

Semester: I						
FUNDAMENTALS OF LINEAR ALGEBRA, CALCULUS AND STATISTICS						
Category: Applied Science Course						
Stream: Computer Science (Common to AI, BT, CS, CY, CD & IS Programs)						
(Theory)						
Course Code	:	MAT211CT		CIE	:	100 Marks
Credits: L:T:P	:	3:1:0		SEE	:	100 Marks
Total Hours	:	42L+14T		SEE Duration	:	3 Hours

Unit-I	09 Hrs
Elementary Linear Algebra Rank of matrices-Rank of a matrix by Echelon form, consistency of system of linear equations- homogeneous and non-homogeneous equations, Gauss elimination, Gauss-Jordan and Gauss-Seidel methods. Eigenvalues and Eigenvectors-Properties, largest eigenvalue by Rayleigh's power method. Implementation using MATLAB.	
Unit – II	09 Hrs
Differential Calculus Basics of polar coordinates, polar curves, angle between radius vector and tangent. Curvature, radius of curvature-Cartesian, polar & parametric forms (without proof), center and circle of curvature (formulae only) and problems. Taylor's and Maclaurin's series for a function of single variable (statements only) and problems. Simulation using MATLAB.	
Unit –III	08 Hrs
Multivariable Functions and Partial Differentiation Functions of several variables, Partial derivatives-Definition and notations, higher order partial derivatives-problems, total differentials, total derivatives, composite functions and chain rule-Problems. Extreme values for function of two variables-Method of Lagrange multipliers. Jacobians - Properties and problems. Simulation using MATLAB.	
Unit –IV	08 Hrs
Multiple Integrals Double integrals-Introduction and method of evaluation-Problems. Change of order of integration and change of variables to polar coordinates-Problems. Applications-Area, volume and center of gravity. Triple integrals-Introduction and method of evaluation and problems. Applications-Volume of a solid and centre of gravity. Simulation using MATLAB.	
Unit –V	08 Hrs
Statistics Central moments, mean, variance, coefficients of skewness and kurtosis in terms of moments. Curve fitting by method of least squares, fitting of curves-Polynomial, exponential and power functions. Correlation and linear regression analysis-Problems. Applications. Implementation using MATLAB.	

Course Outcomes: After completing the course, the students will be able to	
CO1	Illustrate the fundamental concepts of linear algebra, differential calculus, partial differentiation, multiple integrals and statistics.
CO2	Apply the acquired knowledge of linear algebra, differential calculus, partial differentiation, multiple integrals and statistics to solve the problems of engineering applications.
CO3	Analyze the solution of the problems using appropriate techniques of linear algebra, differential calculus, partial differentiation, multiple integrals and statistics to the real - world problem and optimize the solution.
CO4	Interpret the overall knowledge of linear algebra, calculus, integration and statistics gained to demonstrate the problems arising in many practical situations.

Reference Books	
1	Higher Engineering Mathematics, B. S. Grewal, 44 th Edition, 2015, Khanna Publishers, ISBN: 978-81-933284-9-1.
2	Calculus, Saturnino L. Salas, Einar Hille and Garret J. Etgen, 10 th Edition, 2022, Wiley India, ISBN: 9789390421961.
3	Schaum's Outline of Advanced Calculus, Robert Wrede and Murray Spiegel, 3 rd Edition, 2010, McGraw-Hill Education, ISBN -10: 0071623663, ISBN -13: 978-0071623667.
4	Advanced Engineering Mathematics, E. Kreyszig, 10 th Edition (Reprint), 2016, John Wiley & Sons, ISBN: 978-0470458365.
5	Calculus, James Stewart, 8 th Edition, 2016, Cengage Learning, ISBN: 978-1-285-74062-1.

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	COMPONENTS	MARKS
1	QUIZZES: Quizzes will be conducted in online/offline mode. TWO QUIZZES will be conducted & Each Quiz will be evaluated for 10 Marks. THE SUM OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.	20
2	TESTS: Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). TWO tests will be conducted. Each test will be evaluated for 50 Marks. FINAL TEST MARKS WILL BE REDUCED TO 40 MARKS.	40
3	EXPERIENTIAL LEARNING: Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning (05), Program specific requirements (05), Video based seminar/presentation/demonstration (10), MATLAB (20) ADDING UPTO 40 MARKS.	40
MAXIMUM MARKS FOR THE CIE THEORY		100

RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q. NO.	CONTENTS	MARKS
PART A		
1	Objective type questions covering entire syllabus	20
PART B (Maximum of TWO Sub-divisions only)		
2	Unit 1 : (Compulsory)	16
3 & 4	Unit 2 : Question 3 or 4	16
5 & 6	Unit 3 : Question 5 or 6	16
7 & 8	Unit 4 : Question 7 or 8	16
9 & 10	Unit 5: Question 9 or 10	16
MAXIMUM MARKS FOR THE SEE THEORY		100