##  <br> Schedule of Teaching

## Department of Mathematics



Govt. College Jhandutta Distt. Bilaspur (H.P.)

## Prepared by:

Rekha Devi
Assistant Professor
Department of Mathematics

## Class: B.A./B.Sc First Year

## Course: Differential Calculus (MATH101 TH)

## Lectures per week: 3

## Course Outcomes (CO):

The students will be well conversant with the following types of differential calculus:

- CO-1. Basic theory of differential calculus.
- Limit and Continuity, Types of discontinuities.
- Differentiability of functions.
- Indeterminate forms, Rolle's theorem.
- Concavity, Convexity \& Points of Inflexion. Maxima and Minima with Lagrange Multipliers Method (two variables), Jacobian (upto three variables).

| S.No. | Topic | Week | Month |
| :---: | :---: | :---: | :---: |
| 1. | Introduction about Syllabus, Choice based credit system (CBCS), Basic theory of differential calculus | First Week | July |
| 2. | Limit | Second Week |  |
| 3. | Questions related to Limit | Third Week |  |
| 4. | Continuity | Fourth Week |  |
| 5. | Questions related to Continuity | First Week | August |
| 6. | Types of discontinuities. | Second Week |  |
| 7. | Differentiability of functions | Third Week |  |
| 8. | Questions related to Differentiability of functions | Fourth Week |  |
| 9. | Successive differentiation | First Week | September |
| 10. | Leibnitz's theorem | Second Week |  |
| 11. | Indeterminate forms | Third Week |  |
| 12. | Rolle's theorem | Fourth Week |  |
| 13. | Questions related to Rolle's theorem | First Week | October |
| 14. | Lagrange's theorem | Second Week |  |
| 15. | Questions related to Lagrange's theorem | Third Week |  |


| 16. | Cauchy Mean Value theorem | Fourth Week |  |
| :---: | :---: | :---: | :---: |
| 17. | Questions related to Cauchy Mean Value theorem | First Week | November |
| 18. | Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series. | Second Week |  |
| 19. | Questions related to these theorems | Third Week |  |
| 20. | Maclaurin's series of $\sin \mathrm{x}, \cos \mathrm{x}, \mathrm{e}^{\mathrm{x}}, \log (1+\mathrm{x}),(1+\mathrm{x})^{\mathrm{m}}$. | Fourth Week |  |
| 21. | Concavity, Convexity \& Points of Inflexion | First Week | December |
| 22. | Curvature, Radius of curvature, center of curvature | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |
| 25. | Asymptotes, Singular points, Double point, Polar coordinates, Relation between Cartesian and polar coordinates | Second Week | February |
| 26. | Functions of several variables (upto three variables): Limit and Continuity of these functions | Third Week |  |
| 27. | Partial differentiation, Euler's theorem on homogeneous functions | Fourth Week |  |
| 28. | Lagrange Multipliers Method (two variables), Jacobian (up to three variables). | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| 31. | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Course: Differential Equations (MATH102 TH)

## Lectures per week: 3

## Course Outcomes (CO):

The students will be well conversant with the following types of differential equations:

- Basic theory of linear differential equations, Wronskian, and its properties. First order exact differential equations. Integrating factors, rules to find an integrating factor.
- Methods for solving higher-order differential equations. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear nonhomogenous equations.
- The method of variation of parameters with constant coefficients. The Cauchy-Euler equation and Legendre equation. Simultaneous differential equations, Total differential equations.
- Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations.Formation of first order partial differential equations (PDE).
- Linear partial differential equation of first order, Lagrange's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.

| S.No. | Topic | Week | Month |
| :---: | :---: | :---: | :---: |
| 1. | Introduction about Syllabus, Choice based credit system (CBCS), Basic theory of linear differential equations | First Week | July |
| 2. | Wronskian, and its properties | Second Week |  |
| 3. | Integrating factors | Third Week |  |
| 4. | Rules to find an integrating factor | Fourth Week |  |
| 5. | First order higher degree equations solvable for $x, y, p$. | First Week | August |
| 6. | Clairut's form | Second Week |  |
| 7. | Methods for solving higher-order differential equations | Third Week |  |
| 8. | Solving a differential equation by reducing its order | Fourth Week |  |
| 9. | Linear homogenous equations with constant coefficients | First Week | September |
| 10. | Linear non homogenous equations | Second Week |  |
| 11. | The method of variation of parameters with constant coefficients | Third Week |  |
| 12. | The Cauchy-Euler equation and Legendre equation | Fourth Week |  |
| 13. | Simultaneous differential equations | First Week | October |
| 14. | Total differential equations | Second Week |  |
| 15. | Order and degree of partial differential equations | Third Week |  |


