MA 2001: Engineering Mathematics-III (Semester –III)	
Teaching Scheme **Lectures: 4 Hrs/Week** **Total Credits : 04**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment: 10Marks** **End Semester Exam : 60 Marks**

Course description:

Engineering Mathematics-III (MA 2001) is a compulsory course to all second year engineering students of the institute in the Semester –III and is a continuation of previous year courses viz. Engineering Mathematics-I (MA1001) and Engineering Mathematics-II (MA1002). This course intends to provide engineering students a coherent and balanced account of major mathematical techniques and tools.

Course Objective:

This course intends to provide an overview of analytical and numerical techniques to solve ordinary and partial differential equations, which we apply to solve many engineering problems of mechanical, civil electrical Engineering.

Course Outcomes:

After completing the course, students will be able to:

CO1	determine the solution of second and higher order linear differential equation and apply knowledge of LDE to solve the problems in civil, mechanical and electrical engineering
CO2	classify, formulate and solve the first order and second order linear, non-linear partial differential equations and apply the knowledge of partial differential equations to solve the problems in civil, mechanical and electrical engineering
CO3	find approximate solution of ordinary differential equations of first order and find the convergence and stability of the approximate solutions

Detailed syllabus:

Unit-I	**Linear Differential Equations (LDE):** Linear Differential Equations **(LDE)** with constant coefficients, Differential equations reducible to LDE with constant coefficients, Simultaneous LDE with constant coefficients	**08 Hrs**
Unit-II	**Applications of Linear Differential Equations (LDE):** L-C-R Circuit, Coupled Electrical Circuits, Bending of beams, Spring-Mass system	**08 Hrs**
Unit-III	**Partial Differential Equations (PDE):** First order linear/ nonlinear Partial Differential Equation Formation **(PDE)**, Lagrange's equation, Linear Partial Differential Equations **(PDE)** of second and higher order with constant coefficients, Linear non-homogeneous PDE.	**08 Hrs**
Unit-IV	**Applications of Partial Differential Equations:** Solutions of one-dimensional wave equation, one-dimensional heat equation, Steady state solution of two-dimensional heat equation, Fourier series solutions in Cartesian coordinates.	**08 Hrs**
Unit-V	**The approximation for the solution of first order Ordinary Differential Equations:** Taylor series method, Euler's method, Euler's modified Method, Runge-Kutta Fourth order Method, Milne's Predictor-Corrector Method, Solution of system of ordinary differential equations by Runge-Kutta methods.	**08 Hrs**

Text and Reference Books

1. A Text Book of engineering Mathematics (Vol.1 &2) by P.N.Wartikar & J.N.Wartikar, Pune Vidhyarthi Griha Prakashan, Pune.
2. Advanced Engineering Mathematics by Erwin Kreyszig, Willey Eastern Ltd. Mumbai.
3. Engineering Mathematics-A Tutorial Approach by Ravish R Singh, Mukul Bhatt.
4. Higher Engineering Mathematics by B. S. Grewal, Khanna publication, New Delhi.
5. Advanced Engineering Mathematics by H. K. Dass, S. Chand and Sons.
6. Calculus by G. B. Thomas and R. L. Finney, Addison- Wesley, 1996
7. Elements of Partial Differential Equations by I.N. Sneddon

Mapping of Course outcome with Program Outcomes (Civil Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2						1			
CO2	1								1			
CO3	1								2			

Mapping of Course outcome with Program Outcomes (Mechanical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1		1		2	3				
CO2	1		2		2	3				
CO3	1		3		3	3				

Mapping of Course outcome with Program Outcomes (Electrical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	1													
CO2	1													
CO3	1													

Mapping of Course outcome with Program Outcomes (Electronics and Tele-communication Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3							3		3	
CO2	2	3							3		3	
CO3	2	3	3						3		3	

Mapping of Course outcome with Program Outcomes (Computer Science Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											3
CO2	1											3
CO3	1											3

Mapping of Course outcome with Program Outcomes (Information Technology)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1								3		
CO2	1	1								3		
CO3	1	1								3		

