



॥संहती कार्य साधिका, शिलंम परम भूषणंम॥

**Shetkari Shikshan Prasarak Mandal's  
KRISHNA MAHAVIDYALYA RETHARE BK.**

**Department of Mathematics  
PROGRAM SPECIFIC OUTCOMES  
AND  
COURSE OUTCOMES  
FOR OUTCOME-BASED EDUCATION**



Shetkari Shikshan Prasarak Mandal's

**KRISHNA MAHAVIDYALAYA, RETHARE BK**

**DEPARTMENT OF MATHEMATICS**

**PROGRAMME OUTCOMES**

**Academic Year 2017-2018**

After completion of the B. Sc. program, the students will develop ability:

- PO A. Recognize that Mathematics permeates the world around us.
- PO B. Appreciate the usefulness, power and beauty of Mathematics.
- PO C. Enjoy Mathematics and develop patience and persistence when solving the problem.
- PO D. Understand and be able to use the language symbols and notations of Mathematics.
- PO E. Develop Mathematical curiosity and use inductive as well as deductive reasoning when solving problems.
- PO F. Became confident in using Mathematics to analyze and solve problems both in college and real life situations.
- PO G. Develop knowledge, skills and attitudes necessary to pursue further studies in Mathematics.
- PO H. Develop abstract, logical and critical thinking and the ability to reflect critically upon their work and the work of others.
- PO I. Develop ability to critically assess numerical and graphical information and to prepare for future challenges.



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**DEPARTMENT OF MATHEMATICS**

**PROGRAMME SPECIFIC OUTCOMES**

**Academic Year 2017-2018**

- PSO A. Though knowledge and understanding students develop mathematical reasoning to make deductions and solve problems.
- PSO B. Mathematical inquiry encourages students to become risk takers, inquires and critical thinkers.
- PSO C. At the end of the course students should be able to communicate mathematical ideas, reasoning and findings.
- PSO D. Students are encouraged to share their thinking with teachers and peers and to examine different problem solving strategies.
- PSO E. Students will develop the knowledge, skills and attitudes necessary to pursue further studies in Mathematics.
- PSO F. Students will enjoy Mathematics and develop patience and persistence when solving the problem.
- PSO G. Students will develop abstract, logical and critical thinking and the ability to reflect critically upon their work and the work of others.
- PSO H. Students will understand and be able to use the language symbols and notations of Mathematics.





Shetkari Shikshan Prasarak Mandal's

**KRISHNA MAHAVIDYALAYA, RETHARE BK**

**DEPARTMENT OF Mathematics**

**MATHEMATICS COURSE OUTCOMES**

**Academic Year 2019-2020**

**B.Sc. (Mathematics)**

**Annexure-C**

**Course Outcomes: B.Sc. I Paper I: Complex Numbers and Algebra**

By the end of this Course students should be able to know about:

- CO 1. Understand De-Moivre's theorem, examples and applications.
- CO 2. Understand elementary functions of complex variables .
- CO 3. Apply Cayley- Hamilton theorem for finding inverse.
- CO 4. Understand homogeneous linear equations and non-homogeneous linear equations .
- CO 5. Understand quadratic forms and congruence of matrices.
- CO 6. Understand groups and its properties .

**B.Sc. I Paper II : Calculus**

By the end of this Course students should be able to know about:

- CO 1. Understand Taylor's and Maclaurin's theorem and examples.
- CO 2. Understand Leibnitz's theorem and its application.
- CO 3. Understand different indeterminate forms Solve indeterminate forms.
- CO 4. Understand radius of curvature in Cartesian , parametric and polar equations.
- CO 5. Understand partial differential equation , homogeneous function and apply euler's theorem on homogeneous functions.

**Paper III: Geometry**

By the end of this Course students should be able to know about:

- CO 1. Understand change of axes .
- CO 2. Understand different types of equations and relation between Cartesian and polar co-ordinates .
- CO 3. Understand the sphere and cone , solve examples on it.



#### **Paper IV: Differential Equations:**

By the end of this Course students should be able to know about:

- CO 1. Understand types of differential equations.
- CO 2. Solve different types of ordinary differential equations.
- CO 3. Understand applications of differential equations.

#### **Paper V: Differential Calculus**

By the end of this Course students should be able to know about:

- CO 1. Understand definition of limits and continuity.
- CO 2. Understand differentiability at point and necessary and sufficient condition for the existence of a derivative.
- CO 3. Understand the basic ideas of Jacobian and examples.
- CO 4. Understand conditions for maxima and minima and Lagrange's method of undetermined multipliers of three variables.
- CO 5. Understand vector calculus, its types and properties and solve examples on it.