| 16. | Concept of linear partial differential equations | Fourth Week |  |
| :---: | :---: | :---: | :---: |
| 17. | Concept of non-linear partial differential equations | First Week | November |
| 18. | Formation of first order partial differential equations(PDE) | Second Week |  |
| 19. | Linear partial differential equation of first order | Third Week |  |
| 20. | Questions of Linear partial differential equation of first order | Fourth Week |  |
| 21. | Lagrange's method | First Week | December |
| 22. | Questions related Lagrange's method | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |
| 25. | Classification of second order partial differential equations into elliptic | Second Week | February |
| 26. | Classification of second order partial differential equations into elliptic | Third Week |  |
| 27. | Classification of second order partial differential equations into parabolic through illustrations only | Fourth Week |  |
| 28. | Classification of second order partial differential equations into hyperbolic through illustrations | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| 31. | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Class: B.A/B.SC 2nd Year

## Course: Real Analysis (MATH201TH)

## Lectures per week: 3

## Course Outcomes (CO):

On completion of this unit of the course, the student will be able to develop a clear-cut idea on sequence and series of functions defined on a set after covering the following:

- Sequence of functions defined on a set, Point wise and uniform convergence. Cauchy $1^{\text {st }}$ Theorem and $2^{\text {nd }}$ Theorem, Cauchy criterion of uniform convergence. Weirstrass' M-test.
- Series of functions defined on a set, Point wise and uniform convergence. Cauchy criterion of uniform convergence. Weierstrass' M-test.
- Power series: Fundamental theorem of power series. Cauchy- theorem. Determination of radius of convergence. Uniform and absolute convergence of power series.

| S.No. | Topic | Week | Month |
| :---: | :---: | :---: | :---: |
| 1. | Introduction about Syllabus, Choice based credit system (CBCS), Real Line | First Week | July |
| 2. | Bounded sets | Second Week |  |
| 3. | Suprema and infima | Third Week |  |
| 4. | completeness property of R | Fourth Week |  |
| 5. | Archimedean property of R | First Week | August |
| 6. | Intervals | Second Week |  |
| 7. | Concept of cluster points and statement of Bolzano- <br> Weierstrass theorem | Third Week |  |
| 8. | Real Sequence | Fourth Week |  |
| 9. | Bounded sequence | First Week | September |
| 10. | Cauchy convergence criterion for sequences | Second Week |  |
| 11. | Cauchy's theorem on limits | Third Week |  |
| 12. | Order preservation and squeeze theorem | Fourth Week |  |
| 13. | Monotone sequences and their convergence (monotone convergence theorem without proof). | First Week | October |
| 14. | Infinite series | Second Week |  |
| 15. | Cauchy convergence criterion for series | Third Week |  |
| 16. | Positive term series, geometric series | Fourth Week |  |
| 17. | Comparison test, convergence of p-series | First Week | November |
| 18. | Root test, Ratio test | Second Week |  |
| 19. | Alternating series, Leibnitz's test | Third Week |  |
| 20. | Definition and examples of absolute and conditional convergence | Fourth Week |  |


| 21. | Sequences of functions | First Week | December |
| :---: | :---: | :---: | :---: |
| 22. | Series of functions | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |
| 25. | Pointwise and uniform convergence | Second Week | February |
| 26. | $\mathrm{M}_{\mathrm{n}}$ test, Results about uniform convergence | Third Week |  |
| 27. | Power series | Fourth Week |  |
| 28. | Radius of convergence | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| 31. | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Course: Algebra MATH202TH

## Lectures per week: 3

## Course Outcomes (CO):

Students will get an overall understanding of the following concepts:

