Course Title	Mathematics-I for Computer Science Engineering stream		
Course Code	MAT6S11	(L-T-P)	(3-1-0)4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: To help students understand and apply numerical methods, calculus, and Laplace transforms to solve engineering problems and real-life applications.

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

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods, and Laplace transforms to solve mathematical and engineering problems.	PO1	-
CO2	Analyze polar curves, partial differentiation, numerical techniques, and Laplace transform methods to model and solve engineering problems of moderate complexity.	PO2	-
CO3	Develop mathematical models to analyze and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3	-

MODULE - 1	8 Hrs.

Polar coordinates: Introduction to polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Curvature – Path Smoothing in AI/ML, Curvature and Radius of Curvature -Applications in Robotics.

Self-Study: Radius of curvature in Cartesian form, Derivative of arc length.

MODULE - 2	11 Hrs.

Introduction to series expansion: Concepts of Differentiation, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Introduction to Partial derivative, Physical and geometrical interpretation of partial differentiation, Importance and properties of Jacobians, Extreme values for a function of two variables.

Applications - Optimization of Loss Function in Machine Learning, Variable Transformation for Data Scaling

Self-Study: Lagrange's method of undermined multipliers, Composite function, Relation between Cartesian coordinates and other coordinate systems.

MODULE - 3	11 Hrs.

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

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

Applications- Estimating vehicles passing through a Toll Booth, Energy consumption in a smart home, Estimating Rain water Collected.

Self-Study: Bisection method, Lagrange's interpolation formulae and Inverse Lagrange's interpolation formula, Secant method, Weddle's rule.

MODULE - 4	12 Hrs.

Laplace Transforms: Importance of Laplace transform in engineering applications, Laplace transform of standard functions

properties, Laplace transform of standard functions, Laplace transform- unit-step functions.

Inverse Laplace Transforms: Definition and general properties, Computation of the inverse by the method of partial fraction and completing square method, solution of differential equations.

Applications: Network Signal Processing, Robotics Control System.

Self-Study: Laplace Transforms - periodic functions, Unit-impulse function.

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

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2021
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2018
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	Reprint	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- **https://www.courseera.org/**
- **https://nptel.ac.in/courses/**

Teaching - Learning - Evaluation Scheme :

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)

Problem Solving Assignment	Problem selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report writing and submission	6
	Preparation of slide and presentation	7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	**Remarks**	**Marks**
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	**Hours**
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	**Program Outcomes [POs]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3				-								
CO2		3			-								
CO3		2	1		-								

Course Title	Mathematics-I for Civil Engineering		
Course Code	MAT6C11	(L-T-P)/C	(3-1-0)4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: Enable students to apply numerical methods to solve mathematical and engineering problems, analyze linear systems, and model real-life situations using appropriate mathematical techniques.

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

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods, and linear algebra to solve basic mathematical problems.	PO1	-
CO2	Apply polar curves, partial differentiation, numerical techniques, and linear algebra concepts to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyze and solve engineering application problems : Vehicle Dynamics on a Superelevated Curved Road, Stiffness of a beam, Soil Settlement Under a Foundation-Foundation Differential Settlement Analysis, discharge of the Stream, Rocket Launch Optimization and Traffic flow problems, Stretching of an elastic membrane, to determine the growth of a population model using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	8 Hrs.

Polar coordinates: Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Vehicle Dynamics on a Super elevated Curved Road, Stiffness of a beam

Self-Study: Radius of curvature in Cartesian form, Derivative of arc length,

MODULE - 2	11 Hrs.

DIFFERENTIAL CALCULUS: Definition of differentiability, Statement of Taylor's theorem, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation Evaluation of Jacobians. Extreme values for a functions of two variables.

Applications: Soil Settlement Under a Foundation-Foundation Differential Settlement Analysis

Self-Study: Lagrange's method of undermined multipliers, composite function, properties on Jacobians.

MODULE - 3	11 Hrs.

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

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Weddle's rule.

Applications -- discharge of the Stream, Rocket Launch Optimization

Self-Study: Secant method, Bisection method, Lagrange's interpolation formulae, Inverse Lagrange's interpolation formula.

