MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF MATHEMATICS

Course Title	**Mathematics for Electrical and Electronics Engineering stream-1**		
Course Code	22MATE11	**(L-T-P)C**	(3-1-2-4)
SEE duration	3 hour	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	PO1	PO2
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals, Counting principle, bayes theorem on probability.	3	-
CO2	Inspect the maximumoutput of a function (experimental data), analyze the region of integration connected with multiple integrals so as to determine the area, volume.	3	2
CO3	Apply the numerical methods to compute: The area of a region, root (input) of an equation for the given output, missing input, or output of the given experimental data (interpolation/extrapolation).	3	-
CO4	Model the real-life problems/engineering application problems and solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability. Statement of Taylor's theorem, Taylor series for a function of one variable - Illustrative examples.

Partial Differentiation: Definition of Partial derivative,Physical and geometrical interpretation of partial differentiation, and Illustrative examples, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor series.Extreme values of functions of two variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method,Newton-Raphson method,Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule. Illustrative examples from engineering field.

Self-learning topics: Quadrature formula,Inverse Lagrange's interpolation formula, central difference formula- Bessel's formula, to find the relation between the input and output of an experimental data using suitable interpolation formula.

MODULE –3	**10 Hrs.**

Multiple Integrals: Introduction to coordinate systems.Double integrals in Cartesian & Polar form, Application to find area and volume Evaluation of triple integrals in Cartesian , cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in EEE:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

Applications of Optimization (extremevalues of a single variable)- to find the peak current in an alternative circuits.

Applications of line integrals- forcing electrons together, To estimate the total amount of pollutant produced due to production of electricity by burning oil.. finding projectile height from its acceleration, initial velocity& initial position.

Application of root finding- ion concentration.

Counting principle - sum rule, product rule, permutation and combination, , review of probability-applications of Baye's theorem.

Self study—To express the experimental data interms of cubic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting), applications of differential calculus. **A**pplication of multiple integrals- Brief note on the applications connected with field and wave theory.

MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF MATHEMATICS

List of Programmes:

1. computation of roots using - bisection method , Newton Raphson method.
2. To compute the extreme values of a function of two variables.
3. Interpolation by- Newtons forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)
6. Solution of first order differential equation and plotting the graph.
7. Finding angle between polar curves & computing the curvature of a given curve.
8. Finding partial derivatives, Jacobians.
9. Computing area by line integral & double integral.
10. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

1.Proofs are not required for any theorems and properties.

2.There should not be any questions from self study part in semester End Examination.

Text Books :

.1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.

2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India P.v.t. Ltd. 8th Edition, (Wiley student edition) 2004.

3. Thomas Finney, Calculus, 9th edition, Pearson education, 2002

Reference Books:

1. R. K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age International p.v.t. Publishers, 6th edition, 2014.

2. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF MATHEMATICS

Course Title	**Mathematics for Computer Science Engineering stream -1**		
Course Code	22MATS11	**(L-T-P)C**	(3-1-2-4)
SEE duration	3 hours	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practical)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	PO1	PO2
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals, Counting principle, bayes theorem on probability	3	-
CO2	Inspect the maximumoutput of a function (experimental data), analyze the region of integration connected with multiple integrals so as to determine the area, volume.	3	2
CO3	Apply the numerical methods to compute: The area of a region, root (input) of an equation for the given output, missing input, or output of the given experimental data (interpolation/extrapolation).	3	-
CO4	Model the real-life problems/engineering application problems and solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability. Statement of Taylor's theorem, Taylor series for a function of one variable - Illustrative examples.

Partial Differentiation: Definition of Partial derivative,Physical and geometrical interpretation of partial differentiation, and Illustrative examples, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor series.Extreme values of functions of two

variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule. Illustrative examples from engineering field.

Self-learning topics: Quadrature formula,Inverse Lagrange's interpolation formula, central difference formula- Bessel's formula, to find the relation between the input and output of an experimental data using suitable interpolation formula.

