BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

BRIDGE COURSE MATHEMATICS-I
(Common to all branches)
(Effective from the academic year 2018-19)

Subject Code : UMA330M | **CIE Marks : 50**
Contact Hours/Week : 3L | **SEE Marks: 50**
Total Hours:40 | **Exam Hours : 03**
Semester : III | **Credits: Mandatory**

Course Learning Objectives: This course (**UMA330M**) will enable students to master the basic tools of calculus and vectors to become skilled for solving problems in science and engineering.

Differential Calculus: **15 Hours**

Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Taylor's and Maclaurin's series expansions for one variable (statements only)without proof. problems

Partial differentiation : Introduction to function of several variables, Partial derivatives; Euler's theorem - problems. Total derivatives-differentiation of composite functions. Jacobians-problems,

Integral Calculus: **15 Hours**

Reduction formula $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$ and $\int \sin^n x \cos^n x dx$. Evaluation of double and triple integrals. Area bounded by the curve.

Beta and Gamma functions: Definitions, Relation between beta and gamma functions-problems.

Vector Calculus: **10 Hours**

Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems

Text Books:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. Thomas' Calculus: Early Transcendentals, Single Variable (13th Edition)
2. Calculus: Early Transcendentals James Stewart
3. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
4. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
5. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
6. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.

Course Outcomes: On completion of this course, students are able to:

CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.

CO2: Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO3: Apply the concept of multiple integrals and their usage in computing the area and volumes.

CO4 : Apply the knowledge of vector calculus to solve the engineering problems

Question paper pattern for SEE

1. Total of eight questions uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--

BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

BRIDGE COURSE MATHEMATICS-II
(Common to all branches)
(Effective from the academic year 2018-19)

Subject Code : UMA430M	**CIE Marks : 50**
Contact Hours/Week : 03	**SEE Marks: 50**
Total Hours:40	**Exam Hours : 03**
Semester : IV	**Credits: Mandatory**

Course Learning Objectives: The purpose of the course **UMA430M** is to facilitate the students with concrete foundation of differential equations and Laplace transform to acquire the knowledge of these mathematical tools.

Ordinary differential equations of first order: **15 Hours**

Variable seperable,Homogeneous.Exact form and reducible to exact differential equations. Linear and Bernoulli's equation.

Differential Equations of higher order:

Second and higher order linear ODE's with constant coefficients-Inverse differential operator, method of variation of parameters(second order); Cauchy's and Legendre homogeneous equations.

Laplace Transform: **15 Hours**

Introduction, Definition of Laplace Transform, Laplace Transform of Elementary functions, Properties: Shifting, differentiation, Integral and division by t. Periodic function, Heaviside's Unit step function

Inverse Laplace transforms –

Properties. Convolution theorem. Solutions of linear differential equations

Partial Differential Equations(PDE's): **10 Hours**

Introduction to PDE : Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Solution of Lagrange's linear PDE, method of separation of variables,

Text Books:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. Thomas' Calculus: Early Transcendentals, Single Variable (13th Edition)
2. Calculus: Early Transcendentals James Stewart
3. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
4. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
5. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
6. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.

Course Outcomes: On completion of this course, students are able to:

CO1: Explain various physical models through first and higher order differential equations and solve such linear ordinary differential equations.

CO2: Apply the Laplace transform techniques to solve differential equations.

CO3: Understand a variety of partial differential equations and solution by exact methods.

CO4: solve PDE by direct integration and Solution of Lagrange's linear PDE, method of separation of variables

Question paper pattern for SEE

1. Total of eight questions uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	--	--	--	--	--	--	--	--

BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

MODEL COURSE PLAN

Title of Course	**:**	**Engineering Mathematics-I**	**Course Code**	**:**	**UMA161C**
Credits	**:**	**04(L-T-P: 3-2-0)**	**Contact Hours/ Week**	**:**	**03**
Total Hours	**:**	**40**	**Tutorial Hours**	**:**	**26**
CIE Marks	**:**	**50**	**SEE Marks**	**:**	**50**
Semester	**:**	**I**	**Year**	**:**	**2020-2021**

Prerequisites: Basics of differentiation**,** Integration and vector algebra.

Course Objectives: This course will enable students to

1	Enhance learning of Engineering Mathematics.
2	Develop, understanding, stimulate their interest, and increase their proficiency in Mathematics.
3	Visualizing and representations: learners can see abstract concepts; make connections between geometry and algebra.
4	Make our teaching modules more active and improve the learning outcomes of our students.
5	Learn Engineering Mathematics conceptually and relationally in order to be able to apply, when they have learned.
6	Create inquiry based learning and an opportunity to learn, practice.