- Elementary properties using definition of Group. Definition and examples of subgroups.
- Definitions and examples of Ring , Field.
- Concept of Vector space over a Field.
- Basic theorems of homomorphism
- Rings of matrices

| S.No. | Topic | Week | Month |
| :--- | :--- | :--- | :--- |
| 1. | Introduction about Syllabus, Choice based credit system <br> (CBCS), Definition of groups | First Week | July |
| 2. | Examples of groups | Second Week |  |
| 3. | Examples of abelian and non-abelian groups | Third Week |  |
|  |  |  |  |


| 4. | The group $\mathrm{Z}_{\mathrm{n}}$ of integers under addition modulo n and the group $\mathrm{U}(\mathrm{n})$ of units under multiplication modulo n | Fourth Week |  |
| :---: | :---: | :---: | :---: |
| 5. | Cyclic groups from number systems | First Week | August |
| 6. | Complex roots of unity | Second Week |  |
| 7. | Subgroups | Third Week |  |
| 8. | Cyclic subgroups | Fourth Week |  |
| 9. | Concept of a subgroup generated by a subset and the commutator subgroup of group, | First Week | September |
| 10. | Examples of subgroups including the center of a group | Second Week |  |
| 11. | Cosets | Third Week |  |
| 12. | Index of subgroup | Fourth Week |  |
| 13. | Lagrange's theorem, order of an element | First Week | October |
| 14. | Normal subgroups: their definition | Second Week |  |
| 15. | Normal subgroups: their definition, examples, and characterizations | Third Week |  |
| 16. | Quotient groups | Fourth Week |  |
| 17. | Definition of Kernel | First Week | November |
| 18. | Basic theorems of homomorphism | Second Week |  |
| 19. | First theorem of Homomorphism | Third Week |  |
| 20. | Definition and examples of rings | Fourth Week |  |
| 21. | Examples of commutative and non-commutative rings | First Week | December |
| 22. | Zn the ring of integers modulo n | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |
| 25. | Rings of matrices | Second Week | February |
| 26. | Subrings | Third Week |  |
| 27. | Ideals | Fourth Week |  |
| 28. | Definition of Integral domains and fields. | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| 31. | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Course: Integral Calculus (MATH309TH)

## Lectures per week: 2

- Evaluation of definite integrals.
- Integration as the limit of a sum.
- Reduction formulae for integrals.
- Definition of Improper Integrals: Statements of (i) $\mu$-test (ii) Comparison test - Simple problems only. Use of Beta and Gamma functions.
- Working knowledge of double integral.
- Applications in Rectification, Quadrature, volume and surface areas of solids formed by revolution of plane curve and areas problems only.

| S.No. | Topic | Week | Month |
| :---: | :---: | :---: | :---: |
| 1. | Introduction about Syllabus, Choice based credit system (CBCS), Overview of Integration | First Week | July |
| 2. | Integration by Partial fractions | Second Week |  |
| 3. | Questions related to Integration by Partial fractions | Third Week |  |
| 4. | Integration of rational and irrational functions | Fourth Week |  |
| 5. | Questions related to integration of rational and irrational functions | First Week | August |
| 6. | Properties of definite integrals | Second Week |  |
| 7. | Questions related to Properties of definite integrals | Third Week |  |
| 8. | Reduction Formulae | Fourth Week |  |
| 9. | Questions related to Reduction Formulae | First Week | September |
| 10. | Reduction Formulae, $\int \operatorname{Sin}^{\mathrm{n}} \mathrm{x} d \mathrm{x}, \int \operatorname{Cos}^{\mathrm{n}} \mathrm{x} d \mathrm{x}$, | Second Week |  |
| 11. | Questions related to Reduction Formulae, $\int \operatorname{Sin}^{\mathrm{n}} \mathrm{x} d \mathrm{x}$ | Third Week |  |
| 12. | Reduction Formulae, $\int \operatorname{Sin}^{\mathrm{n}} \mathrm{x} d \mathrm{x}$ | Fourth Week |  |
| 13. | Questions related to Reduction Formulae $\int \operatorname{Cos}^{\mathrm{n}} \mathrm{x} d \mathrm{x}$ | First Week | October |
| 14. | Reduction Formulae $\int e^{\text {ax }} x n d x, \int x^{\mathrm{n}}(\log x)^{\mathrm{m}} d x, \int x$ ${ }^{\mathrm{n}} \operatorname{Sin} x d x, \int x^{\mathrm{n}} \cos x d x$ | Second Week |  |


