SYLLABUS (CBCS) FOR S. Y. B. Sc.(Computer Science)
MATHEMATICS
(w.e.f. June, 2020)

Academic Year 2020-2021

Class **:** S.Y. B. S.c (Computer Science) (Semester- I)
Paper Code : CSMT2101
Paper **:** I **Title of Paper:**Applied Algebra
Credit **:** 2 **No. of lectures:** 48

1.General Vector Spaces : [14 lectures]
(1) Introduction.
(2) Real Vector Spaces.
(3) Euclidean n-Space.
(4) Subspaces of a Vector Space.
(5) Linear Combination and Linear Span.
(6) Linear Independence.
(7) Basis and Dimension.
(8) Row Space, Column Space, Null Space.
(9) Rank and Nullity.
2. **Eigen Values and Eigen Vectors**: [12 lectures]
(1) Introduction.
(2) Eigen Values and Eigen Vectors.
(3) Diagonalization.
(4) Quadratic Forms.
3. Linear Transformations: [16 lectures]
(1) Introduction.
(2) Linear Transformation.
(3) Kernel and Range of a Linear Transformation.
(4) Inverse Linear Transformation.
(5) Matrix of General Linear Transformation.
4. Inner Product Spaces : [6 lectures]
(1) Inner Products.
(2) Angle and Orthogonality in Inner Product Spaces.
(3) Gram-Schmidt Process.
Text Books:

H. Anton and C. Rorres, Elementary Linear Algebra with Applications, Eleventh Ed.
Wiley, (1994).

Sections : 4.1 to 4.8, 5.1 to 5.2, 7.3, 6.1 to 6.3, 8.1 to 8.4

Reference Books:

(1) M. Artin, Algebra, Prentice Hall of India , New Delhi, (1994).
(2) K. Hoffmann and R. Kunze Linear Algebra, Second Ed. Prentice Hall of India New
Delhi, (1998).
(3) S. Lang, Introduction to Linear Algebra, Second Ed. Springer-Verlag, New Yark,

(1986).
(4) A. Ramchandra Rao and P. Bhimasankaran, Linear Algebra, Tata McGraw Hill, New Delhi (1994).
(5) Discrete Mathematics Structures (sixth edition), Kloman, Busby and Ross. PHI.
(6) G. Strang, Linear Algebra and its Applications. Third Ed. Harcourt Brace Jovanovich, Orlando, (1988).
(7) S. Kumaresan , Linear Algebra: A Geometric Approach, Prentice Hall of India, New Delhi,
1999.

Class : S.Y. B. S.c(Computer Science) (Semester- I)
Paper Code: CSMT2103
Paper : III   **Title of Paper:** Practical

1. Intoduction of Scilab with some basic commands.
2. Basic operations on matrices.
3. Regula-Falsi Method and Newton raphson Method.
4. Eigen values & Eigen vectors ,Diagonalization.
5. Newton's forward interpolation formula and Newton's backward interpolation formula
6. Newton's backward interpolation formula and Newton's divided difference formula.
7. Numerical Integration by Trapezoidal Method , Numerical Integration by Simpson's (1/3)rd rule and Numerical Integration by Simpson's (3/8)th rule.
8. Euler's Method and Runge-kutta Method.
9. Inner Product Spaces.

Class : S.Y. B. S.c(Computer Science) (Semester- I)
Paper Code: CSMT2102
Paper : II   **Title of Paper:** Numerical Techniques

Credit : 2   **No. of lectures:** 48

1.Errors: [03]
    1) Accuracy of numbers.
    2) Errors.
2.Algebraic and Transcendental Equation.   [06]
    1) False Position Method.
    2) Newton Raphson Method.

3. Calculus of Finite Differences: [10]
   1) Differences .
      i.   Forward Difference
      ii.   Backward Differences
      iii. Central Differences
      iv. Other Differences
      v.   Properties of Operators
      vi. Relation between Operators.
   2) Fundamental Theorem of Differences of Polynomial.(without proof)
   3) Estimation of Error by Difference Table.
   4) Technique to determine the Missing Term.

4. Interpolation with Equal Interval.   [10]
   1) Newton's Gregory Formula for Forward Interpolation.
   2) Newton's Gregory Formula for Backward Interpolation.
   3) Central Difference Formulae.
      i.   Gauss Forward Difference Formula.
      ii.   Gauss Backward Difference Formula.
      iii. Bessel's Interpolation Formula.

5. Interpolation with Unequal Interval.   [08]
   1) Lagrange's Interpolation Formula.
   2) Error in Lagrange's Interpolation Formula.
   3) Divided Difference.
   4) Newton's Divided Difference Formula.

6. Numerical Integration .   [05]
   1) General Quadrature Formula.
   2) Trapezoidal Rule.
   3) Simpson's One –Third Rule.
   4) Simpson's Three –Eight Rule.