Course Outcomes:

	At the end of the course the student should be able to:
1	Able to solve various Engineering problems analytically using concepts of polar curves, curvatures and Taylor's series.
2	Able to solve various Engineering / physical problems use concepts of partial differentiation, Method of Lagrange multipliers, error and approximations.
3	Apply the concepts of multiple integrals and their usage in computing the area and volumes.
4	Apply beta and gamma concepts to solve engineering problems.
5	Apply the knowledge of differentiation of vectors to solve the engineering problems.
6	Exhibit the interdependence of line, surface and volume integrals.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
No	**Programme Outcomes / Course Outcomes**															
The students will be able to:																
1	Able to solve various Engineering problems analytically using concepts of polar curves, curvatures and Taylor's series.	✓														
2	Able to solve various Engineering / physical problems use concepts of partial differentiation, Method of Lagrange multipliers, error and approximations.	✓	✓													
3	Apply the concepts of multiple integrals and their usage in computing the area and volumes.	✓														
4	Apply beta and gamma concepts to solve engineering problems.	✓	✓													
5	Apply the knowledge of vector calculus to solve the engineering problems.	✓														
6	Exhibit the interdependence of line, surface and volume integrals.	✓														

Course Content

Title of Course	**:**	**Engineering Mathematics-I**	**Course Code**	**:**	**UMA161C**
Credits	**:**	**04(L-T-P:3-2-0)**	**Contact Hours/ Week**	**:**	**03**
Total Hours	**:**	**40**	**Tutorial Hours**	**:**	**26**
CIE Marks	**:**	**50**	**SEE Marks**	**:**	**50**
Semester	**:**	**I**	**Year**	**:**	**2020-2021**

Content	**Hrs.(L+T)**
Unit - I	
Differential Calculus-1: Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian, parametric and polar forms (without proof) Taylor's and Maclaurin's series expansions for one variable (statements only) problems.	**10+06**
Unit – II	
Differential Calculus-2: Introduction to function of several variables, Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables and its applications; Method of Lagrange multipliers with one subsidiary condition, Jacobian-problems, Errors and approximations.	**10+08**
Unit – III	
Integral Calculus: Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals-change of order of integration and changing into polar, spherical and cylindrical co-ordinates. Applications to find area and volumes. Beta and Gamma functions: Definitions, relation between beta and gamma functions-problems.	**10+06**
Unit – IV	
Vector Calculus: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems Vector Integration: Line integrals, surface integrals and volume integrals. Green's theorem, Stoke's theorem, Gauss divergence theorem (without proof) - problems.	**10+06**

Note: L: Lecture and T: Tutorial

Text Books:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
- Dennis G Zill., Warren S Wright, Advanced Engineering Mathematics, 4th Edition, Jones & Bartlett India Pvt. Ltd, 2011.
- E. Kreyszing: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. Maurice D weir, Joel Hass and Frank R. Giordano, "Thomas calculus", Pearson, eleventh edition, 2011.
2. **Calculus:** Early Transcendentals James Stewart, Cengage Learning, 2017.
3. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Vector Analysis: Schaum's out line series by Spiegel Murray, McGraw Hill publishing Co.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	--	--	--	--	--	--	--	--

BASAVESHWAR ENGINEERING COLLEGE, BAGALKOTE

MODEL COURSE PLAN

Title of Course	**:**	**Engineering Mathematics-II**	**Course Code**	**:**	**UMA261C**
Credits	**:**	**04(L-T-P:3-2-0)**	**Contact Hours/ Week**	**:**	**05**
Total Hours	**:**	**40**	**Tutorial Hours**	**:**	**26**
CIE Marks	**:**	**50**	**SEE Marks**	**:**	**50**
Semester	**:**	**II**	**Year**	**:**	**2020-2021**

Prerequisites: Elementary Matrices and first order differential equations.

Course Objectives: This course will enable students to

1	Understand linear algebra and its applicability in different engineering fields.
2	strengthen the analytical abilities and basic mathematical skills of students for effective understanding of engineering subjects.
3	create and analyse mathematical models using higher order differential equations to solve application problems such as harmonic motion and circuits.
4	Introduce the basic concepts required to understand, construct, solve and interpret partial differential equations.
5	reduce a differential equation to an algebraic problem and apply Laplace transforms, inverse Laplace transforms and its applications.
6	give an ability to apply knowledge of mathematics on engineering problems.

