

Applied Mathematics – I (New Syllabus) (B. Tech and B. Chem)

	Course Code:	Course Title: Applied Mathematics I	Credits = 4		
			L	T	P
	Semester: I	Total contact hours: 60	3	1	0
List of Prerequisite Courses					
	HSC Standard Mathematics				
List of Courses where this course will be prerequisite					
	This is a basic Mathematics course. This knowledge will be required in almost all subjects later on				
Description of relevance of this course in the B. Chem. Engg. Program					
This is a basic Mathematics course. This knowledge will be required in almost all subjects later on. This knowledge is also required for solving various mathematical equations that need to be solved in several chemical engineering courses such as MEBC, momentum transfer, reaction engineering, separation processes, thermodynamics, etc.					
	Course Contents (Topics and subtopics)		Reqd. Hours		
1	Solutions of system of linear equations (Gauss-elimination, LU-decomposition etc.) Numerical methods for solving non-linear algebraic / transcendental etc. Newton's method, Secant, Regula Falsi, Jacobi Numerical solution set of linear algebraic equations: Jacobi, Gauss Siedel, and under / over relaxation methods		10		
2	Interpolation and extrapolation for equal and non-equal spaced data (Newtons Forward, Newtons backward and Lagrange) Numerical integration (trapezoidal rule, Simpson's Rule)		10		
3	Probability of Statistics: Functions of random variables, probability distribution functions, expectation, moments Statistical hypothesis tests, t-tests for one and two samples, F-test, χ^2 -test Statistical Methods for Data Fitting: Linear, multi-linear, non-linear regression		10		
4	Differential Calculus: Higher order differentiation and Leibnitz Rule for the derivative, Taylor's and Maclaurin's theorems, Maxima/Minima, convexity of functions, Radius of curvature;		10		
5	Functions of two or more variables, Limit and continuity, Partial differentiation, Total derivatives, Taylor's theorem for multivariable functions and its application to error calculations, Maxima/Minima, Jacobian.		10		

6	Integral Calculus: Beta and Gamma functions, Differentiation under the integral sign, surface integrals, volume integrals	10
List of Text Books/ Reference Books		
	Advanced Engineering Mathematics, Erwin Kreyszig, John-Wiely.	
	Advanced Engineering Mathematics S. R. K. Iyengar, R. K. Jain, Narosa	
	Introductory Methods Of Numerical Analysis, S. S. Sastry, PHI.	
	A First Course in Probability, Sheldon Ross, Pearson Prentice Hall	
	Probability and Statistics in Engineering , W.W. Hines, D. C. Montgomery, D.M. Goldsman, John-Wiely	

CO for Applied Mathematics – I (New Syllabus) (B. Tech and B. Chem)

CO1: Students should be able to explain basic concepts of matrix theory, numerical techniques, probability distributions and calculus of single variable (K1, K2).

CO2: Students should be able to apply basic concepts of differential calculus to solve problems related to extremum, approximations, curvature etc. (K3, K4)

CO3: Students should be able to apply basic numerical techniques to solve linear and nonlinear equations. (K3, K4)

CO4: Students should be able to do basic statistical inference, linear and nonlinear regression analysis and design of experiments. (K3, K4)

CO5: Students should be able to effectively choose appropriate mathematical and statistical concepts to solve various real world problems. (K4, K5)