Mathematics

Programme specific outcomes

Course outcomes

Geometry

After studying the paper, students are able to:

- understand geometrical terminology for angles, triangles, quadrilaterals and circles
- measure angles using a protractor.
- use geometrical results to determine unknown angles
- recognize line and rotational symmetries
- find the areas of triangles, quadrilaterals and circles and shapes based on these.

Calculus

After studying the paper, students are able to:

- interpret a function from an algebraic, numerical, graphical and verbal perspective and extract information relevant to the phenomenon modeled by the function.
- verify the value of the limit of a function at a point using the definition of the limit
- calculate the limit of a function at a point numerically and algebraically using appropriate techniques including l'Hospital's rule.
- find points of discontinuity for functions and classify them.

understand the consequences of the intermediate value theorem for continuous functions

interpret the derivative of a function at a point the as the instantaneous rate of change in the quantity modeled and state its units.

interpret the derivative of a function at a point as the slope of the tangent line and estimate its value from the graph of a function

sketch the graph of the derivative from the given graph of a function.

given a table of function values, approximate the value of the derivative at a point using the forward difference quotient and the centered difference quotient

Differential Equation

After studying the paper, students are able to:

Explain the concept of differential equation.

Classify the differential equations with respect to their order and linearity.

Explain the meaning of solution of a differential equation.

Express the existence-uniqueness theorem of differential equations

solve first-order ordinary differential equations.

Solve exact differential equations.

Converts separable and homogeny equations to exact differential equations by integrating factors

Solve Bernoulli and Ricotta differential equations.

find solution of higher-order linear differential equations.

Express the basic existence theorem for higher- order linear differential equations.

Solves the homogeneous linear differential equations with constant coefficients

Apply the method of undetermined coefficients to solve the non-homogeneous linear differential equations with constant coefficients.

Uses the method "variations of parameters" to find to solution of higher-order linear differential equations with variable coefficients

Solve the Cauchy-Euler equations.

Number Theory and Numerical Analysis

After studying the paper, students are able to:

solve an algebraic or transcendental equation using an appropriate numerical method

approximate a function using an appropriate numerical method

solve a differential equation using an appropriate numerical method

evaluate a derivative at a value using an appropriate numerical method

solve a linear system of equations using an appropriate numerical method

perform an error analysis for a given numerical method

prove results for numerical root finding methods

calculate a definite integral using an appropriate numerical method

code a numerical method in a modern computer language

Mechanics

After studying the paper, students are able to:

verify the Parallelogram Law of Forces To verify Kinematic of a particle, to verify kinetics of a particals,to understand motion of a projectile, to verify central orbit, to verify forces acting on a particle, to verify equilibrium of forces acting on a particle ,to forces acting on a rigid body, center of gravity

Analysis Paper

After completion of this paper, students will be able to

- Describe fundamental properties of the real numbers that lead to the formal Development of real analysis.
- Comprehend regions arguments developing the theory underpinning real analysis
- Demonstrate an understanding of limits ad how that are used in sequences, series and differentiation.
- Construct rigorous mathematical proofs of basic results in real analysis.
- Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.