

SYLLABUS (NEP)

MATHEMATICS SYLLABUS

Semester	Course Code	Course Name	Components with Credits		Total credits
			Theory	Practical	
I	MAT/MJ/100	Computer oriented numerical analysis	4	-	4
	MAT /MJ/101	Differential Calculus	4	-	4
	MAT /MN/102	<i>[To be chosen from an MJ course offered by other disciplines]</i>	4	-	4
		Introductory Course (Interdisciplinary)	3	-	3
	AEC/103	MIL/English I	3	-	3
	VAC/104	Understanding India	2	-	2
					20

COMPUTER ORIENTED NUMERICAL ANALYSIS

MAT/MJ/100

4 Credits

- UNIT 1** Difference operators and relation between them, differences of a polynomial, factorial polynomials. Solutions of algebraic and Transcendental equations, Bisection method, Iteration method, Regula falsi method, Newton-Raphson method.
- UNIT 2** Difference tables: forward difference, backward difference, Divided difference; Newton's forward and backward interpolation formulae, Newton's divided differences formula for interpolation, Lagrange's interpolation polynomials.
- UNIT 3** Solution of system of linear equations, Gauss elimination method , Gauss-Jordan method, Gauss-Siedel method, Crout's method.
- UNIT 4** Numerical differentiation and integration, trapezoidal rule, Simpson's rule. Numerical solution of differential equations - Taylor series method, Picard's method, single and multistep method, Euler's method, Runge-Kutta methods (up to second order), predictor-corrector method.

Suggested readings

1. Rajaraman, V. : Computer Oriented Numerical Methods (Prentice-Hall of India Pvt. Ltd., New Delhi), 2002 Edition.
2. Jain, M. K., Iyenger, S. R. K., Jain, R. K.: Numerical Methods (Problems and solutions) Wiley Eastern Ltd., (New Age International Publishers Ltd.) 1995 Edition.
3. Kandasamy, P., Thilagavathy, K., and Gunavathy, K. : Numerical Methods, (S. Chand & Co. Ltd., New Delhi), 2003 Edition.
4. Calculus of finite differences and Numerical analysis by Saxena, S Chand & Co.

DIFFERENTIAL CALCULUS

MAT/MJ/101

4 Credits

UNIT 1 *Functions and graphs* of real valued functions; definition of limit, standard theorems on limits, *continuity* : theorems on sum, difference, product, quotient and composite of continuous functions; properties of continuous functions defined on closed and bounded intervals : (statements with illustrations only) boundedness. Derivatives of real valued functions on intervals : definition; derivative as a rate measurer, derivative as the gradient of tangent;

UNIT 2 Equations of tangents, normals, Subtangent and Subnormal to plane curves; successive differentiation; Leibnitz's theorem; L'Hospital's Rule (statements only with applications)

UNIT 3 Increasing and decreasing functions, concavity upwards and downwards, points of inflections, multiple roots, location of roots of $f(x)$; Taylor's and Maclaurin's theorem with Cauchy's form of remainders; Taylor's and Maclaurin's series; expansion of standard functions such as e^x , $\sin x$, $\cos x$, $\log(1+x)$, $(1+x)^n$; asymptotes; tracing of simple plane curves having no singular points; curvature of plane curves (cartesian and parametric equations only);

UNIT 4 Function of two variables, partial derivatives, Euler's theorem, maxima and minima. Lagrange's method of multipliers, Jacobian.

Suggested readings

1. Das, B.C. & Mukherjee, B.N. : Differential Calculus, U.N. Dhur & Sons (P) Ltd.
2. Maity, K. C. and Ghosh, R. K. : Differential Calculus, New Cental Book Agency Pvt Ltd., 2001 Ed.