MODULE - 4	**12 Hrs.**

Linear Algebra: Elementary row transformation of a matrix, Rank of the matrix, Consistency and solution of system of linear equations -Gauss Elimination method, Guass seidal method, Eigen values and Eigen vectors , Rayleigh power method .

Application - Traffic flow problems, Stretching of an elastic membrane, to determine the growth of a population model.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Stretching of an elastic membrane.

Note:

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

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8	Wiley India P.v.t. Ltd	2018
3	Linear Algebra and its Applications	Gilbert Strang	4	Cengage Publications	2022

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	Linear Algebra and its Applications	David C Lay	4	Pearson Publications	2018

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/
3. https://nptel.ac.in/courses/111106135
4. https://nptel.ac.in/courses/111105160

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus
3. https://nptel.ac.in/courses/111104092

Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial component	2	14	28
3	Student Study Hours–Self Learning	1	14	14
4	Activity Based Learning	-	-	29
5	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity based learning(29)				
Problem Solving Assignment		Problem selection		4
		Formulate the methodology		6
		Solving the problem		6
		Report writing and submission		6
		Preparation of slide and presentation		7

Proposed Assessment Plan (for50marksofCIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted ● Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1and 2)	3
Activity	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3				-								
CO2		3			-								
CO3		2	1		-								

Course Title	Mathematics-I for Mechanical Engineering Stream		
Course Code	MAT6M11	**(L-T-P)/C**	(3-1-0)/4
Exam	3hours	**Hours / Week**	06
SEE	50 Marks	**Total Hours**	42L+14SL+28T+36ABL=120

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

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

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods and linear algebra to solve mathematical problems.	PO1	-
CO2	Analyse polar curves, partial differentiation, numerical techniques, and algebraic techniques to solve engineering problems of moderate complexity.	PO2	-
CO3	Develop mathematical models to analyse and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	**8 Hrs.**

Polar coordinates: Introduction to polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Vehicle Dynamics on a Super elevated Curved Road, Design of a Smooth Pipe Junction.

Self-Study: Radius of curvature in Cartesian form, Derivative of arc length.

MODULE - 2	**11 Hrs.**

Introduction to series expansion: Concepts of Differentiation, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, Importance and properties of Jacobians, Extreme values for a function of two variables.

Applications - Mechanical Design Application - Optimization of Material for an Open-Top Box, Designing a Cylindrical Oil Tank with Minimum Material

Self-Study: Lagrange's method of undermined multipliers, Composite function, Relation between Cartesian coordinates and other coordinate systems

MODULE - 3	**11 Hrs.**

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

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Weddle's rule.

Applications - Discharge of the Stream, Pressure Distribution on a Curved Turbine Blade

Self-Study: Bisection method, Lagrange's interpolation formulae and Inverse Lagrange's interpolation formula, Secant method.

MODULE - 4	**12 Hrs.**

Linear Algebra: Elementary row transformation of a matrix, Rank of the matrix, Consistency of system of linear equations. Solution of system of linear equations - Gauss elimination method, Gauss-Seidel method. Linear dependent and independent vectors using rank concept.

Application - Formulation and solution of diet-related linear programming problems involving nutrient constraints and minimum cost optimization, Traffic flow problem, Application of mathematical and statistical models for forecasting rainfall using historical weather data.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Stretching of an elastic membrane.

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.

Prescribed Text Books:

Sl .No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8 (Wiley student edition)	Wiley India P.v.t. Ltd	2018
3.	Linear Algebra and its Applications	Gilbert Strang	4	Cengage Publications	2022

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2.	Linear Algebra and its Applications	David C Lay	4	Pearson Publications	2018
3.	Engineering Mathematics	B. S. Grewal	2	Khanna Publishers	2024

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/

3. https://nptel.ac.in/courses/111106135
4. https://nptel.ac.in/courses/111105160

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus

Teaching - Learning - Evaluation Scheme :

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)		
Problem Solving Assignment	Problem selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report writing and submission	6
	Preparation of slide and presentation	7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										

Course Title	Mathematics-I for Electronics & Communication Engineering stream		
Course Code	MAT6EC11	(L-T-P) / C	(3-1-0) /4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

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	POs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods, and multiple integrals to solve basic mathematical problems.	PO1
CO2	Apply polar curves, partial differentiation, numerical techniques, and multiple integration to solve engineering problems of moderate complexity.	PO2
CO3	Analyze and solve engineering application problems involving antenna radiation, current flow, beam analysis, signal power distribution, and communication systems using appropriate mathematical techniques.	PO2, PO3

MODULE - 1	8 Hrs.