Course Outcomes:

	At the end of the course the student should be able to:
1	Solve systems of linear equations with different methods in linear algebra.
2	Solve first order linear equations and nonlinear equations of certain types and interpret the solutions.
3	Solve second and higher order linear differential equations with constant coefficients.
4	Solve PDE by direct integration method, method of separation of variables and Lagrange's method.
5	Derive heat, wave equation and solve by the method of separation of variables.
6	Apply Laplace transforms and inverse transforms for standard functions and to solve differential equations.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O3
No	**Programme Outcomes / Course Outcomes**															
The students will be able to:																
1	Solve systems of linear equations with different methods from linear algebra	✓	✓													
2	Solve first order linear equations and nonlinear equations of certain types and interpret the solutions	✓	✓													
3	Solve second and higher order linear differential equations with constant coefficients	✓														
4	Solve PDE by direct integration method, method of separation of variables and Lagrange's method.	✓														
5	Derive heat and wave equation and solve by the method of separation of variables.	✓														
6	Apply Laplace transforms for solving differential equations.	✓	✓													

Course Content

Title of Course	:	Engineering Mathematics-II	Course Code	:	UMA261C
Credits	:	04(L-T-P:3-2-0)	Contact Hours/ Week	:	05
Total Hours	:	40	Tutorial Hours	:	26
CIE Marks	:	50	SEE Marks	:	50
Semester	:	II	Year	:	2020-2021

Content	Hrs.(L+T)
Unit - I	
Elementary Linear Algebra: Recap of Matrices: Rank of a matrix-echelon form. Solution of system of linear equations -consistency. Gauss-elimination method and Gauss-Seidel method. Eigen values and Eigen vectors. **Ordinary differential equations of first order:** Exact and reducible to exact differential equations. Linear and Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits.	**10+06**
Unit –II	
Differential Equations of higher order: Second and higher order linear ODE's with constant coefficients-Inverse differential operator, method of variation of parameters(second order); Cauchy's and Legendre homogeneous equations. **Applications**: Simple harmonic motion and LCR circuits.	**10+08**
Unit – III	
Partial Differential Equations(PDE's): Introduction to PDE: Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Solution of Lagrange's linear PDE, method of separation of variables, Derivation of one dimensional heat and wave equations and solutions by the method of separation of variables.	**10+06**
Unit – IV	
Laplace Transform:	**10+06**

Introduction, Definition of Laplace Transform, Laplace Transform of Elementary functions, Properties: Shifting, differentiation, Integral and division by t. Periodic function, Heaviside's Unit step function. **Inverse Laplace transforms:** Properties, Convolution theorem, Solutions of linear differential equations-Applications to Engineering problems.	

Text Books:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
- Dennis G Zill.,Warren S Wright, Advanced Engineering Mathematics, 4th Edition, Jones & Bartlett India Pvt. Ltd, 2011.
- E. Kreyszing: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. Maurice D weir, Joel Hass and Frank R. Giordano, "Thomas calculus", Pearson, eleventh edition, 2011.
2. **Calculus:** Early Transcendental SJames Stewart, Cengage Learning, 2017.
3. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Anton Bivens and Davis, "Calculus ", Wiley student edition, 7th edition, 2010.

Course Outcomes	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	--	--	--	--	--	--	--	--

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	**20**	**20**
CIE-II	**20**	**20**
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	**10**	**10**
SEE	**100**	**50**
Total	**150**	**100**

Question paper pattern for CIE-I and CIE-II:

1. Question paper consists Part-A and Part-B. Question number 1 is compulsory, it consists of short answer questions of 1 or 2 marks, covering Unit-I and Unit-II (no multiple choice questions and No true or false questions).
2. In Part-B, three questions are to be set as per the following table.

CIE	Number of questions /Maximum marks	Sub divisions	Unit
I	One question of 15 marks	Sub divisions shall not be mixed within the unit	Unit-I
	One question of 15 marks	Sub divisions shall not be mixed within the unit	Unit-II
	One question of 15 marks	Sub divisions shall be mixed from the unit-I and unit-II.	Unit-I &Unit-II
II	One question of 15 marks	Sub divisions shall not be mixed within the unit	Unit-III
	One question of 15 marks	Sub divisions shall not be mixed within the unit	Unit-IV
	One question of 15 marks	Sub divisions shall be mixed from the unit-I and unit-II.	Unit-III &Unit-IV

Question paper pattern for SEE:

1. Question paper consists Part-A and Part-B. Question number 1 is compulsory, it consists of short answer questions of 1 or 2 marks, covering entire syllabus (no multiple choice questions and No true or false questions, 50% of questions must be L3 and L4 level).
2. In Part-B total of eight questions with two from each unit; with internal choice to be set uniformly covering the entire syllabus.
3. Each question carries 20 marks and should not have more than four subdivisions.
4. In Part-B, any FOUR full questions are to be answered choosing at least one from each unit.
5. Sketches, figures and tables if any should be clearly drawn, as the same is scanned for printing.
6. The question paper should contain all the data / figures / marks allocated, with clarity.