7. Numerical Solution of Ordinary Differential Equation.   [06]
   1) Euler's Method.
   2) Rung -Kutta Method.

Text Book:
      S.S Sastry , Introductory Methods of Numerical Analysis, 5th edition,
      Prentice Hall of India, 1999
      Sections: 1.3, 1.4, 2.3, 2.5, 3.3, 3.5, 3.6, 3.7(3.7.1, 3.7.3), 3.10, 3.9(3.9.1)
      6.4, 8.4, 8.5

Reference Books:
   1) H.C. Saxena; Finite differences and Numerical Analysis, S. Chand
     And Company.
   2) K.E. Atkinson ; An Introduction to Numerical Analysis, Wiley Publications.
   3) Balguruswamy; Numerical Analysis.
   4) A textbook of Computer Based Numerical and Statistical Techniques, by
     A.K.Jaiswal and Anju Khandelwal. New Age International Publichers.

Class : S.Y. B. Sc.(Computer Science) (Semester- II)
Paper Code : CSMT2201
Paper **:** I   **Title of Paper:** Computational Geometry

Credit **:** 2   **No. of lectures:** 48

1. Two Dimensional Transformation :   [16]
    1) Introduction.
    2) Representation of Points.
    3) Transformations and matrices.
    4) Transformations of Points.
    5) Transformations of straight lines.
    6) Midpoint transformation.
    7) Transformation of parallel lines.
    8) Transformation of Intersecting lines.
    9) Transformation: rotation , reflection , scaling , shearing.
    10) Combined transformation.
    11) Transformation of Unit square.
    12) Solid body transformation.
    13) Transformation and Homogeneous co-ordinates , Translation,
    14) Rotation about an arbitrary point.
    15) Reflection through an arbitrary line.
    16) Projection – a geometric Interpretation of homogeneous co-ordinates.
    17) Overall Scaling.
2. Three Dimensional transformations :   [16]
    1) Introduction.
    2) Three dimensional – Scaling , shearing , rotation , reflection , translation.
    3) Multiple transformations.
    4) Rotation about – an axis parallel to co-ordinate axes , an arbitrary axis in space.
    5) Reflection through – co-ordinate planes , planes parallel to co-ordinate planes ,
    arbitrary planes .
    6) Affine and perspective transformations.
    7) Orthographic projections.
    8) Axonometric projections.
    9) Oblique projections.
    10) Single point perspective transformations.
3. Plane curves :   [10]
    1) Introduction.
    2) Curve representation.
    3) Non – parametric curves.
    4) Parametric curves.
    5) Parametric representation of circle and generation of circle.
    6) Parametric representation of ellipse and generation of ellipse.
    7) Parametric representation of parabola and generation of parabolic Segment.
    8) Parametric representation of hyperbola and generation of hyperbolic Segment

4. Space curves: [06]
    1) Bezier curves – Introduction , definition , properties (without proof), curve fitting (up to n=3) , equation of in matrix form(up to n=3).

Text Book:
    D. F. Rogers, J.A. Adams, Mathematical elements for Computer graphics, Mc Graw Hill Intnl Edition.

Reference Books:
    1) M. E. Mortenson, Computer Graphics Handbook, Industrial Pres Inc
    2) Schaum Series, Computer Graphics.

Class   : S.Y. B. Sc.(Computer Science) (Semester- II)
Paper Code: CSMT2202
Paper   : II   **Title of Paper:** Operation Research

Credit   : 2   **No. of lectures:** 48

1. Modeling with Linear Programming [06]
    1) Two-Variable LP Model.
    2) Graphical LP Solution
    3) Linear Programming Applications
2. The Simplex Method [10]
    1) LP Model in Equation form
    2) Transition from Graphical to Algebraic Solution
    3) The Simplex Method
    4) Special cases in Simplex Method
3. Duality [08]
    1) Definition of the Dual problem
    2) Primal dual relationships
4. Transportation Model and its Variants [12]
    1) Definition of the Transportation problem
    2) The Transportation Algorithm
    3) The Assignment Model
5. Decision Analysis and Games [12]
    1) Decision Under Uncertainty
    2) Optimal solution of two person zero sum games
    3) Solution of mixed strategy games.

Text Book:
    Operation Research (An Introduction) Ninth Edition, by Hamdy A. Taha.
    Sections : 2.1, 2.2, 2.4.2, 3.1, 3.2, 3.3, 3.5, 4.1, 4.2, 5.1, 5.3, 5.4, 15.3, 15.4
Reference Books:
    1) Operation Research by S.D.Sharma.
    2) Operation Research by J.K.Sharma.

Class   : S.Y. B. S.c(Computer Science) (Semester- I)
Paper Code: CSMT2203
Paper   : III   **Title of Paper:** Practical

1. Sorting a set of points w.r.t. a line and Sorting a set of points w.r.t. a rectangle.
2. Find a pair of points with least mutual distance from the given set and Find a pair of points with farthest mutual distance from the given set.
3. Solution of L.P.P. by simplex method.
4. 2-D transformation.
5. Transportation Problem
6. Assignment Problem.
7. 3-D transformation.
8. Generation of uniformly n-points on standard circle
9. Sort given set of points w.r.t. rectangular box.