Polar coordinates: Introduction to polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Antenna Radiation Pattern (Polar Curve), Current Flow Path (Curvature).

Self-Study: Radius of curvature-Cartesian form, Derivative of arc-length.

MODULE - 2	11 Hrs.

Introduction to series expansion: Concepts of Differentiation, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, Importance and properties of Jacobians, Extreme values for a functions of two variables.

Applications: Application of total derivative- controlling sag in a uniformly loaded beam.

Self-Study: Lagrange's method of undermined multipliers, composite function.

MODULE - 3	11 Hrs.

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

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

Applications: Application of root finding- ion concentration.

Self-Study: Bisection method, Lagrange's interpolation formulae and Inverse Lagrange's interpolation formula, Secant method.

MODULE - 4	**12 Hrs.**

Multiple Integrals: Evaluation of double and triple integrals, change of order of integration, Areas and volume using double integration.

Beta and Gamma functions: Definitions, properties of Beta and Gamma functions.

Application: Signal Power Distribution in an Antenna, Microwave Signal Energy in a Communication Chamber.

Self-Study: Surface area using double integration, relation between Beta and Gamma functions.

NOTE

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

Prescribed Text Books

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2016
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2004
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition,	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics, ,	N.P. Bali and Manish Goyal	Reprint,	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- **https://www.courseera.org**
- **https://nptel.ac.in/courses**

Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning(ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity Based Learning (29)				Hours
Problem Solving Assignment	Problem Selection			4
	Formulate the methodology			6
	Solving the problem			6
	Report Writing & Submission			6
	Preparation of slide and presentation			7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Activity Based Learning	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1and 2)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**3**												
CO2		**3**											
CO3		**2**	**1**										

Course Title	Mathematics-I for Electrical and Electronics Engineering		
Course Code	MAT6EE11	(L-T-P) / C	(3-1-0) /4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL= 120

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	POs	PSOs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods, and statistics to solve basic mathematical problems.	PO1	-
CO2	Apply polar curves, partial differentiation, numerical techniques, and probability concepts to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyze and solve engineering application problems involving antenna radiation, current flow, ion concentration, and experimental data analysis using appropriate mathematical techniques.	PO2, PO3	-

MODULE - 1	8 Hrs.

Polar coordinates: Introduction to polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Antenna Radiation Pattern (Polar Curve), Current Flow Path (Curvature).

Self Study: Radius of curvature in Cartesian form, Derivative of arc length.

MODULE - 2	11 Hrs.

Introduction to series expansion: Concepts of Differentiation, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, Importance and properties of Jacobians, Extreme values for a functions of two variables.

Applications: Application of total derivative- controlling sag in a uniformly loaded beam.

Self Study: Lagrange's method of undermined multipliers, Composite function, Relation between Cartesian coordinates and other coordinate systems.

MODULE - 3	11 Hrs.

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

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

Applications - Application of root finding- ion concentration.

Self-Study: Bisection method, Lagrange's interpolation formulae and Inverse Lagrange's interpolation formula, Secant method.

MODULE - 4	**12 Hrs.**

Statistics: Curve fitting- Linear, Quadratic.

Random Variable: Introduction to Random variables, Discrete random variables, Binomial distribution and Poisson distribution.

Application - Experimental data analysis for probability applications in Electrical and Electronics Engineering: current load and component failure.

Self-Study - Probability and set notations, independent events.