Basaveshwar Engineering College, Bagalkote
B.E. III Semester Syllabus

Subject: Computational Methods for Biotechnology Subject code : UMA332C

3 Credits (3-0-0) Duration of SEE: 03 Hrs.
CIE: 50 Marks SEE: 50 Marks

Course Objectives:

To apply the knowledge of Mathematics in various engineering fields, students are able

- *To be acquired the knowledge about various methods of interpolation*
- *To be understand the numerical methods of solving algebraic, transcendental equations.*
- *It is very much essential to understand the basic concepts of numerical differentiation and numerical integration.*
- *To be understand the basic concepts of numerical solutions of ode and pde.*
- *To be understand the calculus of variations , as a systematic way of modeling and solving physical problems*

Course outcomes:

On the successful completion of this course, students are able

CO1: The ability to solve engineering problems using interpolation techniques.

CO2: The ability to solve problems using non-linear equations, numerical differention and integration.

CO3: Be capable to perform numerical solutions of ordinary differential equations.

CO4: It is essential to understand the basic concepts of numerical solutions of partial differential equations.

CO5: Very natural contexts for calculus of variations include engineering Mechanics and electromagnetism where we use the knowledge of the energy in the system.

Unit-I

Numerical Analysis I: **10 Hours**

Finite differences, forward, backward operators and Central difference – Sterling Central difference formula (no derivations on relations between operators). Newton-Gregory forward and backward interpolation formulae. (Without proof), Lagrange's and Newton's divided difference interpolation formulae (without proof).

Unit-II

Numerical Analysis II: **10 Hours**

Introduction to root finding problems: Bisection Method, Newton-Raphson method. Numerical differentiation using Newton's forward and backward formulae-problems, Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rule and Weddle's rule (no derivation of any formulae)-problems.

Unit-III

Numerical solutions of Differential Equations: **10 Hours**

Taylors Series Method, Euler's and Modified Euler's method, Runge-Kutta 4th order method, Milne's predictor and corrector method (problems only).Numerical solutions of one-dimensional heat and wave equations by explicit method, Laplace equation by using five point formula.

Unit-IV

Calculus of Variations **10 Hours**

Variation of a function and a functional, extremal of a functional, variational problems, Euler's equation, standard variational problems including geodesics, minimal surface of revolution, hanging chain and Brachistochrone problems.

Total: 40 Hours

Resources:

1. Numerical Methods for Engineers by Steven C Chapra & Raymond P Canale.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
3. Advanced Engineering Mathematics By H. K. Das, S. Chand & company Ltd. Ram Nagar, New Delhi.
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from entire syllabus.

w.e.f.2019-2020 : Following contents are approved in the BOS meeting held on 26th JUNE 2019

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

Basaveshwar Engineering College, Bagalkote
B.E. III Semester Syllabus

Subject: Computational Methods for Civil Engineering Subject code: UMA331C

3 Credits (3-0-0) Duration of SEE: 03 Hrs.
CIE: 50 Marks SEE: 50 Marks

Course Objectives:

To apply the knowledge of Mathematics in various engineering fields, students are able

- *To be understand the numerical methods of solving algebraic, transcendental equations.*
- *To be acquired the knowledge about various methods of interpolation*
- *It is very much essential to understand the basic concepts of numerical integration, numerical solutions of ode and pde*
- *To be understand concepts of Fourier series and Fourier transforms, because Fourier series is very powerful tool to solve ode and pde.*
- *To be understand the calculus of variations , as a systematic way of modeling and solving physical problems*

Course outcomes:

On the successful completion of this course, students are able

CO1: The ability to solve engineering problems using non-linear equations and interpolation techniques.

CO2: Be capable to perform numerical integration and solutions of differential equations.

CO3: Fourier analysis provides a set of mathematical tools which enable the engineer to break down a wave into its various frequency components. It is then possible predict the effect of a particular waveform.

CO4: It is essential to understand the basic concepts of Fourier transforms to solve ordinary differential equations and partial differential equations.

CO5: Very natural contexts for calculus of variations include engineering Mechanics and electromagnetism where we use the knowledge of the energy in the system.

Unit-I

Numerical Analysis-I: **10 Hours**

Introduction to root finding problems, Newton-Raphson method. Finite differences, forward and backward difference operators (no derivations on relations between operators) Newton-Gregory forward and backward interpolation formulae. (Without proof), Lagrange's and Newton's divided difference interpolation formulae (without proof) Numerical differentiation using Newton's forward and backward formulae-problems.

Unit-II

Numerical analysis-II: **10 Hours**

Numerical Integration: Simpson's one third rule, Simpson's three eighth rule (no derivation of any formulae)-problems. Numerical solution of ODE and PDE: Euler's and Modified Euler's method, Runge-Kutta 4^{th} order method, Numerical solutions of one-dimensional heat and wave equations by explicit method, Laplace equation by using five point formula.

Unit-III

Fourier series: **10 Hours**

Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous and functions having finite number of discontinuities, even and odd functions. Half-range series, practical harmonic analysis.