#### **Paper VI : Differential Equations**

By the end of this Course students should be able to know about:

- CO 1. Understand general form of homogeneous and non-homogeneous linear equations of higher order.
- CO 2. Solve second order differential equations of different forms and examples on it.
- CO 3. Understand ordinary simultaneous differential equations.
- CO 4. Geometrical interpretation on simultaneous differential equations.
- CO 5. Understand total differential equations and its geometrical interpretation.

#### **Paper VII: Integral calculus**

By the end of this Course students should be able to know about:

- CO 1. Understand gamma and beta functions and its properties.
- CO 2. Understand multiple integrals in Cartesian and polar coordinates and examples on it.
- CO 3. Understand Fourier Series.
- CO 4. Apply Fourier series for even and odd functions.
- CO 5. Understand differentiation under integral sign and error function.

#### **Paper VIII: Discrete Mathematics**





By the end of this Course students should be able to know about:

- CO 1. Understand relations, its types, congruence relation and theorems on it.
- CO 2. Understand division algorithm in which how to find GCD and LCM.
- CO 3. Use classical notations of logic: implications, equivalence, negation, proof by contradiction, proof by induction, and quantifiers.
- CO 4. Apply notions in logic in other branches of mathematics.
- CO 5. Appreciate applications of shortest path algorithms in computer science.

### **Paper IX: Real Analysis**

By the end of this Course students should be able to know about:

- CO 1. The integrations of bounded function on a closed and bounded interval.
- CO 2. Some of the families and properties of Riemann integrable functions.
- CO 3. The applications of the fundamental theorems of integrations.
- CO 4. Extension of Riemann integral to the improper integrals when either the interval of integration is infinite or the integrand has infinite limits at a finite number of points on the interval of integration.
- CO 5. Understand sequence and series of real numbers and solve examples on it.

### **Paper X: Modern Algebra**

By the end of this Course students should be able to know about:

- CO 1. Basic concepts of group and rings with examples.
- CO 2. Identify whether the given set with the compositions form Ring, Integral domain or field.
- CO 3. Understand the difference between the concepts Group and Ring
- CO 4. Apply fundamental theorem, isomorphism theorems of groups to prove this theorems for rings.
- CO 5. Understand the concepts of polynomial rings , unique factorization domain .

### **Paper XI: Partial Differential Equations**

By the end of this Course students should be able to know about:

- CO 1. Provide student basic knowledge of a Partial differential equations and understand non-linear partial differential equations of order 1.
- CO 2. Formulate and apply suitable methods to solve problems.
- CO 3. Solve different types of partial differential equations .



CO 4. Understand linear partial differential equations and its examples.

### **Paper XII: Numerical Methods-I**

By the end of this Course students should be able to know about:

CO 1. Understand concept of Numerical Methods.

CO 2. Apply Numerical Methods to solve different types of examples.

CO 3. Understand the graphical representation of Numerical Methods.

CO 4. Understand system of linear equations.

CO 5. Apply Numerical Methods to solve real life problem.

### **Paper XIII: Metric space**

By the end of this Course students should be able to know about:

CO 1. Acquire the knowledge of notion of metric space, open set and closed set.

CO 2. Demonstrate the properties of continuous functions on metric space.

CO 3. Apply the notion of metric space to continuous function on metric space.

CO 4. Understand the basic concept of connectedness, completeness and compactness of metric spaces.

CO 5. Appreciate process of abstraction of limits and continuity to metric space.

### **Paper XIV: Linear Algebra**

By the end of this Course students should be able to know about:

CO 1. Understand notion of vector space basis. .

CO 2. Understand concept of linear transformation and its application to real life situation.

CO 3. work out algebra of linear transformation.

CO 4. Appreciate connection between linear transformation and matrices.

CO 5. Work out Eigenvalues, Eigen vectors and its connection with real life situation.

### **Paper XV: Complex Analysis**

By the end of this Course students should be able to know about:

CO 1. Learn basic concepts of function of complex variables.

CO 2. Be introduced to concept of analytic functions.

CO 3. Learn concept of complex integration and basic results thereof.

CO 4. Be introduced to concept of sequence and series of complex variables.

CO 5. Learn to apply concept of residues to evaluate certain real integrals.

### **Paper XVI: Numerical Methods-II**



By the end of this Course students should be able to know about:

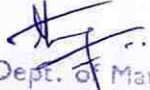
CO 1. Understand concept of Numerical Methods-I.

CO 2. Apply notions numerical methods in other branches of mathematics.

CO 3. Understand forward and backward interpolation for equal and unequal intervals.

CO 4. Derive Lagrange's interpolating polynomial, understand numerical integration and differentiation.

CO 5. Understand ordinary differential equations in numerical methods.

  
Head of Dept. of Mathematics  
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