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.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2016
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2004
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition,	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics, ,	N.P. Bali and Manish Goyal	Reprint,	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- **https://www.courseera.org/_**
- **https://nptel.ac.in/courses/___**

Teaching - Learning - Evaluation Scheme:

Proposed Assessment Plan (for 50 marks of CIE):

Tool	**Remarks**	**Marks**
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Activity Based Learning	20
Total		**50**

Evaluation of Learning Process (7Hours)

Sl. No	**Teaching and Learning Method**	**No. of Hours/ Week**	**No. of Weeks**	**Hours/ Semester**
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning(ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)		Hours
Problem Solving Assignment	Problem Selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report Writing & Submission	6
	Preparation of slide and presentation	7

Type of Evaluation	Hours
CIE (1and 2)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**3**												
CO2		**3**											
CO3		**2**	**1**										

Course Title	Mathematics-II for Computer Science Engineering stream		
Course Code	MAT6S21	(L-T-P)	(3-1-0)4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective To train the students to acquire knowledge in differential equations, vector calculus and curve fitting, so as to solve basic engineering application problems.

COs	Outcomes	POs
CO1	Apply the concepts of ordinary differential equations, numerical methods, and probability theory to solve mathematical and engineering problems.	PO1
CO2	Analyze differential equation models, numerical techniques for ordinary and partial differential equations, and probabilistic methods to solve engineering problems of moderate complexity.	PO2
CO3	Develop mathematical models to analyze and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3

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

MODULE - 1	10 Hrs.

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth,. carbon dating half-life period.

Self-study - Bernoulli's differential equation, Reducible to exact differential equations.

MODULE - 2	10 Hrs.

Linear differential equation with constant coefficients - Solutions of second-order and high order differential equations. Solution of non-homogenous differential equations for the combination of exponential, trigonometric and polynomial function. Method of variation of parameters.

Applications of second order, first degree Differential equations: - A Spring mass oscillations-Undamped free oscillations, damped free oscillations, forced oscillations with damping, forced oscillations without damping.

Self-study- Non- homogenous differential equations for the product of different standard forms, LDE with variable coefficients (Legendre's differential equations).

MODULE - 3	10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Euler's modified method, Runge-Kutta (RK) method of fourth order.

Numerical solution of Partial Differential Equations. Classification of PDE, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications: CPU load balancing in cloud systems, Data Transfer Rate Estimation.

Self-Study- Milne's Predictor-corrector method, Adam-Bash forth method.

MODULE - 4	12 Hrs.

Probability Theory: Basic concepts of Probability and its properties (concept only), Baye's theorem.

Random Variable: Introduction to Random variables, Discrete random variables, Binomial distribution and Poisson distribution.

Applications: Bayes' Theorem – in E-Commerce, Website Request Analysis.

Self-Study- Probability and set notations, independent events.

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.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8 (Wiley student edition)	Wiley India P.v.t. Ltd	2018
3	Calculus	Thomas Finney	9	Pearson education	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	A textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	Reprint	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- **https://www.courseera.org/_____**
- **https://nptel.ac.in/courses/_____**

Teaching - Learning - Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity Based Learning (29)				
Problem Solving Assignment		Problem selection		4
		Formulate the methodology		6
		Solving the problem		6
		Report writing and submission		6
		Preparation of slide and presentation		7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO5**	**PO 6**	**PO7**	**PO8**	**PO 9**	**PO10**	**PO11**	**PSO 1**	**PSO 2**
CO1	3				-								
CO2		3			-								
CO3		2	1		-								

Course Title	Mathematics-II for Civil Engineering		
Course Code	MAT6C21	(L-T-P)/C	(3-1-0)4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective To train the students to acquire knowledge in differential equations, vector calculus and curve fitting, so as to solve basic engineering application problems.

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

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of differential equations, numerical methods, vector calculus, and Statistics to solve basic mathematical problems.	PO1	-
CO2	Apply differential equations, numerical techniques, vector operations, and Statistics to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyze and solve engineering application problems involving population models, carbon dating half-life period, and Mechanical spring oscillation, Temperature Distribution in Concrete During Curing, Hydraulic Engineering Application-Reservoir Water Level Prediction, and Finding projectile height from its acceleration using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	9 Hrs.