1 – High, 2 – Medium, 3 - Low

Assessment table:

Course outcomes	CO1				CO2				CO3			
Assessment Tool	K1	K2	K3	K5	K1	K2	K3	K5	K 1	K2	K3	K5
Class Test-I 15 Marks	2	1	6	6	0	0	0	0	0	0	0	0
Class Test-II 15 Marks	0	0	0	0	2	1	6	6	0	0	0	0
Teachers Assessment 10 Marks	1	1	0	2	1	1	0	2	0	0	0	2
ESE Assessment 60 Marks	4	0	10	10	4	0	10	10	2	0	0	10

Teaching Strategies:

The teaching strategy planned through the lectures, and team based home works. Exercises assigned weekly to stimulate the students to actively use and revise the learned concepts, which also help the students to express their way of solving the problems fluently in written form. Most critical concepts and mistakes emphasized

Teacher's Assessment: Teacher's assessment of 10 marks based on the following.

1) Home assignments
2) Surprise tests with multiple choice questions

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	Test1	Test2	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	2	2	2	10
K2	Understand	1	1	2	0
K3	Apply	06	06	00	20
K4	Analyze	00	00	00	00
K5	Evaluate	06	06	06	30
K6	Create	00	00	00	00
Total		15	15	10	60

MA 2002: Mathematical Transforms Semester –IV(Open Elective)	
Teaching Scheme **Lectures: 3 Hrs/Week** **Total Credits : 03**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment : 10Marks** **End Semester Exam : 60 Marks**

Prerequisites: Engineering Mathematics-III

Course description:

Mathematical Transforms (MA 2002) is an Open Elective course offered to Second Year Engineering students of the institute. This course is intended to provide engineering students a coherent and balanced account of major Transform Techniques (Continuous Transforms, Discrete Transforms),

Course Objectives:

This course provides an overview of analytical techniques to solve ordinary differential equations, partial differential equations. It also provides a strong fundamental base for the analysis of signal, time invariant systems, signals processing and helps in many engineering problems

Course Outcomes:

After completing the course, students will be able to:

CO1	Understand and apply the concepts in Laplace Transform
CO2	Understand and apply the concepts in Fourier Transform
CO3	Understand and apply the concepts in Z-transform

Detailed Syllabus

Unit-I	**Laplace Transform –I (LT):** Definition of Laplace Transform, Properties of Laplace Transform, Laplace Transform of basic functions, First Shifting Theorem, Second Shifting Theorem, Initial value Theorem, Final value Theorem, Convolution Theorem Laplace Transform of Derivative of a function, Integral of a, function,	**06Hrs**
Unit-II	**Laplace Transform-II (LT):** Laplace Transform of Periodic function, Unit Step Function, Unit Impulse function, Error Function Inverse Laplace Transform using: Expansion Method ,Partial Fraction Method ,Using properties and theorems ,Convolution Theorem	**06 Hrs**
Unit-III	**Fourier Transform (FT):** Fourier Integral Theorem ,Fourier Transform pair , Fourier Sine Transform, Fourier Cosine Transform ,Properties of Fourier Transform ,Transform of simple functions ,Convolution Theorem ,Parseval's Identity	**06 Hrs**
Unit-IV	**Z-Transform:** Z-Transforms of basic discrete functions ,Region of Convergence Change of scale property ,Shifting Theorems ,Convolution Theorem Initial Value Theorem, Final Value Theorem ,Inverse Z-Transform: Expansion Method ,Partial Fraction Method, Method of Residue	**06 Hrs**
Unit-V	**Application of Transforms:** Application Transforms Techniques to solve LDE with Constant Coefficients ,Simultaneous Differential Equations, Integral Equations , Partial Differential Equations ,Difference Equations, Evaluation of some indefinite Integrals	**06 Hrs**

Text and Reference Books

1. P.N.Wartikar & J.N.Wartikar ,"A Text Book of engineering Mathematics" (Vol.1 &2) by,

   Pune Vidhyarthi Griha Prakashan, Pune.
2. Ravish R Singh, Mukul Bhatt ,"Engineering Mathematics-A Tutorial Approach "
3. B. S. Grewal,"Higher Engineering Mathematics", Khanna publication, New Delhi.
4. H. K. Dass,"Advanced Engineering Mathematics", S. Chand and Sons.

