APPLIED MATHEMATICS

(E.C.E)

Instruction	4 Periods per week (3 Theory + 1 Tutorial)
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course objectives:

- To introduce the concept of vector spaces and linear transformations
- To introduce a few numerical methods to solve certain types of problems
- To study correlation, regression and optimization

Outcomes: At the end of the course students will be able to

- analyze vectors geometrically and algebraically and to represent transformation by matrices.
- solve non linear equations, system of linear equations and ordinary differential equations numerically.
- formulate and model a linear programming problem from a word problem and solve them using simplex method in 2 and 3 dimensions.
- perform a regression analysis and to compute and interpret the coefficient of correlation.

UNIT- I

Linear Algebra:

Vector spaces, Subspaces, Basis and dimension, Linear transformations and their representation by matrices, Rank and Nullity of transformation.

UNIT- II

Numerical methods:

Solution of Algebraic and Transcendental equations-Bisection method, Regula falsi method, Newton-Raphson method, Solution of linear system of equations, Gauss elimination method, Gauss- Seidel iteration method, Interpolation, Lagrange's interpolation, Newton's divided difference interpolation, Newton's Forward and Backward difference interpolations.

UNIT- III

Numerical differentiation, Interpolation approach, Numerical solutions of ordinary differential equations Single step methods, Taylor's series method, Euler method, Picard's method of successive approximation, Runge-Kutta method of 4^{th} order, Multi step methods, Predictor-Corrector method, Euler PC method, Miline and Adams Moulton PC method.

UNIT-I V

Curve fitting:

Curve fitting by method of least squares**,** correlation and regression, types of correlations, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, equal ranks, equations to the lines of regression.

UNIT- V

Optimization:

Basic Concepts,Unconstrained Optimization, Linear Programming, Simplex method, Simplex Method : Difficulties.

Suggested Reading:

1. R.K.Jain & S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition, 2014.
2. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition, 2014.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons,2012.
4. S.C.Gupta and V.K.Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand& Sons, 2014.

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