Unit-IV

Fourier transforms: **10 Hours**

Infinite Fourier transforms and inverse Fourier transforms- simple properties, Fourier sine and Fourier cosine transforms.

Calculus of Variations:

Variation of a function and a functional, extremal of a functional, variational problems, Euler's equation, standard variational problems including geodesics, minimal surface of revolution, hanging chain and Brachistochrone problems.

Total: 40 Hours

Resources:

1. Numerical Methods for Engineers by Steven C Chapra & Raymond P Canale.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
3. Advanced Engineering Mathematics By H. K. Das, S. Chand & company Ltd. Ram Nagar, New Delhi.
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from entire Syllabus.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

B.E. IV Semester Syllabus

UMA431C: Mathematical Methods for Civil Engineering

3 Credits (3-0-0) Duration of SEE: 03 Hrs. CIE: 50 Marks SEE: 50 Marks

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various Engineering fields by making them

- to form a specific relation for the given group of data using least square sense method.
- to specify probability is an area of study which involves predicting the relative likely hood of various outcomes.

Course outcomes:
On completion of this course, students are able
CO1: to apply the least square sense method to construct the specific relation for the given group of data.

CO2: to apply the concept of probability to find the physical significance of various distribution phenomena.

CO3: to apply the concept of probability to perform engineering duties in planning and designing, engines, machines and other mechanically functioning.

CO4: to apply the concept of probability to study the performance of Mechanical systems.

CO5: to apply the concept of Markov Chain for commercial and industry purpose.

Unit –I

Complex Variables: **10 Hours**

Analytic function, Cauchy-Reimann equations in Cartesian and polar forms. Construction of analytic function (Cartesian and polar forms)

Complex Integration:

Line integral, Cauchy's theorem – corollaries (without Proof), Cauchy's integral formula. Taylor's and Laurent's series (statements only), singularities, poles, calculation of residues, Cauchy's residue theorem (without proof) – problems.

Unit-II

Special Function: **10 Hours**

Series solution of Bessel's differential equation, recurrence formulae, generating function, orthogonal property, Bessel's integral formula.

Unit –III

Statistics and Probability **10 Hours**

Statistics: Curve fitting by the method of least squares: $y = a + bx$, $y = ab^x$ and $y = a + bx + cx^2$ Correlation and regression.

Probability: addition rule, conditional probability, multiplication rule, Baye's rule.

Unit –IV

Probability distributions: **10 Hours**

Binomial distributions Poisson distributions and Normal distributions(No drivations). Concept of joint probability, Joint distributions - discrete random variables, Independent random variables, Problems on expectation and variance.

Markov chains:

Markov chains: Introduction, Probability vectors, Stochastic Matrices, Fixed Points and Regular stochastic Matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states.

Total: 40 Hours

Resources:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.

2. Theory and problems of probability by Seymour Lipschutz (Schaum's Series).
3. Advanced Engineering Mathematics by H. K. Dass
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)
5. Probability and stochastic processes by Roy D. Yates and David J. Goodman, wiley India pvt.ltd 2nd edition 2012.
6. Advanced Engineering Mathematics by Peter V. O'Neil.

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from entire syllabus.

Course Outcomes	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

Basaveshwar Engineering College, Bagalkote
B.E. III Semester Syllabus

Subject: Computational Methods for Computer Science Subject code: UMA336C

3 Credits (3-0-0) CIE: 50 Marks
SEE: 50 Marks Duration of SEE: 03 Hrs.

Course Objectives:

To apply the knowledge of Mathematics in various engineering fields, students are able

- *To be understand the numerical methods of solving algebraic, transcendental equations.*
- *To be acquired the knowledge about various methods of interpolation*
- *It is very much essential to understand the basic concepts of numerical integration, numerical solutions of ode and pde*
- *To be understand concepts of Fourier series and Fourier transforms, because Fourier series is very powerful tool to solve ode and pde.*
- *To be understand the calculus of variations , as a systematic way of modeling and solving physical problems*

Course outcomes:

On the successful completion of this course, students are able

CO1: The ability to solve engineering problems using non-linear equations and interpolation techniques.

CO2: Be capable to perform numerical integration and solutions of differential equations.

CO3: Fourier analysis provides a set of mathematical tools which enable the engineer to break down a wave into its various frequency components. It is then possible predict the effect of a particular waveform.

CO4: It is essential to understand the basic concepts of Fourier transforms to solve ode and pde.

CO5: Very natural contexts for calculus of variations include engineering Mechanics and electromagnetism where we use the knowledge of the energy in the system.

UNIT-I

Numerical Analysis-I: **10 Hours**

Introduction to root finding problems, Newton-Raphson method Finite differences, forward and backward difference operators (no derivations on relations between operators). Newton-Gregory forward and backward interpolation formulae (without proof). Lagrange's and Newton's divided difference interpolation formulae (without proof). Numerical differentiation using Newton's forward and backward formulae-problems.