| 15. | Questions related to $\int e^{\text {ax }} x n d x, \int x^{\mathrm{n}}(\log x)^{\mathrm{m}} d x$ | Third Week |  |
| :---: | :---: | :---: | :---: |
| 16. | Questions related to , $\int x^{\mathrm{n}} \operatorname{Sin} x d x, \int x^{\mathrm{n}} \cos x d x$ | Fourth Week |  |
| 17. | Reduction Formulae $\int \operatorname{Sin}^{\mathrm{n}} \mathrm{X} \operatorname{Cos}^{\mathrm{n}} \mathrm{X} d x$ | First Week | November |
| 18. | Questions related to Reduction Formulae $\int \operatorname{Sin}^{n} \mathrm{X} \operatorname{Cos}^{\mathrm{n}} \mathrm{X}$ $d x$ | Second Week |  |
| 19. | Reduction by connecting two integrals (Smaller Index + 1 <br> Method) | Third Week |  |
| 20. | Questions related to Reduction by connecting two integrals (Smaller Index +1 Method) | Fourth Week |  |
| 21. | Areas and lengths of curves in the plane, volumes and surfaces of solids of revolution | First Week | December |
| 22. | Questions related to Areas and lengths of curves in the plane, volumes and surfaces of solids of revolution | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |
| 25. | Cartesian and parametric form | Second Week | February |
| 26. | Questions related to Cartesian and parametric form | Third Week |  |
| 27. | Double and Triple integrals | Fourth Week |  |
| 28. | Questions related to Double and Triple integrals | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| 31. | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Course: Vector Calculus (MATH310TH)

## Lectures per week: 2

Students will get an overall understanding of the following concepts:

- Scalar and vector product of three vectors. Product of four vectors. Reciprocal vectors. Vector differentiation, Scalar valued point functions, vector valued point functions.
- Gradient of a scalar point function. Divergence and curl of a vector point function. Gradient, Divergence and curl of sums and products.
- Orthogonal curvilinear coordinates. Conditions for orthogonality. Fundamental triads of mutually orthogonal unit vectors. Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvilinear coordinators.
- Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigenvalues and eigen vectors for such transformations and eigen spaces as invariant subspaces.

| S.No. | Topic | Week | Month |
| :---: | :---: | :---: | :---: |
| 1. | Introduction about Syllabus, Choice based credit system (CBCS), Concepts of scalar and vector product | First Week | July |
| 2. | Scalar and vector product of three vectors | Second Week |  |
| 3. | Questions related to Scalar and vector product of three vectors | Third Week |  |
| 4. | Product of four vectors. | Fourth Week |  |
| 5. | Questions related to Product of four vectors | First Week | August |
| 6. | Reciprocal vectors | Second Week |  |
| 7. | Questions related to Reciprocal vectors | Third Week |  |
| 8. | Vector differentiation | Fourth Week |  |
| 9. | Questions related to Vector differentiation | First Week | September |
| 10. | Scalar valued point functions | Second Week |  |
| 11. | Questions related to Scalar valued point functions | Third Week |  |
| 12. | Vector valued point functions | Fourth Week |  |
| 13. | Derivative along a curve | First Week | October |
| 14. | Directional derivatives | Second Week |  |
| 15. | Gradient of a scalar point function | Third Week |  |
| 16. | Questions related to Gradient of a scalar point function | Fourth Week |  |
| 17. | Divergence and curl of a vector point function | First Week | November |


| 18. | Questions related to Divergence and curl of a vector point <br> function | Second Week |
| :--- | :--- | :--- |
| 19. | Gradient, Divergence and curl of sums and products. | Third Week |
| 20. | Laplacian operators in terms of orthogonal curvilinear <br> coordinators | Fourth Week |
| 21. | Questions related to Laplacian operators in terms of <br> orthogonal curvilinear coordinators | First Week |
| December |  |  |
| 22. | line integral | Second Week |
| 23. | MTT | Third Week |
| 24. | MTT | Fourth Week |
| 25. | Surface integral | Second Week |
| 26. | Questions related to Surface integral | Third Week |
| 27. | Volume integral Theorems of Gauss, Green and Stokes <br> (without proof) and the problems based on these <br> theorems. | Fourth Week |
| 28. | Questions related to Volume integral Theorems of Gauss, <br> Green and Stokes | First Week |

There will be class test at the end of each unit.

