21MAT01	ALGEBRA AND CALCULUS (COMMON TO ALL BRANCHES)	L	T	P	C
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Course Objectives:

- To provide the skills to the students for solving different real time problems by applying Algebra, matrices and differential calculus.
- Understand the concepts of improper and proper integrals and their applications
- Extend their knowledge of derivatives to find curvature, evolutes, etc., and measure extreme values of a given function of several variables.
- Compute external values which arise in functions of several variables.

UNIT I	ALGEBRA AND MATRICES	12Hours

Inverse and rank of matrices - System of linear equations-Symmetric, Skew symmetric and orthogonal matrices - Unitary matrices-Eigen values and Eigen vectors - Diagonalization of matrices - Cayley-Hamilton Theorem-Reduction from quadratic form to canonical form.

UNIT II	DIFFERENTIAL CALCULUS	12Hours

Curvature of curve - Center and Radius of Curvature (Cartesian polar, parametric and implicit form) Evolutes - Involutes - Envelopes (one parameter and two parameter) - Evolutes as the envelope of normal.

UNIT III	INTEGRAL CALCULUS	12Hours

Methods of integration-Definite integrals and its properties-Reduction formula for $e^{ax}x^n$, $\sin^m x$, $\cos^n x$, $\sin^m x \cos^n x$ (without proof) - Problems of Beta and Gamma functions - Inter-relation.

UNIT IV	APPLICATIONS OF DIFFERENTIAL CALCULUS & INTEGRAL CALCULUS	12Hours

Applications of differential calculus -Tangent & Normal –Angle of intersection of two curves – Angle between tangents - Velocity and acceleration - Applications of Integral calculus - Area and Volume in Cartesian and polar coordinates

UNIT V	FUNCTIONS OF SEVERAL VARIABLES	12Hours

Limits and continuity - partial derivatives -Total derivatives-differentiation of implicit functions - Jacobian - properties of Jacobians - Taylor's series for functions two variables - Maxima and Minima of functions of two variables (proofs of theorems are not included) - Constrained Maxima and Minima-Lagrange's method of multipliers.

Course Outcomes:

- After the completion of the course the student will be able to
- Solve engineering problems which needs matrix computations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Identify Radius, Centre, Envelope and circle of curvature and apply them in the problem solving.
- Evaluation of improper integrals using beta and gamma functions
- Apply the concepts in solving physical problems arising in engineering

- Students should be able to apply the basic concepts of differential calculus to solve problems released function to maxima and minima of a single and two variables.

Text Books:

- B.S.Grewal . "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd edition, 2014.
- James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015
- Thomas' Calculus, George B.Thomas, D.Weir and J. Hass, 13th edition, Pearson, 2014.
- N.P. Bali, "A Text Book of Engineering Mathematics", 13th edition.

References:

1. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
2. Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
3. Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

Reference Links:

https://nptel.ac.in › courses
https://en.wikipedia.org