UNIT-II

Numerical Analysis- II: **10 Hours**

Numerical integration: Simpson's one third rule, Simpson's three eighth rule (no derivation of any formulae)-problems. Numerical solutions of ode and pde: Euler's and Modified Euler's method, Runge-Kutta 4^{th} order method .Numerical solutions of one-dimensional heat and wave equations by explicit method, Laplace equation by using standard five point formula.

UNIT-III

Fourier Series: **10Hours**

Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous and functions having finite number of discontinuities, even and odd functions. Half range series, Practical harmonic analysis.

UNIT-IV

Fourier transform : **10 Hours**

Infinite Fourier transforms and inverse Fourier transforms- simple properties, Fourier sine and Fourier cosine transforms.

Calculus of Variations:

Variation of a function and a functional, extremal of a functional, variational problems, Euler's equation, standard variational problems including geodesics, minimal surface of revolution, hanging chain and Brachistochrone problems.

Total 40 Hours

Resources:

1. Numerical Methods for Engineers by Steven C Chapra &Raymond P Canale.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
3. Advanced Engineering Mathematics By H. K. Das, S. Chand & company Ltd. Ram Nagar, New Delhi.
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question paper pattern for SEE

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from entire syllabus.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

Above contents approved in the BOS meeting held on 26.06.2019 for the academic year 2019-2020

W.e.f . 2019-2020

B.E. IV Semester Syllabus

Branch: Computer Science & Information Science

UMA436C: Statistics and Probability Theory

3 Credits (3-0-0) **Duration of SEE: 03 Hrs.** **CIE: 50 Marks** **SEE: 50 Marks**

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various Engineering fields by making them

- to form a specific relation for the given group of data using least square sense method.
- to specify probability is an area of study which involves predicting the relative likely hood of various outcomes.

Course outcomes:

On completion of this course, students are able

CO1: to apply the least square sense method to construct the specific relation for the given group of data.

CO2: to apply the concept of probability to find the physical significance of various distribution phenomena.

CO3: to apply the concept of probability to perform engineering duties in planning and designing, engines, machines and other mechanically functioning.

CO4: to apply the concept of probability to study the performance of Mechanical systems.

CO5: to apply the concept of Markov Chain for commercial and industry purpose.

UNIT-I

Statistics: **10 Hours**

Curve fitting by the method of least squares : $y = a + bx$, $y = ab^x$, $y = a + bx + cx^2$.

Correlation , expression for the rank correlation coefficient and regression.

UNIT –II

Probability: **10 Hours**

Probability: Addition rule, conditional probability, multiplication rule, Baye's rule. Discrete and continuous random variables-Probability density function, cumulative distribution function.

UNIT –III

Probability distributions: **10 Hours**

Binomial distribution, Poisson distribution and Normal distribution. Concept of joint probability, Joint distributions - discrete and continuous random variables, Independent random variables, problems on expectation and variance.

UNIT –IV

Markov chains: **10 Hours**

Markov chains: Introduction, Probability vectors, Stochastic Matrices, Fixed Points and Regular stochastic Matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states.

Total: 40 Hours

Resources:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
2. Theory and problems of probability by Seymour Lipschutz (Schaum's Series).
3. Advanced Engineering Mathematics by H. K. Dass
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)
5. Probability and stochastic processes by Roy D. Yates and David J. Goodman, wiley India pvt.ltd 2nd edition 2012.
6. Advanced Engineering Mathematics by Peter V. O'Neil.

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from entire syllabus.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--

CO5	3	2	--	--	---	--	--	--	--	--	--	--

Above contents approved in the BOS meeting held on 26.06.2019 for the academic year 2019-2020

w. e. f. 2019-20

Basaveshwar Engineering College, Bagalkote
B.E. III Semester Syllabus

Subject: Computational Methods for Electrical science Subject code: UMA335C

3 Credits (3-0-0) Duration of SEE: 03 Hrs.
CIE: 50 Marks SEE: 50 Marks

Course Objectives:

To apply the knowledge of Mathematics in various engineering fields, students are able

- *To be understand the numerical methods of solving algebraic, transcendental equations.*
- *To be acquired the knowledge about various methods of interpolation*
- *It is very much essential to understand the basic concepts of numerical differention, numerical integration and numerical solutions of ode.*
- *To be understand concepts of Fourier series, Fourier transforms, and z-transforms, because Fourier series is very powerful tool to solve ode and pde.*

Course outcomes:

On the successful completion of this course, students are able

CO1: The ability to solve engineering problems using non-linear equations and interpolation techniques.

CO2: The ability to solve problems using numerical differention and numerical integration.

CO3: Be capable to perform numerical solutions of ordinary differential equations.