## Course: Matrices

## MATH 301TH

## Lectures per week: 3

Students will get an overall understanding of the following concepts:

- Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous and nonhomogeneous equations with number of equations and unknowns up to three.
- Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix.
- Definition of Vector space, R, R2, R3 as vector spaces over R, Concept of Linear dependence/Independence, Standard basis for R, R2, R3, Examples of different bases. Subspaces of R2, R3.
- Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigenvalues and eigen vectors for such transformations and eigen spaces as invariant subspaces.

| S.No. | Topic | Week | Month |
| :--- | :--- | :--- | :--- |
| 1. | Introduction about Syllabus, Choice based credit system <br> (CBCS), definition of matrices | First Week | July |
| 2. | Types of matrices | Second Week |  |
| 3. | Rank of a matrix | Third Week |  |
| 4. | Invariance of rank under elementary transformations | Fourth Week |  |
| 5. | Reduction to normal form | First Week | August |
| 6. | Solutions of linear homogeneous equations | Second Week |  |
| 7. | Solutions of non-homogeneous equations with number of <br> equations and unknowns up to three | Third Week |  |
| 8. | Matrices in diagonal form. Reduction to diagonal form <br> upto matrices of order 3. Computation of matrix inverses <br> using elementary row operations. Rank of matrix. Solutions <br> of a system of linear equations using matrices. Illustrative <br> examples of above concepts from Geometry, Physics, <br> Chemistry, Combinatorics and Statistics. |  |  |


| 11. | Rank of matrix | Third Week |  |
| :---: | :---: | :---: | :---: |
| 12. | Solutions of a system of linear equations using matrices | Fourth Week |  |
| 13. | Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics | First Week | October |
| 14. | Definition of Vector space, R, R2, R3 as vector spaces over R | Second Week |  |
| 15. | Concept of Linear dependence/Independence | Third Week |  |
| 16. | Standard basis for R, R2, R3, Examples of different bases. | Fourth Week |  |
| 17. | Subspaces of R2, R3. | First Week | November |
| 18. | Translation, Dilation, Rotation, Reflection in a point, line and plane | Second Week |  |
| 19. | Rotation, Reflection in a point, line and plane | Third Week |  |
| 20. | Questions related to Rotation, Reflection in a point, line and plane | Fourth Week |  |
| 21. | Questions related to Rotation, Reflection in a point, line and plane | First Week | December |
| 22. | Matrix form of basic geometric transformations | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |
| 25. | Interpretation of eigen values | Second Week | February |
| 26. | Interpretation of eigen vectors for these transformations | Third Week |  |
| 27. | Eigen spaces as invariant subspaces. | Fourth Week |  |
| 28. | Questions related to eigenvalues and eigen vectors | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| 31. | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Course: Numerical Methods (MATH304TH)

## Lectures per week: 3

The student will get an overall idea of

- To find a real root of an algebraic or transcendental equation. Location of root (tabular method), Bisection method, Newton-Raphson method with geometrical significance, Numerical Problems.
- Newton's Backward interpolation Formula, Lagrange's Interpolation Formula.
- Numerical differentiation, Central difference method
- Numerical Integration: Trapezoidal and Simpson's one-third formula (statement only). Problems on Numerical Integration.

| S.No. | Topic | Week | Month |
| :---: | :---: | :---: | :---: |
| 1. | Introduction about Syllabus, Choice based credit system (CBCS), Algorithms | First Week | July |
| 2. | Algorithms | Second Week |  |
| 3. | Convergence with questions | Third Week |  |
| 4. | Bisection method with questions | Fourth Week |  |
| 5. | False position method with examples | First Week | August |
| 6. | Fixed point iteration method with questions | Second Week |  |
| 7. | Newton's method and questions | Third Week |  |
| 8. | Secant method | Fourth Week |  |
| 9. | LU decomposition | First Week | September |
| 10. | Gauss-Jacobi iterative methods | Second Week |  |
| 11. | Gauss-Siedel and SOR iterative methods | Third Week |  |
| 12. | Lagrange and Newton interpolation | Fourth Week |  |
| 13. | Newton interpolation | First Week | October |
| 14. | Finite difference operators | Second Week |  |
| 15. | Numerical differentiation | Third Week |  |
| 16. | Newton's forward difference method | Fourth Week |  |
| 17. | Backward difference method | First Week | November |
| 18. | Sterling's Central difference method | Second Week |  |
| 19. | Questions related to Newton's forward difference method | Third Week |  |


| 20. | Questions related to Backward difference method methods | Fourth Week |  |
| :--- | :--- | :--- | :--- |
| 21. | Questions related to Sterling's Central difference method | First Week | December |
| 22. | Questions related to Sterling's Central difference method | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |
| 25. | Trapezoidal rule | Second Week | February |
| 26. | Questions related to Trapezoidal rule | Third Week |  |
| 27. | Simpson's rule, Euler's method | Fourth Week |  |
| 28. | Questions related to Simpson's rule, Euler's method | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| 31. | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Class: B.A./B.Sc. Third Year

