

**T.R.R. GOVERNMENT DEGREE COLLEGE,  
KANDUKUR, PRAKASAM DIST., AP**



**DEPARTMENT OF MATHEMATICS**

**PROGRAM OUTCOMES**

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**SPECIFIC COURSE OUTCOMES**

## Program Outcomes:

**After Completion of the programme, a student of Department of Mathematics will be able to**

- (1) Demonstrates fundamental systematic knowledge of Mathematics and its applications in engineering, science, technology and Mathematical Sciences.
- (2) Demonstrate educational skills in areas of analysis, geometry, algebra, mechanics, differential equations etc.,
- (3) Apply knowledge, understanding and skills to identify the difficult/unsolved problems in Mathematics and to collect the required information in possible range of sources and try to analyze and evaluate these problems using appropriate methodologies.
- (4) Fulfil learning requirements in Mathematics, drawing from a range of contemporary research works and their applications in diverse areas of Mathematical Sciences.
- (5) Apply disciplinary knowledge and skills in Mathematics in newer domains and uncharted areas.
- (6) Identify challenging problems in Mathematics and obtain well-defined solutions.
- (7) Exhibit subject-specific transferable knowledge in Mathematics relevant to job trends and employment opportunities.

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**SPECIFIC COURSE OUTCOMES:**

**CORE COURSE-1: DIFFERENTIAL EQUATIONS**

After successful completion of this course, the student will be able to

- (1) Compute exact solutions of solvable first order and first degree differential equations and linear and Bernoulli's equations
- (2) Construct Orthogonal Trajectories.
- (3) Compute general solution of First order but not of first degree differential equations.
- (4) Compute the general solution of Equations solvable for  $p$ ,  $x$ ,  $y$  and Clairaut's Equations.
- (5) Compute general solutions of Higher order linear differential equations by using various methods.

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**CORE COURSE-2: THREE DIMENSIONAL ANALYTICAL SOLID GEOMETRY**

After successful completion of this course, the student will be able to

- (1) Get the knowledge of Planes
- (2) Basic idea of Lines, Sphere and
- (3) Understand the properties of planes, lines, spheres and cones
- (4) Express the problems geometrically.

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### **CORE COURSE-3: ABSTRACT ALGEBRA**

After successful completion of this course, the student will be able to

- (1) Recognize the mathematical objects called groups.
- (2) Link the fundamental concepts of groups and symmetries of geometrical objects.
- (3) Explain the significance of the notions of cosets, normal subgroups, and factor groups.
- (4) Analyze consequences of Lagrange's theorem.
- (5) Describe about structure preserving maps between groups and their consequences.
- (6) Describe inner automorphisms and their properties.
- (7) Extend group structure to finite permutation groups (Cayley's Theorem).
- (8) Generate groups with given specific conditions.
- (9) Describe the fundamental concepts in Ring Theory such as of the ideals, Quotient Rings, Integral Domains and Fields.

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### **CORE COURSE-4: REAL ANALYSIS**

After successful completion of this course, the student will be able to

- (1) Describe different properties of the Real Numbers.
- (2) Define and recognize bounded, convergent, divergent, Cauchy and monotonic sequences and calculate limit superior, limit inferior of bounded sequences.
- (3) Apply the ratio, root and alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
- (4) Examine the Continuity and discontinuous functions and their properties.
- (5) Describe the properties of Differentiation and Mean-value Theorems.
- (6) List some of the properties of Riemann Integrable functions and apply the fundamental theorems of Integration.

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## **CORE COURSE-5A: RING THEORY & VECTOR CALCULUS**

After successful completion of this course, the student will be able to

- (1) Describe the fundamental concepts in Ring Theory such as of the ideals, Quotient Rings, Integral Domains and Fields.
- (2) Describe the Principal Ideals, Prime Ideals and Maximal Ideals.
- (3) Describe the concepts of Vector Differentiation and Differential Operators.
- (4) Calculate the line integral, surface integral and volume integrals.
- (5) Identify the importance of Green, Gauss and Stoke's theorems in other branches of Mathematics.

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## **CORE COURSE-5B: LINEAR ALGEBRA**

After successful completion of this course, the student will be able to

- (1) Demonstrate the concepts of vector spaces, subspaces, bases, dimension and their properties with examples.
- (2) Identify Matrices with Linear Transformations.
- (3) Develop an idea about inner product space and proceed to normed linear spaces.
- (4) Use Gram-Schmidt Process to find Orthogonal set of non-null vectors from any arbitrary set of vectors.

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## **CORE ELECTIVE COURSE-6 B: NUMERICAL ANALYSIS**

After successful completion of this course, the student will be able to

- (1) Perform an error analysis for a given numerical method.
- (2) Get the knowledge of Errors in numerical computations.
- (3) Solve algebraic or transcendental equations using an appropriate numerical method.
- (4) Approximate a function using an appropriate numerical method.
- (5) Prove results for numerical root finding methods.
- (6) Get the knowledge of Finite Differences in Interpolation.
- (7) Understand the concepts of Interpolation with equal and unequal intervals.
- (8) Code a Numerical Method in a Modern Computer Language.

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## **CLUSTER ELECTIVE COURSE-8 A 1: INTEGRAL TRANSFORMS**

After successful completion of this course, the student will be able to

- (1) Get the knowledge of Solutions of Ordinary Differential and Partial Differential equations by using Laplace Transforms.
- (2) Get the knowledge of applications of Laplace Transforms to Integral Equations.
- (3) Get the knowledge of Fourier Transforms.
- (4) Get the knowledge of Finite Fourier Transforms.

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## CLUSTER ELECTIVE COURSE-8 A 2: ADVANCED NUMERICAL ANALYSIS

After successful completion of this course, the student will be able to

- (1) Get the knowledge on Fitting a Straight Line, Exponential Function, Power Function and Second Degree Parabola.
- (2) Evaluate a derivative at a value using appropriate numerical methods.
- (3) Calculate a definite integral using appropriate numerical methods.
- (4) Solve an ordinary differential equation using appropriate numerical methods.
- (5) Express the problems numerically.

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