MS2- Mathematics- Number Theory and Computational Geometry

Unit 1. Divisibility

1.1 Introduction

1.2 Divisibility

1.3 Primes

Unit 2. Congruences

2.1 Congruences

2.2 Solution of Congruences

2.3 The Chinese Remainder Theorem

Unit 3. Greatest integer function

3.1 Greatest integer function

3.2 Arithmetic functions

3.3 The Mobius Inversion formula

Unit 4. Quadratic Reciprocity

4.1 Quadratic residues

4.2 Quadratic reciprocity

4.3 The Jacobi Symbol

Unit 5. Diophantine Equations

5.1 Diophantine equations $ax + by = c$

5.2 Pythagorean triplets.

Unit 6. Two dimensional Transformations

Introduction, Representation of Points, Transformations and Matrices, Transformation of Points, Transformation of Straight Lines, Midpoint Transformation, Transformation of Parallel Lines, Transformation of Intersecting Lines, Rotation, Reflection, Scaling, Combined Transformations, Transformation of the Unit Square, Solid Body Transformation, Translations and Homogeneous Coordinates, Rotation About an Arbitrary Point, Reflection Through an Arbitrary Line, Projection - A Geometric Interpretation of Homogeneous Coordinates, Overall Scaling, Points at Infinity

Unit 7. Three Dimensional Transformations

Three Dimensional Scaling and Shearing, Three Dimensional Rotation. Three Dimensional Reflection. Three Dimensional Translation. Multiple Transformations, Rotations about an Axis Parallel to a coordinate axis, Rotation about an Arbitrary Axis in Space, Reflection Through an Arbitrary Plane. Affine and Perspective Geometry, Orthographic Projections, Axonometric

Projections, Oblique Projections, Perspective Transformations. Techniques for generating perspective views, Vanishing points

Unit 8. Plane Curves

Curve representation, non-parametric curves, parametric curves, parametric representation of a circle, parametric representation of an Ellipse, parametric representation of a parabola, parametric representation of a Hyperbola.

Unit 9. Space Curves Beizer curves

Introduction, definition, properties (without proofs), curve fitting (up to n = 3), equation of the curve in matrix form (up to n = 3).