Reference books:

1. Erwin Kreyszig,"Advanced Engineering Mathematics", Willey Eastern Ltd. Mumbai.
2. Michael Greenberg ,"Advanced Engineering Mathematics", Pearson, 2/e

Mapping of Course outcome with Program Outcomes (Civil Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2						1			
CO2	1								1			
CO3	1								2			

Mapping of Course outcome with Program Outcomes (Mechanical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1		1		2	3				
CO2	1		2		2	3				
CO3	1		3		3	3				

Mapping of Course outcome with Program Outcomes (Electrical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	1													
CO2	1													
CO3	1													

Mapping of Course outcome with Program Outcomes (Electronics and Tele-communication Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3							3		3	
CO2	2	3							3		3	
CO3	2	3	3						3		3	

Mapping of Course outcome with Program Outcomes (Computer Science Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											3
CO2	1											3
CO3	1											3

Mapping of Course outcome with Program Outcomes (Information Technology)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1								3		
CO2	1	1								3		
CO3	1	1								3		

1 – High, 2 – Medium, 3 - Low

Assessment table:

Course outcomes	CO1				CO2				CO3			
Assessment Tool	K1	K2	K3	K5	K1	K2	K3	K5	K 1	K 2	K3	K5
Class Test-I 15 Marks	2	1	6	6	0	0	0	0	0	0	0	0
Class Test-II 15 Marks	0	0	0	0	2	1	6	6	0	0	0	0
Teachers Assessment 10 Marks	1	1	0	2	1	1	0	2	0	0	0	2
ESE Assessment 60 Marks	4	0	10	10	4	0	10	10	2	0	0	10

Teaching Strategies:

The teaching strategy is planed through the lectures, and team based home works. Exercises are assigned weekly to stimulate the students to actively use and revise the learned concepts which also help the students to express their way of solving the problems fluently in written form. Most critical concepts and mistakes are emphasized

Teacher's Assessment: Teacher's assessment of 10 marks is based on the following.

1) Home assignments
2) Surprise tests with multiple choice questions

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	Test1	Test2	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	2	2	2	10
K2	Understand	1	1	2	0
K3	Apply	06	06	00	20
K4	Analyze	00	00	00	00
K5	Evaluate	06	06	06	30
K6	Create	00	00	00	00
Total		15	15	10	60

MA 2003:Vector Calculus and Functions of Complex Variable Semester-IV (Open Elective)	
Teaching Scheme **Lectures: 3 Hrs/Week** **Total Credits : 03**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment: 10Marks** **End Semester Exam : 60 Marks**

Prerequisites: Engineering Mathematics-III

Course description:

Vector Calculus and Functions of Complex Variable (MA 2003) is an Open Elective offered to third year engineering students (All Branches) of the institute. This course intended to provide Engineering students a coherent and balanced account of knowledge of Complex Analysis and Vector Calculus, which helps in mathematical treatment of Physical and Engineering problems.

Course Objectives: The objective of the course is to introduce and develop the concept of Functions of Complex Variables and the methods of Vector Analysis.

Course Outcomes:

After completing the course, students will be able to:

CO1	Differentiate vector functions of a single variable. Calculate velocity and acceleration vectors for moving particles. Understand and be able to find the unit tangent vector, the unit normal Find the gradient of a function. Find the divergence and curl of a vector field and prove identities involving these. Calculate the directional derivative of a function. Calculate the unit normal at a point on a surface. Recognise irrotational and solenoidal vector fields.
CO2	Evaluate line and surface integrals. Understand the various integral theorems relating line, surface, and volume integrals.
CO3	Understand the concepts of analytic functions, conjugate harmonic functions, C-R equations, singularities, residues and residue theorem
CO4	demonstrate the understanding of the concepts of geometric transformations of some functions of complex variable
CO5	apply the concepts of contour integrations to evaluate some definite/ indefinite integrals

