Lave; Hallie Puncochar; Julie Romey;
Mary Schatz; Art Schneider; and Diane Shingledecker

Open Oregon Educational Resources
