**SWARNANDHRA COLLEGE OF ENGINEERING & TECHNOLOGY**

AUTONOMOUS

Accredited by National Board of Accreditation, AICTE, New Delhi

Accredited by NAAC with “A” Grade-3.32/4.00 CGPA,

Recognised under 2(f)&2(B) of UGC Act 1956,Approved by AICTE,

Permanently Affiliated to JNTUK, Kakinada

SEETHARAMPURAM, NARSAPURAM-534 280, W.G.DT.,

**B Tech I SEMESTER**

**LINEAR ALGEBRA**

**(Common to All Branches)**

**SYLLABUS (R20)**

**Course Objectives:**

* This course will illuminate the students in the concepts of calculus and linear algebra.
* This course equips the students with standard concepts and tools an intermediate level to advanced level and to develop the confidence; ability to handle various real world problems and their applications.

**Bridge Course:** Limits, continuity, Types of matrices

**Unit I: Matrix Operations and Solving Systems of Linear Equations**

Rank of a matrix by Echelon form, Normal form - solving system of homogeneous and non-homogeneous linear equations- Gauss Elimination, Jacobi and Gauss Seidel methods

**Learning Outcomes:**

At the end of this unit, the student will be able to

* solve system of linear equations. (K2)
* determine the rank of a matrix. (K2)

**Unit II: Eigen values and Eigen vectors**

Eigen values and Eigen vectors - and their properties (without proof). Cayley-Hamilton theorem (without proof), Finding inverse and powers of a matrix by Cayley-Hamilton theorem - Reduction of a matrix to diagonal form.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* find eigen values and eigen vectors of a matrix. (K2)
* find inverse and powers of a matrix by Cayley-Hamilton theorem.(K2)

**Unit III:  Quadratic forms**

Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* reduce a matrix to diagonal form and identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (K3)

**Unit IV:    Multivariable calculus**

Expansions of functions: Taylor’s and Maclaurin's series - Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* expand the given function as Taylor’s and Maclaurin’s series. (K3)
* find partial derivatives numerically and symbolically and use them to analyze and interpret the way in which a function varies. (K3)
* acquire the knowledge in maxima and minima of functions of several variables (K1)
* utilize  Jacobian of a coordinate transformation to deal with the problems in change of variables (K3)

**Unit V: Multiple Integrals**

**Double Integrals:** Change of order of integration, double integrals in polar coordinates, areas enclosed by plane curves.

**Triple Integrals**: Evaluation of triple integrals, change of variables.

**Learning Outcomes:**

At the end of this unit, the student will be able to

* evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates.(K3)
* apply double integration techniques in evaluating areas bounded by a region.(K4)

**Textbooks:**

1. B. S. Grewal, Higher Engineering Mathematics, 43/e, Khanna Publishers, 2015.

**References:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2013.
2. B.V. RAMANA, Higher Engineering Mathematics, Tata McGraw Hill, 2007.

**Course Outcomes:**

At the end of the course, the student will be able to

1. develop the use of matrix algebra techniques that is needed by engineers for practical applications (K3)
2. familiarize with functions of several variables which is useful in optimization (K3)
3. learn important tools of calculus in higher dimensions. Students will become familiar with double integral(K3)
4. familiarize with triple integral and also learn the utilization of special functions. (K4)