CO4: Fourier analysis provides a set of mathematical tools which enable the engineer to break down a wave into its various frequency components. It is then possible predict the effect of a particular waveform.

CO5: It is essential to understand the basic concepts of Fourier transforms and z –transforms, to solve ode, pde and difference equations.

Unit-I

Numerical Analysis-I: **10 Hours**

Introduction to root finding problems, Bisection Method, Newton-Raphson method. Finite differences, forward and backward difference operators (no derivations on relations between operators) Newton-Gregory forward and backward interpolation formulae. (Without proof), Lagrange's and Newton's divided difference interpolation formulae (without proof).

Unit-II

Numerical Analysis-II: **10 Hours**

Numerical differentiation using Newton's forward and backward formulae-problems.Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rule and Weddle's rule (no derivation of any formulae)-problems. Euler's and Modified Euler's method, Runge-Kutta 4^{th} order method.

Unit-III

Fourier Series: **10 Hours**

Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous and functions having finite number of discontinuities, even and odd functions. Half-range series, practical harmonic analysis.

Unit-IV

Fourier transforms and z-transforms: **10 Hours**

Infinite Fourier transforms and inverse Fourier transforms- simple properties, Fourier sine and Fourier cosine transforms, Inverse Fourier sine and cosine transforms. Z-transforms-definition, standard forms, linearity property, damping rule, shifting rule-problems.

Total: 40 Hours

Resources:

1. Numerical Methods for Engineers by Steven C Chapra&Raymond P Canale.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
3. Advanced Engineering Mathematics By H. K. Das, S. Chand & company Ltd. Ram Nagar, New Delhi.
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from **entire** syllabus.

w. e. f. 2019-20

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

B.E.IV semester Syllabus

Branch: EC, EE & EI

UMA435C: Statistical methods for Electrical science

3 Credits (3-0-0) Duration of SEE: 03 Hrs. CIE: 50 Marks SEE: 50 Marks

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various Engineering fields by making them

- to form a specific relation for the given group of data using least square sense method.
- to specify probability is an area of study which involves predicting the relative likely hood of various outcomes.

Course outcomes:

On completion of this course, students are able

CO1: to apply the least square sense method to construct the specific relation for the given group of data.

CO2: to apply the concept of probability to find the physical significance of various distribution phenomena.

CO3: to apply the concept of probability to perform engineering duties in planning and designing, engines, machines and other mechanically functioning.

CO4: to apply the concept of probability to study the performance of Mechanical systems.

CO5: to apply the concept of Markov Chain for commercial and industry purpose.

Unit –I

Statistics: **10 Hours**

Curve fitting by the method of least squares: $y = a + bx$, $y = ab^x$, $y = a + bx + cx^2$ Correlation, expression for the rank correlation coefficient and regression.

Unit –II

Probability: **10 hours**

Probability: addition rule, conditional probability, multiplication rule, Baye's rule. Discrete and continuous random variables-Probability density function, Cumulative distribution function,

Unit –III

Probability distributions: **10 Hours**

Binomial distributions Poisson distributions and Normal distributions. Concept of joint probability, Joint distributions - discrete and continuous random variables, Independent random variables, Problems on expectation and variance.

Unit –IV

Markov chains: **10 Hours**

Markov chains: Introduction, Probability vectors, Stochastic Matrices, Fixed Points and Regular stochastic Matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states.

Total: 40 Hours

Resources:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.

2. Theory and problems of probability by Seymour Lipschutz (Schaum's Series).
3. Advanced Engineering Mathematics by H. K. Dass
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)
5. Probability and stochastic processes by Roy D. Yates and David J. Goodman, wiley India pvt.ltd 2nd edition 2012.
6. Advanced Engineering Mathematics by Peter V. O'Neil.

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks:

Ten objective type questions can be prepared from entire syllabus.

Course Outcomes	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

Basaveshwar Engineering College, Bagalkote
B.E. III Semester Syllabus

B.E. IV Semester Syllabus

Branches: Mechanical Engineering, Industrial Production & Automobile Engineering.

Subject: Computational Methods for Mechanical science Subject code: UMA333C

3 Credits (3-0-0) CIE: 50 Marks
SEE: 50 Marks Duration of SEE: 03 Hrs.

Course Objectives:

To apply the knowledge of Mathematics in various engineering fields, students are able

- *To be understand the numerical methods of solving algebraic, transcendental equations.*
- *To be acquired the knowledge about various methods of interpolation*
- *It is very much essential to understand the basic concepts of numerical integration, numerical solutions of ode and pde*
- *To be understand concepts of Fourier series and Fourier transforms, because Fourier series is very powerful tool to solve ode and pde.*
- *To be understand the calculus of variations , as a systematic way of modeling and solving physical problems*

Course outcomes:

On the successful completion of this course, students are able

CO1: The ability to solve engineering problems using non-linear equations and interpolation techniques.

