Applied Mathematics – I

F.E. Sem. I

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	80
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25

SYLLABUS

- **Pre-requisite :** Review on Complex Number-Algebra of Complex Number, Different representations of a Complex number and other definitions, D'Moivre's Theorem.

1. **Complex Numbers**
   - Powers and Roots of Exponential and Trigonometric Functions.
   - Circular functions of complex number and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions. Logarithmic functions.
   - Separation of real and Imaginary parts of all types of Functions.
   - Expansion of $\sin^n \theta$, $\cos^n \theta$ in terms of sines and cosines of multiples of θ and Expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin \theta$, $\cos \theta$.

2. **Matrices and Numerical Methods**
   - Types of Matrices (symmetric, skew - symmetric, Hermitian, Skew Hermitian, Unitary, Orthogonal Matrices and properties of Matrices). Rank of a Matrix using Echelon forms, reduction to normal form, PAQ forms, system of homogeneous and non -homogeneous equations, their consistency and solutions. Linear dependent and independent vectors.
   - Solution of system of linear algebraic equations, by (1) Gauss Elimination Method (Review) (2) Guass Jordan Method (3) Crouts Method (LU) (4) Gauss Seidal Method and (5) Jacobi iteration (Scilab programming for above methods is to be taught during lecture hours)

3. **Differential Calculus**
   - Successive differentiation : n^{th} derivative of standard functions. Leibnitz's Theorem (without proof) and problems.
   - Partial Differentiation : Partial derivatives of first and higher order, total differentials, differentiation of composite and implicit functions.
   - Euler's Theorem on Homogeneous functions with two and three independent variables (with proof).Deductions from Euler's Theorem.

4. **Application of Partial differentiation, Expansion of functions, Indeterminate forms and curve fitting**
   - Maxima and Minima of a function of two independent variables. Lagrange's method of undetermined multipliers with one constraint. Jacobian, Jacobian of implicit function. Partial derivative of implicit function using jacobian.
   - Taylor's Theorem (Statement only) and Taylor's series, Maclaurin's series (Statement only). Expansion of e^x, sin x, cos x, tan x, sinh x, cosh x, tanh x, log (1+x), $\sin^{-1} x$, $\cos^{-1} x$, Binomial series. Indeterminate forms, L-Hospital Rule, problems involving series also.
   - Fitting of curves by least square method for linear, parabolic, and exponential. Regression Analysis(to be introduced for estimation only)
   (Scilab programming related to fitting of curves is to be taught during lecture hours)

Mumbai University Question Paper Format
1) Question paper will comprise of 6 questions, each carrying 20 marks.
2) Total 4 questions need to be solved.
3) Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
5) Remaining question will be randomly selected form all the modules.
6) Weightage of marks should be proportional to number of hours assigned to each module.

Reference Books
1) A text book of Applied Mathematics (*P.N. Wartikar and J.N. Wartikar*) Vol. I and II by Pune Vidyarthi Graha.
2) Higher Engineering Mathematics (*Dr. B.S. Grewal*) Khanna Publication
3) Advanced Engineering Mathematics (*Erwin Kreyszig*) Wiley EasternLimited,9th Ed.
4) Matrices (*Shanti Narayan*).
5) Numerical (*S.S. Sastry*) Prentice Hall

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