



RAICHUR UNIVERSITY, RAICHUR

**Under Graduate Curriculum for Degree of
Bachelor of Science (B.Sc) in**

**Mathematics
(I & II Semester)**

**As per Revised NEP 2024
With Effect from the Academic year from
2024-25 and onwards**

THEORY PAPER
SEMESTER-II
24MT-2: ALGEBRA –II AND CALCULUS – II

Subject	Algebra-II and Calculus-II	Semester	II
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Course Learning Objectives:

- a) To understand the concept of groups, subgroups, Cyclic groups with examples.
- b) To understand the major polar curves.
- c) To understand the concept of tracing of curves.
- d) To understand the concept of integral calculus.

Course Outcome: On successful completion of the course, the student will able to:

- a) Understand cyclic groups and its generators; Applications and importance of Lagrange's theorem. Also, able to find the all cosets of a finite group.
- b) Plot of standard Cartesian, Polar and Parametric curves.
- c) Find the surface area and volume of solids of revolution.
- d) Acquire more knowledge on algebra and calculus.

UNIT I: GROUP THEORY - II

Order of an element - properties, theorems and examples; Cyclic groups – properties, theorems and examples; Cosset decomposition - properties, theorems and examples; Lagrange's theorem and its consequences.

UNIT II: POLAR CO-ORDINATES

Polar coordinates; angle between the radius vector and tangent; Angle of Intersection of two curves; pedal equations; Derivative of an arc in Cartesian, parametric and polar forms; curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms; center of curvature-problems.

UNIT III: TRACING OF CURVES

Concavity, Convexity and points of inflexions; Asymptotes; Nature of singular and multiple points – Cusp, Node and Conjugate points; General rules for tracing of curves – tracing of standard Cartesian, parametric and polar curves.

UNIT IV: INTEGRAL CALCULUS

Reduction formula for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\cot^n x$, $\sec^n x$, $\operatorname{cosec}^n x$, $\sin^m x \cos^n x$ and its applications, Area of plane curves, Surface area and volume of solids of revolutions for standard cures in Cartesian, parametric and polar curves.

Suggested References/Text books:

1. I N Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi.
2. Bernard & Child, Higher algebra, Arihant, ISBN: 9350943199/ 9789350943199.
3. Sharma and Vasishta, Modern Algebra, Krishna PrakashanMandir, Meerut, U.P.
4. Shanti Narayan, Differential Calculus and integral calculus , S. Chand & Company, New Delhi.
5. Vijay K Khanna and S K Bhambri, A Course in Abstract Algebra, Vikas Publications.
6. G K Ranganath, Text Book of B.Sc. Mathematics, S Chand & Company.
7. M.K.Sen and B C Chakraborty introduction to discrete mathematics, Allied publisher
8. M.D. Raisinghania, Ordinary and Partial Differential Equations. 20th Edition
9. S BalachandraRao Differential Calculus ; Publisher, New Age International.

PRACTICAL PAPER
SEMESTER-II
24MP-2: MATHEMATICS LAB-II

(4 hours/ week per batch of not more than 15 students)

Course Learning Objectives:

- a) Foundation for introducing to programming.
- b) Enables the student to explore mathematical concepts and verify mathematical facts through the use of software.
- c) Enhances the skills in programming.
- d) Acquire knowledge of practical applications of algebra and calculus through FOSS.

Course Outcome: On successful completion of the course, the student will able to:

- a) Learn Free and Open Source Software (FOSS) tools for computer programming.
- b) Show proficiency in using the software C-Programming.
- c) Understand the use of various techniques of the software for effectively doing mathematics.
- d) Obtain necessary skills in programming.
- e) Understand the applications of mathematics
- f) Explore and grasp concepts for the future across a wealth of disciplines.

Syllabus: Problems from 24MT 2 (Theory) may be solved with the help of programming.

Suggested Softwares: Maxima/Scilab/Python.

List of Programs (Suggested):

1. Find the generators of a cyclic group.
2. Find all possible Cosets of a finite group.
3. Verification of Lagrange's theorem for finite groups.
4. Finding the angle between the radius vector and tangent.
5. Finding the angle of intersection of two curves and orthogonal curves.
6. Finding the nature of singular points.
7. Plotting of standard Cartesian, Polar and Parametric curves.
8. Problems on properties of integration.
9. Problems on Reduction Formula.
10. Problems to find area of curves.
11. Problems to find surface area of solids of revolution.
12. Problems to find volumes of solids of revolution.