Detailed Syllabus:

Unit-I	**Vector Calculus-I** Scalar point function, vector point function, Differentiation of vector point functions, Physical interpretation of derivative of a vector, function gradient of a scalar point function, Curl of vector point function, , irrotational fields, Divergence of vector point function, solenoidel fields, Directional derivative of scalar function, Vector identities	**06 Hrs**
Unit-II	**Vector Calculus-II** Line integral, Work done in a force field, Surface integral, Volume integral, Green's theorem, Stoke's theorem, Guass-Divergence theorem	**06 Hrs**
Unit-III	**Functions of Complex Variable-I** Limit, continuity and differentiation of complex variable Analytic function, Harmonic function, Cuachy-Reiman Equations (Cartesian and polar form), Harmonic functions. Taylor's Series, Laurent's Series, Singularities, Residues, Residue theorem	**06 Hrs**
Unit-IV	**Functions of Complex Variable-II** Geometrical representations: Conformal transformation Translation, Magnification and Rotation, Inversion and Reflection Transformations: $w = z^2, w = z^n, w = z + \frac{1}{z}, w = e^z, w = \cosh z$ Bilinear transformation, Cross ratio property	**06 Hrs**
Unit-V	**Functions of Complex Variable-III** Cauchy's integral theorem, Cauchy's integral formula for the Derivative of an analytic function,Morera's theorem, Liouvilles theorem,Contour integration: Integration round the unit circle, Rectangular contour, Intended semi-circular contour.	**06 HRs**

Text and Reference Books

1. P.N.Wartikar & J.N.Wartikar ,"A Text Book of engineering Mathematics" (Vol.1 &2) by, Pune Vidhyarthi Griha Prakashan, Pune.
2. Ravish R Singh, Mukul Bhatt ,"Engineering Mathematics-A Tutorial Approach "
3. B. S. Grewal, "Higher Engineering Mathematics" , Khanna publication, New Delhi.
4. H. K. Dass ,"Advanced Engineering Mathematics", S. Chand and Sons.

REFERENCES:

1. Erwin Kreyszig ,"Advanced Engineering Mathematics", Willey Eastern Ltd. Mumbai.
2. Michael Greenberg ,"Advanced Engineering Mathematics", Pearson, 2/e
3. Calculus by G. B. Thomas and R. L. Finney, Addison- Wesley, 1996

Mapping of Course outcome with Program Outcomes (Civil Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2						1			
CO2	1								1			
CO3	1								2			
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Mechanical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1		1		2	3				
CO2	1		2		2	3				
CO3	1		3		3	3				
CO4										
CO5										

Mapping of Course outcome with Program Outcomes (Electrical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	1													
CO2	1													
CO3	1													
CO4														
CO5														

Mapping of Course outcome with Program Outcomes (Electronics and Tele-communication Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3							3		3	
CO2	2	3							3		3	
CO3	2	3	3						3		3	
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Computer Science Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											3
CO2	1											3
CO3	1											3
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Information Technology)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1								3		
CO2	1	1								3		
CO3	1	1								3		
CO4												
CO5												

1 – High, 2 – Medium, 3 – Low

Assessment table:

Course outcomes	CO1				CO2				CO3				CO4				CO5			
Assessment Tool	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5
Class Test-I 15 Marks	2	2		4	2	2		3												
Class Test-II 15 Marks									2	2		5				6				
Teachers Assessment 10 Marks				2				2				2				2				2
ESE Assessment 60 Marks			6	6			6	6			6	6			6	6			6	6

Teaching Strategies:

The teaching strategy includes the lectures, assignments and home works. Exercises are assigned weekly to stimulate the students to actively use and revise the learned concepts, which also help the students to express their way of solving the problems fluently in written form.

Teacher's Assessment: Teacher's assessment of 10 marks is based on the following.

