

**Subject Code: 2SC1040303**

**Subject Title: Mathematics Practical**

**Course Objective:**

This course is designed to enable students to acquire the understanding and practice the applications of Calculus, Vector spaces and numerical analysis.

| Teaching scheme (hours) per week |           | credit |           | Theory Marks          |                  | Practical Marks       |                  | Total |
|----------------------------------|-----------|--------|-----------|-----------------------|------------------|-----------------------|------------------|-------|
| Theory                           | Practical | Theory | Practical | University Assessment | Cont. Assessment | University Assessment | Cont. Assessment |       |
| --                               | 6         | -      | 3         | --                    | --               | 60                    | 40               | 100   |

| Contents |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |            |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|
| Unit No. | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Total Hours | Weight (%) |
| 1        | <ul style="list-style-type: none"> <li>Applications of Vector Space, subspaces.</li> <li>To Expand linearly independent set upto a basis of a vector space.</li> <li>Verification on Dimension theorem and linear transformation.</li> <li>Verifications on Rank-Nullity theorem.</li> <li>To find the inverse of a Linear transformations and linear maps.</li> </ul>                                                                                                                                     | 24          | 25         |
| 2        | <ul style="list-style-type: none"> <li>Application of Bilinear forms and matrices.</li> <li>Application of Symmetric and Skew Symmetric Bilinear forms.</li> <li>Application of Quadratic forms.</li> <li>Application of Lagrange's method.</li> <li>Application of Euler's theorem.</li> <li>Application of Taylor's and Maclaurin's theorems</li> </ul>                                                                                                                                                  | 24          | 25         |
| 3        | <ul style="list-style-type: none"> <li>Application of Gregory-Newton forward formula.</li> <li>Application of Gregory-Newton backward formula.</li> <li>Applications of Newton's divided difference formula.</li> <li>Application of Lagrange's interpolation formula for equal and unequal intervals.</li> </ul>                                                                                                                                                                                          | 24          | 25         |
| 4        | <ul style="list-style-type: none"> <li>Application of Bisection method and Newton's Iteration method.</li> <li>Application false position and Newton's –Raphson method.</li> <li>Application of Numerical differentiation using Newton forward formula.</li> <li>Application of Numerical differentiation using Newton backward formula.</li> <li>Application of Trapezoidal rule.</li> <li>Application of Simpson's <math>1/3^{\text{rd}}</math> rule &amp; <math>3/8^{\text{th}}</math> rule.</li> </ul> | 24          | 25         |

**Course Outcome:**

- After successfully completion of the course, the student will be able to ...
- Understand the application of vector space, dimension and basis.
- Understand the application of Dimension theorem, linear transformation and Rank-Nullity theorem.
- Understand the application of Bisection and Newton's Iteration method and apply it to various types of problems.
- Understand the application of Lagrange's method, Euler's theorem, Taylor's and Maclaurin's theorems.
- Understand the concept of Gregory-Newton forward and backward formula and its applications.
- Understand the concept of Newton's divided difference formula and Lagrange's interpolation formula for equal and unequal intervals and its applications.
- Understand the concept of bilinear forms and its applications.
- Understand the concept of numerical differentiation and its applications.

**List of References:**

- Differential Calculus, by Shantinakaran.
- Vector Analysis, by Murry R. Spiegel.
- An Introduction to linear algebra, by V. Krishnamurthy, JL Arora, East West Press Pvt Ltd, New Delhi.
- Advanced Calculus, by DV Widder, Prentice Hall, New Dellhi
- Advanced Calculus, by R C Buck, MacMillan.
- Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mc Graw Hill.
- Linear Algebra, S K Berberion, Oxford University Press.
- Linear Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut.
- Linear Algebra, Gupta KP, Pragati Prakshan, Meerut.
- Numerical Methods in Engineering and Science, Dr B.S Grewal, Khanna Publication.
- Numerical Analysis and Computational Procedures, S.A Mollah, New Central Book Agency, Calcutta.
- Numerical Analysis, Kunz, McGraw Hill
- Methods in Numerical Analysis, K.W Nelson , Mac Milllan.
- Numerical Methods, Dr. N.Ch., S.N. Iyenger, Dr V.N. Vedomurthy, Vikas Publishing House Pvt. Ltd.
- Theory and Problems of Linear Algebra, Dr. R.D.Sharma, Dr. Ritu Jain, I.K.International Publication House Pvt. Ltd. ,New Delhi.