MODULE –3	**10 Hrs.**

Multiple Integrals: Introduction to coordinate systems , Double integrals in Cartesian & Polar form, Application to find area and volume. Evaluation of triple integrals in Cartesian, cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in Computer science engineering:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

Extremevalues of a single variable- cost and revenue.

Application of numerical integration- general applications connected with business cost and revenue.

Counting principle - sum rule, product rule, permutation and combination, review of probability- applications of Baye's theorem.

Self study—To express the experimental data interms of cubic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting), applications of differential calculus and integral calculus.

MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF MATHEMATICS

List of Programmes:

1. computation of roots using - bisection method , Newton Raphson method.
2. To compute the extreme values of a function of two variables.
3. Interpolation by- Newtons forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)
6. Solution of first order differential equation and plotting the graph.
7. Finding angle between polar curves & computing the curvature of a given curve.
8. Finding partial derivatives, Jacobians.
9. Computing area by line integral & double integral.
10. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

1.Proofs are not required for any theorems and properties.

2.There should not be any questions from self study part in semester End Examination.

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1.Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.

2.Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India P.v.t. Ltd. 8th Edition, (Wiley student edition) 2004.

3.Thomas Finney, Calculus, 9th edition, Pearson education, 2002

Discrete mathematics by J.K. sharma.

Reference Books:

1.R. K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age International p.v.t. Publishers, 6th edition, 2014.

2.N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF MATHEMATICS

Course Title	**Mathematics for Civil Engineering-1**		
Course Code	22MATC11	**(L-T-P)C**	(3-1-2-4)
SEE duration	3 hours	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.
Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	PO1	PO2
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals.	3	-
CO2	Inspect the maximumoutput of a function (experimental data), analyze the regionof integration connected with multiple integrals so as to determine the area, volume.	3	2
CO3	Apply the numerical methods to compute: The area of a region, root of an equation , missing input, or output of the given experimental data (interpolation/extrapolation).	3	-
CO4	Model thereal-lifeproblems/engineering application problems and solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability, Statement of Taylor's theorem, Taylor's series for a function of one variable - Illustrative examples.

Partial Differentiation: Definition of Partial derivative,Physical and geometrical interpretation of partial differentiationand Illustrative examples, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor's series.Extreme values of functions of two variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin's series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule. Illustrative examples from engineering field.

Self-learning topics: Quadrature formula,Inverse Lagrange's interpolation formula, central difference formula- Bessel's formula, to find the relation between the input and output of an experimental data using suitable interpolation formula.

MODULE –3	**10 Hrs.**

Multiple Integrals: Introduction to coordinate systems.Double integrals in Cartesian & Polar form, Application to find area and volume. Evaluation of triple integrals in Cartesian , cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in Civil engineering:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

Applications of Optimization (extremevalues of a single variable)- stiffness of a beam, strength of a beam.

Applications of line integrals- finding projectile height from its acceleration, initial velocity and initial position.

Applications of numerical integration- estimation of discharge in a stream – an application to hydrology, estimation of discharge in a stream – an application to surveying.

Applications of multiple integrals- to find mass and moment for the thin plate covering the region in the xy plane.

Self study- Mass and moment for the object in space, moment of inertia of a circle about its diametrical axis- an application to engineering Mechanics, computation of deflection of beams using double integral. application of arc length-application to make sheets of corrugated iron

roofing.

application of total derivative- controlling sag in an uniformly loaded beam , Application of line integrals- moment, mass and center of mass of a thin rod.

List of Programes:

11. computation of roots using - bisection method , Newton Raphson method.

12. To compute the extreme values of a function of two variables.

13. Interpolation by- Newtons forward & Lagrange's interpolation formula.

14. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)

15. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)

16. Solution of first order differential equation and plotting the graph.

17. Finding angle between polar curves & computing the curvature of a given curve.

18. Finding partial derivatives, Jacobians.

19. Computing area by line integral & double integral.

20. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

1. Proofs are not required for any theorems and properties.
2. There should not be any questions from self study part in semester End Examination.