1) Home assignments
2) Surprise tests with multiple choice questions

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	Test1	Test2	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	04	02	00	00
K2	Understand	04	02	00	00
K3	Apply	00	00	00	30
K4	Analyze	00	00	00	00
K5	Evaluate	07	11	10	30
K6	Create	00	00	00	00
Total		15	15	10	60

MA 3001:Numerical Methods for Engineering Semester-IV (Open Elective)	
Teaching Scheme **Lectures: 3 Hrs/Week** **Total Credits : 03**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment: 10Marks** **End Semester Exam : 60 Marks**

Prerequisites: Engineering Mathematics-III

Course description:

Numerical Methods for Engineering (MA 3001) is an Open Elective to the Third year Engineering students of the institute This course is intended to provide Engineering students a coherent and balanced account of Numerical Methods that form the basis of many engineering analysis tools.

Course Objectives:

To teach students how to apply computational methodologies to solve engineering problems when no closed-form, analytical solution exists. The course intend to understand the basic concepts behind the various numerical methods and implementing it.

Course Outcomes:

After completing the course, students will be able to:

CO1	apply the numerical techniques to solve non-linear ,transcendental equations.
CO2	apply the numerical techniques to solve linear system, Eigen value problems
CO3	apply interpolation technique for numerical differentiation and integration and understand concepts of errors associated with them
CO4	Understand and apply the quadrature formulae for numerical integration and concepts of errors associated with them
CO5	understand and apply the concept of interpolation techniques (Cubic Splines, Least square approximation, Pade approximation) in two dimensions.

Detailed Syllabus:

Unit-I	**The solution of non-linear equations** $f(x)=0$ Iteration for Solving $x=g(x)$,Bracketing Methods for Locating a root, Newton-Raphson Method, Scant Method, Aitkin's Process Newton's Method for System of Equations.	**08 Hrs**
Unit-II	**The solution of linear systems** $AX=B$ Guass-Ellimination with Partial Pivoting, Triangular Factorization, **Iterative methods for Linear systems**: Jaccobi Iteration, Guass-Seidel Iteration, Eigen values of a matrix by Power method and by Jacobi's method.	**08 Hrs**
Unit-III	**Interpolation and Numerical Differentiation** Interpolation with unequal intervals:Lagrange interpolation ,Newton's divided difference , Interpolation with equal intervals: Newton's forward and backward difference formulae Differentiation using Interpolation: Differentiation of the Lagrange's Polynomial, Differentiation of the Newton Polynomial, Sterling's Central –Difference Formula	**08 Hrs**
Unit-IV	**Numerical Integration** Introduction to Quadrature, Newton-Cotes Integration formulae, Composite Trapezoidal and Simpson's rule, Romberg integration Guass-Legendre Integration (two point, three point rule), Evaluation of double integrals by Trapezoidal and Simpson's rules	**08 Hrs**
Unit-V	**Approximation of Functions** Interpolation in two dimensions, Cubic Spline Interpolation, Construction of Cubic Spline, Maxima and Minima of Tabulated functions, Hermite Interpolation, Least-Square Approximations, Chebyshev Polynomial Approximation, Least-Square Approximations by Chebyshev Polynomials, Pade Approximation	**08 Hrs**

Text Books:

1. P.N.Wartikar & J.N.Wartikar ,"A Text Book of engineering Mathematics" (Vol.1 &2) Pune Vidhyarthi Griha Prakashan, Pune.
2. Ravish R Singh, Mukul Bhatt ,"Engineering Mathematics-A Tutorial Approach "
3. B. S. Grewal, "Higher Engineering Mathematics" , Khanna publication, New Delhi.
4. H. K. Dass ,"Advanced Engineering Mathematics", S. Chand and Sons.
5. Grewal, B.S. and Grewal,J.S., "Numerical methods in Engineering and Science", Khanna Publishers, New Delhi, 9th Edition, 2007.
6. Sankara Rao, K. "Numerical methods for Scientists and Engineers", Prentice Hall of India Private Ltd., New Delhi, 3rd Edition,2007

References:

1. Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education Asia, New Delhi, 1 st Edition, 2007.
2. Gerald, C.F. and Wheatley, P.O., "Applied Numerical Analysis", Pearson Education Asia, New Delhi, 6th Edition, 2006.
3. Laurene V. Fausett, "Applied Numerical Analysis using MATLAB", Pearson Education, New Delhi, 1st print, 2nd Edition, 2009
4. Erwin Kreyszig ,"Advanced Engineering Mathematics", Willey Eastern Ltd. Mumbai.
5. Michael Greenberg ,"Advanced Engineering Mathematics", Pearson, 2/e
6. Calculus by G. B. Thomas and R. L. Finney, Addison- Wesley, 1996

Mapping of Course outcome with Program Outcomes (Civil Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2						1			
CO2	1								1			
CO3	1								2			
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Mechanical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1		1		2	3				
CO2	1		2		2	3				
CO3	1		3		3	3				
CO4										
CO5										

Mapping of Course outcome with Program Outcomes (Electrical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	1													
CO2	1													
CO3	1													
CO4														
CO5														

Mapping of Course outcome with Program Outcomes (Electronics and Tele-communication Engg.)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3							3		3	
CO2	2	3							3		3	
CO3	2	3	3						3		3	
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Computer Science Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											3
CO2	1											3
CO3	1											3
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Information Technology)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1								3		
CO2	1	1								3		
CO3	1	1								3		
CO4												
CO5												

1 – High, 2 – Medium, 3 – Low

Assessment table:

Course outcomes	CO1				CO2				CO3				CO4				CO5			
Assessment Tool	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5
Class Test-I 15 Marks	**2**		**6**		**2**		**5**													
Class Test-II 15 Marks									**2**		**6**		**2**		**5**					
Teachers Assessment 10 Marks			**2**				**2**				**2**				**2**				**2**	
ESE Assessment 60 Marks			**6**	**6**			**6**	**6**			**6**	**6**			**6**	**6**			**6**	**6**

Teaching Strategies:

The teaching strategy includes lectures, assignments, and home works. Exercises are assigned weekly to stimulate the students to actively use and revise the learned concepts, which also help the students to express their way of solving the problems fluently in written form.

Teacher's Assessment: Teacher's assessment of 10 marks is based on the following.

1) Home assignments
2) Surprise tests with multiple choice questions

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	Test1	Test2	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	04	04	00	00
K2	Understand	00	00	00	00
K3	Apply	11	11	10	30
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	30
K6	Create	00	00	00	00
Total		15	15	10	60

MA 3002: Statistical Methods Semester-IV	
Teaching Scheme **Lectures: 3 Hrs/Week** **Total Credits : 03**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Perquisites: Nil

Course description, aim, and objectives: Statistical Methods (MA 3002) is an Open Elective course for Third year Engineering students of the institute. The course aims to equip the students with statistical tools and concepts that help in decision-making.

Corse objectives:

1. Create interest in students in statistical thinking.
2. To understand, analyze, and solve problems on random variables statistics, significance testing and goodness of fit tests for probability distributions

Course Outcomes expected:

On completion of this course student should be able to:

CO1	Demonstrate an understanding of the basic concepts of probability distributions and random variables.
CO2	Apply the regression techniques (least square method) and correlation techniques to the sample data. Compute and interpret the results of Bi-variate Regression and Correlation Analysis, for forecasting.
CO3	understand the concepts in estimation theory and estimate population parameters of large or small size sample
CO4	make decisions about population and population parameters
CO5	to apply non-parametric tests for significance testing and goodness of fit of the probability distribution

Detailed Syllabus:

Unit-I	**Random variables statistics** Discrete and Continuous random variables, Expectation and variance of random variables, moments and moment generating functions, , functions of random variables, statistic parameters of Binomial, Poisson, Normal distributions.	**06Hrs**
Unit-II	**Correlation and Regression** Correlation Techniques, Karl-Pearson's Coefficient of Correlation, Bivariate Correlation, Probable Error, Coefficient of Determination, Coefficient of Non-determination, Coefficient of Alienation ,Regression Analysis: Lines of regression, Least square method, Coefficient of Regression , Relation between Correlation and Regression	**06 Hrs**
Unit-III	**Sampling and estimation theories:** The central limit theorem , t-distribution, F-distribution , χ^2 distribution,The sampling distribution of the means , The estimation of population parameters based on a large , sample size ,Estimating the mean of a population based on a small sample size	**06 Hrs**
Unit-IV	**Significance Testing:** Statistical hypotheses ,Significance tests for population means (a) When the , Standard Deviation of the population is known (b) When The Standard Deviation of the population is not known ,Comparing two Sample Means (for Small Samples and Large Samples)	**06Hrs**
Unit-V	**Chi-square and distribution-free tests** Chi-square test , Fitting data to theoretical distributions ,Test the goodness of fit , Introduction to distribution-free tests: Sign test ,Wilcoxon Signed-rank test and Mann-Whitney test	**06 hrs**

Text Books :

1. H.C.Saxena,J.N.Kappor,Mathematical Statistics,S.Chand & Sons,2 nd edition
2. Ronald E, Walpole, Sharon L. Myers, Keying Ye, Probability and Statistics for Engineers and Scientists (8th Edition), Pearson Prentice Hall, 2007
3. Devore, J.L., "Probability and Statistics for Engineering and the Sciences", Thomson
4. Milton, J. S. and Arnold, J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, New Delhi, 4th Edition, 3rd Reprint, 2008.
5. Johnson, R.A. and Gupta, C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2011
6. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", Elsevier, New Delhi, 3rd Edition, 2004.

Reference Books :

1. Douglas C. Montgomery, Design and Analysis of Experiments (7th Edition), Wiley Student Edition, 2009.
2. S. P. Gupta, Statistical Methods, S. Chand & Sons, 37th revised edition, 2008
3. William W. Hines, Douglas C. Montgomery, David M. Goldsman, Probability and Statistics for Engineering, (4th Edition), Willey Student edition, 2006.

Mapping of Course outcome with Program Outcomes (Civil Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2						1			
CO2	1								1			
CO3	1								2			
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Mechanical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1		1		2	3				
CO2	1		2		2	3				
CO3	1		3		3	3				
CO4										
CO5										

Mapping of Course outcome with Program Outcomes (Electrical Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
CO1	1													
CO2	1													
CO3	1													
CO4														
CO5														

Mapping of Course outcome with Program Outcomes (Electronics and Tele-communication Engg.)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3							3		3	
CO2	2	3							3		3	
CO3	2	3	3						3		3	
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Computer Science Engineering)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											3
CO2	1											3
CO3	1											3
CO4												
CO5												

Mapping of Course outcome with Program Outcomes (Information Technology)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1								3		
CO2	1	1								3		
CO3	1	1								3		
CO4												
CO5												

1 – High, 2 – Medium, 3 – Low

Assessment table:

Course outcomes	CO1				CO2				CO3				CO4				CO5			
Assessment Tool	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5	K1	K2	K3	K5
Class Test-I 15 Marks	**2**	**2**	**0**	**4**	**0**	**0**	**3**	**4**												
Class Test-II 15 Marks									**2**		**3**	**3**	**1**		**3**	**3**				
Teachers Assessment 10 Marks	**1**	**1**			**1**	**1**			**1**	**1**			**1**	**1**			**1**	**1**		
ESE Assessment 60 Marks	**2**	**2**		**8**	**2**	**2**		**8**	**2**	**2**		**8**			**6**	**6**			**6**	**6**

Teaching Strategies:

The teaching strategy is planed through the lectures, and team based home works. Exercises are assigned weekly to stimulate the students to actively use and revise the learned concepts which also help the students to express their way of solving the problems fluently in written form. Most critical concepts and mistakes are emphasized

Teacher's Assessment: Teacher's assessment of 10 marks is based on the following.

1) Home assignments
2) Surprise tests with multiple choice questions

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	Test1	Test2	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	02	03	05	06
K2	Understand	02	00	05	06
K3	Apply	03	06	00	12
K4	Analyze	00	00	00	00
K5	Evaluate	08	06	00	36
K6	Create	00	00	00	00
Total		15	15	10	60