## Course: Probability and Statistics (MATH313TH)

## Lectures per week: 2

After completion of this course, the students will be able to understand \& apply the concepts of probability \& statistics covered in the following Units:

- Random experiment, Sample space, probability as a set function, probability axioms, probability space. Finite sample spaces. Conditional probability, Bayes theorem, independence.
- Real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function.
- Discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, Continuous distributions: uniform, normal, exponential.
- Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random
variables, moments, covariance, correlation coefficient, independent random variables, joint moment generating function.
- Measures of central tendency and measures of dispersion, moments, skewness and kurtosis.

| S.No. | Topic | Week | Month |
| :---: | :---: | :---: | :---: |
| 1. | Introduction about Syllabus, Choice based credit system (CBCS), Sample space | First Week | July |
| 2. | Probability axioms | Second Week |  |
| 3. | Real random variables (discrete and continuous), | Third Week |  |
| 4. | Cumulative distribution function | Fourth Week |  |
| 5. | Probability mass/density functions. | First Week | August |
| 6. | Mathematical expectation | Second Week |  |
| 7. | Moments | Third Week |  |
| 8. | Questions related to Mathematical expectation and Moments | Fourth Week |  |
| 9. | Moment generating function | First Week | September |
| 10. | Questions related to Moment generating function | Second Week |  |
| 11. | Characteristic function | Third Week |  |
| 12. | Questions related to characteristic function | Fourth Week |  |
| 13. | Binomial distributions | First Week | October |
| 14. | Questions related to Binomial distributions | Second Week |  |
| 15. | Questions related to Binomial distributions | Third Week |  |
| 16. | Poisson distributions | Fourth Week |  |
| 17. | Questions related to Poisson distributions | First Week | November |
| 18. | Continuous distributions | Second Week |  |
| 19. | Questions related to Continuous distributions | Third Week |  |
| 20. | Joint cumulative distribution function and its properties | Fourth Week |  |
| 21. | Questions related to Continuous distributions | First Week | December |
| 22. | Joint probability density functions | Second Week |  |
| 23. | MTT | Third Week |  |
| 24. | MTT | Fourth Week |  |


| 25. | Marginal and conditional distributions | Second Week | February |
| :--- | :--- | :--- | :--- |
| 26. | Expectation of function of two random variables | Third Week |  |
| 27. | Conditional expectations | Fourth Week |  |
| 28. | Independent random variables. | First Week | March |
| 29. | Revision | Second Week |  |
| 30. | Revision | Third Week |  |
| . | Revision | Fourth Week |  |

There will be class test at the end of each unit.

## Course: Theory of Equations\{ MATH316TH\}

## Lectures per week: 2

After completion of this course, the students will be able to understand \& apply the concepts of probability \& statistics covered in the following Units:

- General properties of polynomials, Graphical representation of a polynomials, maximum and minimum values of a polynomials, General properties of equations.
- Descarte's rule of signs for positive and negative roots, Relation between the roots and the coefficients of equations.
- Symmetric functions, Applications symmetric function of the roots, Transformation of equations. Solutions of reciprocal and binomial equations.
- Algebraic solutions of the cubic (Carden's method) and biquadratic (Descarte's \& Ferrari's method). Properties of the derived functions.

| S.No. | Topic | Week | Month |
| :--- | :--- | :--- | :--- |
| 1. | Introduction about Syllabus, Choice based credit system <br> (CBCS), concepts of polynomials | First Week | July |
| 2. | General properties of polynomials | Second Week |  |
| 3. | Graphical representation of a polynomials, | Third Week |  |
| 4. | maximum and minimum values of a polynomials | Fourth Week |  |
| 5. | Questions related to maximum and minimum values of a <br> polynomial | First Week | August |


| 6. | General properties of equations | Second Week |
| :--- | :--- | :--- |
| 7. | Questions related to General properties of equations | Third Week |
| 8. | Descarte's rule of signs f o r positive and negative roots | Fourth Week |
| 9. | Questions related to Descarte's rule of signs f o r positive <br> and negative roots | First Week |


|  | the derived functions |  |
| :--- | :--- | :--- |
| 28. | Questions related to Biquadratic (Descarte's \& Ferrari’s <br> method). Properties of the derived functions | First Week |
| March |  |  |
|  | Revision | Second Week |
| 30. | Revision | Third Week |
| 31. | Revision | Fourth Week |

There will be class test at the end of each unit.