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, carbon dating half-life period.

Self-study - Bernoulli's differential equation, Reducible to exact differential equations.

MODULE - 2	11 Hrs.

Linear differential equation with constant coefficients - Solutions of homogeneous equations. Particular solution of non-homogenous differential equations by inverse differential operator method for the following standard forms, exponential, polynomial, trigonometric. Method of variation of parameters to solve linear differential equation with constant coefficients.

Applications of second order, first degree Differential equations: - Mechanical spring oscillation-A Spring mass system $mu^{II}(t) + ku^{I}(t) + gu(t) = f(t)$, Undamped free vibrations, damped free vibrations, forced oscillations with damping, forced oscillations without damping.

Self-study- Particular solution of non- homogenous differential equations by inverse differential operator method for the product of standard forms, method of undetermined coefficients, LDE with variable coefficients (Legendre's differential equations. Mechanical system and transmission lines).

MODULE - 3	10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods, Euler's modified method.

Partial Differential Equations. Brief introduction to classification of PDE, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications: Temperature Distribution in Concrete During Curing, Hydraulic Engineering Application-Reservoir Water Level Prediction Using Milne's Predictor-Corrector Method. **Self-Study-** Adams-Bashforth method, Application connected with civil Engineering.	
MODULE - 4	**10 Hrs.**
Vector Calculus: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, Solenoidal and irrotational vector fields. **Statistics: curve fitting –** Linear and quadratic equation, Exponential distribution and Geometric transformation **Applications:** Finding projectile height from its acceleration. **Self-study:** Rank correlation**,** lines of regression.	
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.	

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8 (Wiley student edition)	Wiley India P.v.t. Ltd	2018
3	Probability and Statistics for Engineering and the Sciences	L. Devore	-	-	2022

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	Fundamentals of Statistics in Engineering	Srijib Bhusan Bagchi	-	-	2024

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus
3. https://nptel.ac.in/courses/111104092

Teaching - Learning - Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	3	14	42
2	Tutorial component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
4	Activity Based Learning (ABL)	-	-	29
5	Evaluation of Learning Process	-	-	07

Total Learning Hours/Semester		**120**
Activitybased learning (29)		
Problem Solving Assignment	Problem selection	4
	Formulate themethodology	6
	Solving the problem	6
	Report writing and submission	6
	Preparation of slide and presentation	7

ProposedAssessmentPlan(for50marksofCIE):

Tool	**Remarks**	**Marks**
CIE	Two CIEsconductedfor50 markseach and reduced to 15 marks	30
ActivityDetails	Detailsofactivitiestobeconducted 1) activity	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	**Hours**
CIE (1, 2 and 3)	3
Activity	1
Semester End Exam	3
Total	**7**

CourseArticulationMatrix

Course Outcomes	**ProgramOutcomes[POs]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3				-								
CO2		3			-								
CO3		2	1		-								

Course Title	Mathematics-II for Mechanical Engineering stream		
Course Code	MAT6M21	(L-T-P)/C	(3-1-0)/4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: To train the students to acquire knowledge in differential equations, numerical techniques and vector calculus so as to solve basic engineering application problems.

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

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of ordinary differential equations, numerical methods, vector analysis, and linear algebra to solve mathematical and engineering problems.	PO1	-
CO2	Analyze and solve engineering problems by employing differential equations, vector field concepts, numerical and algebraic techniques.	PO2	-
CO3	Develop mathematical models to analyze and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3	-

MODULE - 1	08 Hrs.

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, carbon dating half-life period.

Self-study - Bernoulli's differential equation, Reducible to exact differential equations.

MODULE - 2	11 Hrs.

Linear differential equation with constant coefficients - Solutions of second-order and high order differential equations. Solution of non-homogenous differential equations for the combination of exponential, trigonometric and polynomial function. Method of variation of parameters.

Applications of second order, first degree Differential equations: - A Spring mass oscillations-Undamped free oscillations, damped free oscillations, forced oscillations with damping, forced oscillations without damping.

