**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 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**BASAVESHWAR ENGINEERING COLLEGE , BAGALKOTE**

# ENGINEERING MATHEMATICS-I
# (CALCULUS)

**(Common to all branches)**
**(Effective from the academic year 2018-19)**

**Subject Code : UMA161C** | **CIE Marks : 50**
**Contact Hours/Week : 05(3L+2T)** | **SEE Marks: 50**
**Total Hours:40** | **Exam Hours : 03**
**Semester : I** | **Credits: 04(3-2-0)**

**Course Learning Objectives**: This course (**UMA161C**) will enable students to master the basic tools of calculus and vectors to become skilled for solving problems in science and engineering.

## UNIT-I L-10 Hours, T-06 Hours

**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

## UNIT-II L-10 Hours, T-08 Hours

**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, Jacobians-problems, Errors and approximations.

## UNIT-III L-10 Hours, T-06 Hours

**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, & volume.
**Beta and Gamma functions:** definitions, Relation between beta and gamma functions-problems.

## UNIT-IV L-10 Hours, T-06 Hours

**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.

**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

CO5: exhibit the interdependence of line, surface and volume integrals.

**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.

| 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**

# ENGINEERING MATHEMATICS-II

**(Differential Equations and Laplace Transform)**
**(Common to all branches)**
**(Effective from the academic year 2018-19)**

| | |
|---|---|
| **Subject Code : UMA261C** | **CIE Marks : 50** |
| **Contact Hours/Week : 05(3L+2T)** | **SEE Marks: 50** |
| **Total Hours:40** | **Exam Hours : 03** |
| **Semester : II** | **Credits: 04(3-2-0)** |

**Course Learning Objectives**: The purpose of the course **UMA261C** is to facilitate the students with concrete foundation of Liner Algebra, differential equations and Laplace transform to acquire the knowledge of these mathematical tools.

**UNIT-I** **L-10 Hours, T-06 Hours**

**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.

**UNIT-II** **L-10 Hours, T-08 Hours**

**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.

**UNIT-III** **L-10 Hours, T-06 Hours**

**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.

**UNIT-IV** **L-10 Hours, T-06 Hours**

**Laplace Transform:** **10 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-Applications toEngineering 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 matrix theory for solving system of linear equations and compute eigen values and eigen vectors required for matrix.

CO2: Explain various physical models through first and higher order differential equations and solve such linear ordinary differential equations.

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

CO4: Able to derive heat and wave equation and solve by method of separation of variables

CO5: Apply the Laplace transform techniques to solve differential equations.

**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.

| 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 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 | 1 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CO2 | 1 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CO3 | 1 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CO4 | 1 | 2 | --- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO5 | 1 | 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 and Calculus of Variations:** **10 Hours**

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

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 | -- | -- | --- | -- | -- | -- | -- | -- | -- | -- |

**W.e.f . 2019-202**

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.

| 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 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 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: UMA333C3

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 | -- | -- | --- | -- | -- | -- | -- | -- | -- | -- |

The above contents are approved in the BOS meeting held on 26th June 2019.