Text Books :

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3.Thomas Finney, Calculus, 9th edition, Pearson education, 2002

Reference Books:

1.R. K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age International p.v.t. Publishers, 6th edition, 2014.

2.N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF MATHEMATICS

Course Title	**Mathematics for Mechanical Engineering -1**		
Course Code	22MATM11	**(L-T-P)C**	(3-1-2-4)
SEE duration	3 hourS	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	PO1	PO2
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals.	3	-
CO2	Inspect the maximumoutput of a function (experimental data), analyze the region of integration connected with multiple integrals so as to determine the area, volume.	3	2
CO3	Apply the numerical methods to compute: The area of a region, root (input) of an equation for the given output, missing input, or output of the given experimental data (interpolation/extrapolation).	3	-
CO4	Model the real-life problems/engineering application problems and solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability. Statement of Taylor's theorem, Taylor series for a function of one variable - Illustrative examples.

Partial Differentiation: Definition of Partial derivative,Physical and geometrical interpretation of partial differentiation, and Illustrative examples, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor series.Extreme values of functions of two

variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule. Illustrative examples from engineering field.

Self-learning topics: Quadrature formula,Inverse Lagrange'sinterpolation formula,central difference formula- Bessel's formula, to find the relation between the input and output of an experimental data using suitable interpolation formula.

MODULE –3	**10 Hrs.**

Multiple Integrals: Introduction to coordinate systems.Double integrals in Cartesian & Polar form, Application to find area and volume Evaluation of triple integrals in Cartesian , cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in mechanical engineering:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

Applications of Optimization (extremevalues of a single variable)- stiffness of a beam, strength of a beam, product design, metal fabrication.

Applications of line integrals- finding projectile height from its accelaration, initial velocity& initial position. Amount of work required to put a satellite in an orbit.

Applications of numerical integration- to estimate the total quantity of oil that has escaped after leakage. To estimate the length of the tank in a design of an airoplane wich has a constantan cross sectional area in each wing.

Application to find root in order to locate submarine.

Application of multiple integrals- to find mass and moment for the thin plate covering the region in the xy plane. Computation of deflection of beams using double integral.

Self study:mass and moment for the object in space, moment of inertia of a circle about its diametrical axis- an application to engineering Mechanics, computation of deflection of beams using double integral..application of total deravitive- controlling sag in an uniformly loaded beam , Application of line integrals- moment, mass and center of mass of a thin rod.work and kinetic energy, work required in pumping the liquid from containers.

List of Programmes:

1. computation of roots using - bisection method , Newton Raphson method.
2. To compute the extreme values of a function of two variables.
3. Interpolation by- Newtons forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)
6. Solution of first order differential equation and plotting the graph.
7. Finding angle between polar curves & computing the curvature of a given curve.
8. Finding partial derivatives, Jacobians.
9. Computing area by line integral & double integral.
10. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

1.Proofs are not required for any theorems and properties.

2.There should not be any questions from self study part in semester End Examination.

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2.Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India P.v.t. Ltd. 8th Edition, (Wiley student edition) 2004.

3.Thomas Finney, Calculus, 9th edition, Pearson education, 2002

Reference Books:

1.R. K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age International p.v.t. Publishers, 6th edition, 2014.

2.N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF MATHEMATICS

Linear Algebra and Integral Transforms

(Common to all Branches of Engineering)

Course Code: 21MA301 **L-T-P-C-2-1-0-3**
Exam Hours: 3 **SEE: 50 Marks**
Lecture Hours-28 **Tutorial Hours-28**

Course Objective:
To introduce linear algebra and transform calculus which may be employed as tools in solving engineering application problems.