Self-study- Non- homogenous differential equations for the product of different standard forms, LDE with variable coefficients (Legendre's differential equations).

MODULE - 3	11 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Euler's modified method, Runge-Kutta (RK) method of fourth order.

Numerical solution of Partial Differential Equations. Classification of PDE, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula

Applications: Engine component Cooling with Internal Heat Generation, vibration of a spring mass system.

Self-Study- Milne's Predictor-corrector method, Adam-Bash forth method.

MODULE - 4	**12 Hrs.**

Vector Calculus: Scalar and vector fields, Gradient, directional derivative, curl and divergence - Physical Interpretation, Solenoidal and Irrotational vector fields.

Linear Algebra: Eigen values and Eigen vectors, Diagonalization and Powers of matrices (3x3), Rayleigh power method.

Applications: Application of Gradient in Heat Flow Analysis, Air flow in an HVAC duct system and ideal fluid flow around an aircraft wing.

Self-study: LU Decomposition method

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.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
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Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	Fundamentals of Statistics in Engineering	Srijib Bhusan Bagchi	First Edition	Shroff Publishers & Distributors Pvt. Ltd	2024
3	A Text book of Engineering Mathematics	N.P.Bali and Manish Goya	10	Laxmi Publications	2022

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus
3. https://nptel.ac.in/courses/111104092Teaching - Learning - Evaluation Scheme:

Teaching - Learning - Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity Based Learning (29)				
Problem Solving Assignment		Problem selection		4
		Formulate the methodology		6
		Solving the problem		6
		Report writing and submission		6
		Preparation of slide and presentation		7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										

Course Title	Mathematics-II for Electronics & Communication Engineering stream		
Course Code	MAT6EC21	**(L-T-P) /C**	(3-1-0) /4
Exam	3hours	**Hours / Week**	04
SEE	50 Marks	**Total Hours**	42L+14SL+28T+36ABL=120

Course Objective: To train the students to acquire knowledge in differential equations and vector calculus, so as to solve basic engineering application problems.

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

COs	Outcomes	POs	PSOs
CO1	Apply fundamental concepts of differential equations, linear algebra, numerical methods, vector calculus, and Laplace transforms to solve basic mathematical problems.	PO1	-
CO2	Apply differential equations, matrix methods, numerical techniques, vector operations, and Laplace transforms to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyze and solve application-oriented engineering problems involving electrical circuits, network analysis, fluid flow, electrostatics, and delayed systems using appropriate mathematical techniques.	PO2, PO3	-

MODULE - 1	**10 Hrs.**

Ordinary Differential Equations - first order first degree - Exact differential equations.

Linear differential equation with constant coefficients - Solutions of second-order and high order differential equations. Solution of non-homogenous differential equations for the combination of exponential, trigonometric and polynomial function.

Applications -Oscillatory Electrical circuit, LC circuit, LCR circuit, LC circuit with E.M.F, LCR circuit with E.M.F.

Self-study - Bernoulli's differential equation, Non- homogenous differential equations for the product of different standard forms.

MODULE - 2	**10 Hrs.**

Linear Algebra: Elementary transformations of a matrix, Echelon form, rank of a matrix, consistency of system of linear equations. Gauss elimination and Gauss –Seidel method to solve system of linear equations. Eigen values and Eigen vectors of a matrix, Rayleigh's power method to determine the dominant Eigen value and corresponding Eigen vector of a matrix.

Applications: Network flow analysis.

Self-Study- Linear transformation, Diagonalization and powers of matrices when Eigen values are already given.

MODULE - 3	**10 Hrs.**

Numerical solution of first order, first degree ODE: Taylor's series method, Euler's modified method, Runge-Kutta (RK) method of fourth order. **Vector Differentiation:** Introduction to vectors, Velocity & acceleration, Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and Irrotational vector fields. Problems. **Applications -**Conservation of laws (Fluid flow- Divergence), Analysis of streamlines and electric potentials (Electrostatics). **Self-Study- Vector Integration**: Line integrals and problems. Adams-Bashforth method, Vector Integration - Surface integrals.

