Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
FEC101	Engineering Mathematics-I	3	--	1*	3	--	1	4

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
FEC101	Engineering Mathematics-I	20	20	20	80	3	25	--	125

Objectives

1. To develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience using SCILAB software to handle real life problems.

Outcomes: Learners will be able to…

1. Illustrate the basic concepts of Complex numbers.
2. Apply the knowledge of complex numbersto solve problems in hyperbolic functions and logarithmic function.
3. Illustrate the basic principles of Partial differentiation.
4. Illustrate the knowledge of Maxima, Minima and Successive differentiation.
5. Apply principles of basic operations of matrices, rank and echelon form of matrices to solve simultaneous equations.
6. Illustrate SCILAB programming techniques to the solution oflinearand simultaneous algebraic equations.

Module	Detailed Contents	Hrs.
01	**Complex Numbers** **Pre-requisite:** Review of Complex Numbers-Algebra of Complex Number, Cartesian, polar and exponential form of complex number. 1.1. Statement of D'Moivre's Theorem. 1.2. Expansion of sinn θ, cosnθ in terms of sines and cosines of multiples of θ and Expansion of sinnθ, cosnθ in powers of sinθ, cosθ 1.3. Powers and Roots of complex number.	 2 2 2
02	**Hyperbolic function and Logarithm of Complex Numbers** 2.1. Circular functions of complex number and Hyperbolic functions. Inverse Circularand Inverse Hyperbolic functions. Separation of real and imaginary parts of all typesof Functions. 2.2 Logarithmic functions, Separation of real and Imaginary parts of Logarithmic Functions. # **Self learning topics:** Applications of complex number in Signal processing, Electrical circuits.	3 3

03	**Partial Differentiation** 3.1 Partial Differentiation: Function of several variables, Partial derivatives of first andhigher order. Differentiation of composite function. 3.2.Euler's Theorem on Homogeneous functions with two independent variables (with proof). Deductions from Euler's Theorem. **# Self learning topics:** Total differentials, implicit functions, Euler's Theorem on Homogeneous functions with three independent variables.	3 3
04	**Applications of Partial Differentiation and Successive differentiation.** 4.1 Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint. 4.2 Successive differentiation: nth derivative of standard functions. Leibnitz's Theorem (without proof) and problems **# Self learning topics:** Jacobian's of two and three independent variables (simple problems)	3 3
05	**Matrices** **Pre-requisite:** Inverse of a matrix, addition, multiplication and transpose of a matrix 5.1.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 and PAQ form. 5.2.System of homogeneous and non –homogeneous equations, their consistency and solutions. **# Self learning topics:** Application of inverse of a matrix to coding theory.	4 2
06	**Numerical Solutions of Transcendental Equations and System of Linear Equations and Expansion of Function.** 6.1 Solution of Transcendental Equations: Solution by Newton Raphson method andRegula –Falsi. 6.2 Solution of system of linear algebraic equations, by (1) Gauss Jacobi Iteration Method, (2) Gauss Seidal Iteration Method. 6.3 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), (x), (x), (x). **# Self learning topics:** Indeterminate forms, L- Hospital Rule, Gauss Elimination Method, Gauss Jordan Method.	2 2 2

Term Work

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practicals.
2. Students must be encouraged to write SCILAB Programs in tutorial class only. Each Student has to write at least 4 SCILAB tutorials (including print out) and at least 6 class tutorials on entire syllabus.
3. SCILAB Tutorials will be based on (i) Guass Elimination Method (ii) GuassSeidal Iteration method (iii) Gauss Jacobi Iteration Method (iv) Newton Raphson Method (v) Regula –Falsi method (vi) Maxima and Minima of functions of two variables

The distribution of marks for term work shall be as follows:

- Class Tutorials on entire syllabus**:** 1**0 marks**
- SCILAB Tutorials**:** **10 marks**
- Attendance (Theory and Tutorial)**:** **05 marks**

The final certification and acceptance of TW ensures the satisfactory performance of laboratory work and minimum passing in the TW.

Assessment

Internal Assessment Test

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Examination

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

References

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
3. Engineering Mathematics by Srimanta Pal and Subodh,C. Bhunia, Oxford University Press
4. Matrices, Shanti Narayan, .S. Chand publication.
5. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill
6. Elementary Linear Algebra with Application by Howard Anton and Christ Rorres. 6th edition.John Wiley & Sons, INC.