Course Outcomes:
At the end of the course students will be able to:

COs	Outcomes	PO1	PO2
CO1	Utilise the concept of consistency of system of equations to solve the engineering application problems and compute the number of linearly independent vectors.	3	2
CO2	Examine for the existence of diagonalization of matrix, find the suitable matrix of transformations so as to get the required image and analyze the system of equations to compute the number of linearly independent Eigen vectors.	3	2
CO3	Apply Laplace transform on simple functions and compute Fourier series of periodic functions.	3	-
CO4	Examine for adopting different techniques of integration so as to compute Fourier series, Laplace transform of a given function.	3	2
CO5	Model the real life problems/engineering application problems and solve the same.	3	2

Course Contents

Module-1	**Linear Algebra:** Importance of Matrices in engineering. Rank of a matrix. Consistency of non homogeneous and homogeneous system of equations, Solution of the system of linear equations by Gauss elimination method and Gauss – Seidel iterative method. Special matrices-matrix of rotation, reflection, translation. To find the matrix of transformation when the image of some points is given. Applications of solution of system of equations to balance the chemical equations.	7 Hours

	Self Study-- Traffic flow problem, To find the suitable combination of food stuff so as to get the desired nutrients as prescribed by a dietician.	
Module–2	**Linear Algebra**: Eigen values and Eigen vectors, properties, Illustrative examples, applications-Stretching of an elastic membrane, to determine the growth of a population model. Role of eigen values, eigenvectors in determining natural frequency, mode shapes of equations of motions (Spring mass system). Diagonalization and powers of 3X3 matrices when Eigen values are already given. **Self Study--** Stability analysis of differential equations which governs the dynamical systems using the concept of eigen value, eigen vectors.	7 Hours
Module–3	**Fourier Series:** Periodic functions and their graphical representation, to find Fourier series by change of interval method, To represent the experimental data as a Fourier series using the method - Practical harmonic analysis. application of Fourier series in engineering-To represent the signal (wave form) in terms of Fourier series, Fourier series representation for the excitation described by the wave form, graphs of Fourier series approximating the given function. **Self Study--** Half range series method.	7 Hours
Module–4	**Laplace Transforms:** Introduction, Definition, Importance of Laplace transform in engineering applications, properties, Laplace transform of standard functions, Laplace transform of derivatives, Laplace transform of periodic functions, unit-step functions. **Inverse Laplace Transforms**: Definition and general properties, Convolution theorem – illustrative examples, Initial value problems. To solve Applications of initial value problems in engineering using Laplace transform **Self Study--** Unit impulse functions (Dirac – delta function). Application of Fourier series to Laplace equation, heat conduction.	7 Hours

Note - Theorems and properties without proof. Applicable to all the Modules.

Text Books:

1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.
2. Linear algebra by David c lay,3rd edition, Pearson education, 2002.

Reference Books:

1. R K Jain and S R K Iyengar, Advanced Engineering mathematics by Narosa publishers, 2nd edition, 2005.
2. Calculus by Thomas Finney, 9th edition, Pearson education, 2002.
3. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd. 8th Edition (Wiley student edition) 2004.

ACTIVITIES:

1. To represent sawtooth periodic motion of a follower operated by a Cam which rotates uniformly, in the form of Fourier series.
2. Application of Fourier series to Laplace equation, heat conduction.
3. Fourier series representation for the excitation described by the wave form,
4. Role of eigen values, eigenvectors in determining natural frequency, mode shapes of equations of motions (Spring mass system).
5. Lenovo input output method – application to balance the economy of a Country.

6. Applications of factorization of matrices-google recommendation.
7. Jordan canonical form when minimal polynomial and characteristic polynomial is given and its application in Engineering.
8. Diagonalize a matrix and determining the principal stresses.
9. Application of Laplace transformation.
10. Application of eigen value eigen vectors in data compression, Signature testing, Face recognition. Google page ranking.
11. Least square solution of system of equations- a matrix approach
12. Unit impulse functions (Dirac – delta function)- application.

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