MODULE - 4	**12 Hrs.**
Laplace Transforms: Importance of Laplace transform in engineering applications, Laplace transform of standard functions properties, Laplace transform of standard functions, Laplace transform- unit-step functions. **Inverse Laplace Transforms:** Definition and general properties, Computation of the inverse by the method of partial fraction, solution of differential equations by using Laplace Transforms. **Applications-**Network packet transmission with delayed start, Dual-phase CPU cooling system with delayed control response. **Self-Study-** Laplace transform of periodic functions, Unit impulse functions (Dirac – delta function), Inverse Laplace transform by the completing square method.	

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.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2016
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2004
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition,	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics,	N.P. Bali and Manish Goyal	Reprint,	Laxmi Publications	2010

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- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- **https://www.courseera.org/**
- **https://nptel.ac.in/courses/**

Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning(ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity Based Learning (29)				Hours
Problem Solving Assignment		Problem Selection		4
		Formulate the methodology		6
		Solving the problem		6
		Report Writing & Submission		6
		Preparation of slide and presentation		7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Activity Based Learning	20
Total		**50**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	**Hours**
CIE (1and 2)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	**Program Outcomes[POs]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**3**												
CO2		**3**											
CO3		**2**	**1**										

Course Title	Mathematics-II for Electrical and Electronics Engineering		
Course Code	MAT6EE21	(L-T-P) /C	(3-1-0) /4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: To train the students to acquire knowledge in differential equations and vector calculus, so as to solve basic engineering application problems.

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

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of differential equations, numerical methods, vector calculus, and Laplace transforms to solve basic mathematical problems.	PO1	-
CO2	Apply differential equations, numerical techniques, vector operations, and Laplace transforms to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyse and solve engineering application problems involving population models, electrical circuits, fluid flow, electrostatics, and delayed systems using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	10 Hrs.

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, Carbon dating half-life period.

Self-study - **Bernoulli's** differential equation, Reducible to exact differential equations.

MODULE - 2	10 Hrs.

Linear differential equation with constant coefficients - Solutions of second-order and high order differential equations. Solution of non-homogenous differential equations for the combination of exponential, trigonometric and polynomial function. Method of variation of parameters.

Applications of second order, first degree Differential equations -Oscillatory Electrical circuit, LC circuit, LCR circuit, LC circuit with E.M.F, LCR circuit with E.M.F, Electro-Mechanical Analogy.

Self-study - Non- homogenous differential equations for the product of different standard forms, LDE with variable coefficients (Legendre's differential equations).

MODULE - 3	10 Hrs.
Numerical solution of first order, first degree ODE: Taylor's series method, Euler's modified method, Runge-Kutta (RK) method of fourth order. **Vector Differentiation:** Introduction to vectors, Velocity & acceleration, Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and Irrotational vector fields, Problems. **Vector Integration**: Line integrals and problems. **Applications -**Conservation of laws (Fluid flow- Divergence), Analysis of streamlines and electric potentials (Electrostatics). **Self-Study-**Adams-Bashforth method, Vector Integration - Surface integrals.	
MODULE - 4	**10 Hrs.**
Laplace Transforms: Importance of Laplace transform in engineering applications, Laplace transform of standard functions properties, Laplace transform of standard functions, Laplace transform- unit-step functions. **Inverse Laplace Transforms:** Definition and general properties, Computation of the inverse by the method of partial fraction and completing square method, solution of differential equations by using Laplace Transforms. **Applications-**Network packet transmission with delayed start, Dual-phase CPU cooling system with delayed control response. **Self-Study-** Laplace transform of periodic functions, Unit impulse functions (Dirac – delta function).	
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.	

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2016
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2004
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition,	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics,	N.P. Bali and Manish Goyal	Reprint,	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
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Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning(ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity Based Learning (29)				Hours
Problem Solving Assignment		Problem Selection		4
		Formulate the methodology		6
		Solving the problem		6
		Report Writing & Submission		6
		Preparation of slide and presentation		7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Activity Based Learning	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1and 2)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**3**												
CO2		**3**											
CO3		**2**	**1**										