CO2: Be capable to perform numerical integration and solutions of differential equations.

CO3: Fourier analysis provides a set of mathematical tools which enable the engineer to break down a wave into its various frequency components. It is then possible predict the effect of a particular wave form.

CO4: It is essential to understand the basic concepts of Fourier transforms to solve ode and pde.

CO5: Very natural contexts for calculus of variations include engineering Mechanics and electromagnetism where we use the knowledge of the energy in the system.

Unit-I

Numerical Analysis-I:

10 Hours

Introduction to root finding problems, Newton-Raphson method. Finite differences, forward and backward difference operators (no derivations on relations between operators) Newton-Gregory forward and backward interpolation formulae (without proof).Lagrange's and Newton's divided difference interpolation formulae (without proof) Numerical differentiation using Newton's forward

and backward formulae-problems.

Unit-II

Numerical analysis-II: **10 Hours**

Numerical Integration: Simpson's one third rule, Simpson's three eighth rule (no derivation of any formulae)-problems. Numerical solution of ODE and PDE: Euler's and Modified Euler's method, Runge-Kutta 4th order method, Numerical solutions of one-dimensional heat and wave equations by explicit method, Laplace equation by using five point formula.

Unit-III

Fourier Series: **10 Hours**

Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous and functions having finite number of discontinuities, even and odd functions. Half-range series, practical harmonic analysis.

Unit-IV

Fourier transforms: **10 Hours**

Infinite Fourier transforms and inverse Fourier transforms- simple properties, Fourier sine and Fourier cosine transforms.

Calculus of Variations:

Variation of a function and a functional, extremal of a functional, variational problems, Euler's equation, standard variational problems including geodesics, minimal surface of revolution, hanging chain and Brachistochrone problems.

Total: 40 Hours

Resources:

1. Numerical Methods for Engineers by Steven C Chapra & Raymond P Canale.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
3. Advanced Engineering Mathematics By H. K. Das, S. Chand & company Ltd. Ram Nagar, New Delhi.
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from entire syllabus.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

B.E. IV Semester Syllabus

Branches: Mechanical Engineering, Industrial Production & Automobile Engineering.

UMA433C: Mathematical methods for Mechanical science

3 Credits (3-0-0) Duration of SEE: 03 Hrs. CIE: 50 Marks SEE: 50 Marks

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various Engineering fields by making them

- to form a specific relation for the given group of data using least square sense method.
- to specify probability is an area of study which involves predicting the relative likely hood of various outcomes.

Course outcomes:

On completion of this course, students are able

CO1: to apply the least square sense method to construct the specific relation for the given group of data.

CO2: to apply the concept of probability to find the physical significance of various distribution phenomena.

CO3: to apply the concept of probability to perform engineering duties in planning and designing, engines, machines and other mechanically functioning.

CO4: to apply the concept of probability to study the performance of Mechanical systems.

CO5: to apply the concept of Markov Chain for commercial and industry purpose.

Unit –I

Complex Variables: **10 Hours**

Analytic function, Cauchy-Reimann equations in Cartesian and polar forms. Construction of analytic function (Cartesian and polar forms)

Complex Integration:

Line integral, Cauchy's theorem – corollaries (without Proof), Cauchy's integral formula. Taylor's and Laurent's series (statements only), singularities, poles, calculation of residues, Cauchy's residue theorem (without proof) – problems.

Unit-II

Special Function: **10 Hours**

Series solution of Bessel's differential equation, recurrence formulae, generating function, orthogonal property, Bessel's integral formula.

Unit –III

Statistics and Probability **10 Hours**

Statistics: Curve fitting by the method of least squares: $y = a + bx$, $y = ab^x$ and $y = a + bx + cx^2$ Correlation and regression.

Probability: addition rule, conditional probability, multiplication rule, Baye's rule.

Unit –IV

Probability distributions: **10 Hours**

Binomial distributions Poisson distributions and Normal distributions (No drivations). Concept of joint probability, Joint distributions - discrete random variables, Independent random variables, Problems on expectation and variance.

Markov chains:

Markov chains: Introduction, Probability vectors, Stochastic Matrices, Fixed Points and Regular stochastic Matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states.

Total: 40 Hours

Resources:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
2. Theory and problems of probability by Seymour Lipschutz (Schaum's Series).
3. Advanced Engineering Mathematics by H. K. Dass
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)
5. Probability and stochastic processes by Roy D. Yates and David J. Goodman, wiley India pvt.ltd 2nd edition 2012.
6. Advanced Engineering Mathematics by Peter V. O'Neil.

Question paper pattern for SEE:

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Assignment Test for 5 Marks: Ten objective type questions can be prepared from entire Syllabus.

Course Outcomes	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--