N.S.S.R's

# Vasantdada Patil Arts, Commerce & Science College Patoda

## Department of Mathematics

# Program and Course Outcomes

## B. Sc. MATHEMATICS

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## Program Outcomes

Know how and where to use technology Investigate and solve unfamiliar math problem Investigate and apply mathematical problems and solutions in a variety of contents related to science and technology, business and industry and illustrate these solutions using symbolic numeric or graphic methods To apply the knowledge of subjects in other faculties like humanities, social sciences The skills of observations and drawing logical inferences from the scientific experiments

## Program Specific Outcomes

- Think logically
- Formulate and develop mathematical arguments in a logical manner.
- Acquire good knowledge and understanding in advanced areas of mathematics.
- Application of mathematics can be used in every sector like social science, all sciences business and
- other contexts.

## Course Outcomes

**Paper No. 101 Differential and vector calculus**

- Define limit continuity, function, hyperbolic function
- Find nth order derivative of the products of the powers of sines and cosines
- Prove Leibnitz's theorem.
- State Rolle's Theorem, lagrange's mean theorem, Cauchy's mean value theorem
- Prove Taylor's theorem • Define: Limit of a function of two variable continuity of a function of two variable at a point, homogeneous function.
- State Euler's theorem on homogeneous functions, total differentials, differentiate implicit function.
- Define: Scalar and Vector valued point functions, directional derivative of point functions along co-ordinate axes.
- Define: Gradient, Operator, Divergence and curl.

**Paper No. 201 Integral calculus and vector calculus**

- Understand case of non-repeated linear factors, case of non-repeated linear or repeated linear factors, case of linear or quadratic non-repeated factors.

- Solve integration of sinn x, cosn x and reduction formulae for integration of sin-nx, cosn x.
- State fundamental theorem.
- Find areas of plane regions, length of plane cureves, volumes and surfaces of revolution.
- Define line integrals, circulation, irrotational vector point functions, surface and volume integral 51
- Interpretation of Gauss theorem.

**Paper No. 301 Number Theory**

- State and prove division algorithem, Find GCD
- State Euclidean algorithm and Diophantine equation ax+by =c
- State Fundamental theorem of arithemetic
- Solve basic properties of congruences.State and Fermat's and wilson's theorem
- Introduce Eulers phi-function, T and 6
- State Euler's theorem Find the Mobius inversion formula.

**Paper No. 401 Numerical Analysis**

- State Bisection method, newton's-Raphson method
- Find finite differences, forward differences, backward differences, differences of a polynomial
- Describe symbolic relation and separation of symbols • Calculate Newton's formulae for interpotetion
- Understand Lagrange's interpolation formula
- State Hermite's interpolation formula • Calculate divided differences and their properties
- State newton's general interpolation formula • Use Least-squares curve fitting procedures
- Understand fitting a straight line
- Find chebyshev polynomials
- Find solutions of different linear system of equations
- Find Numerical solution of ordinary differential equations

**Paper No. 501 Abstract Algebra**

- Understand sets, functions, integers
- Define group
- Understand subgroup, Normal subgroup, quotient groups
- Define homomorphism and automorphism
- Describe different types of rings
- Understand vector spaces and modules

**Paper No. 303 Mechanics**

- Define Rigid body, forces, Equilibrium, statics
- Understand complete theory of forces acting of a particle
- Describe theory related with equilibrium of forces acting on a particle
- Find forces acting on a rigid body
- Understand centre of gravity
- Define velocity and acceleration in terms of derivatives
- Describe Newton's law of motion, matter, Linear momentum, Angular momentum, work,

energy.

- Illustrate rectilinear motion, projectile Motion of projectile, projectile to pass trough a given point
- Understand theory related to central orbits.

**Paper No.102 Differential Equation**

- Explain meaning of differential equation
- Classifies the differential equations as per order and linearity
- Solve first order linear differential, exact differential & Bernoulli's equations
- Solves the Linear differential equations with constant coefficients as well as variable coefficients of higher order.
- Solves the simultaneous and special form of differential equations
- Solves the first order partial differential equation find out partial derivatives.

**Paper No.202 Geometry**

- To understand geometrical terminology for planes, lines, spheres, cones and cylinder, the conicoid
- Solves the problems on different concepts of every subtopic
- Develop the theoretical formulae for different concepts

**Paper No.302 Integral Transform**

- Student will able to
- Explains the concept of Laplace transform.
- Explains basic properties of Laplace transform.
- Find Laplace transform of derivative integral, multiplication by t, division by t, unit step function of f(t).
- Express inverse Laplace transform & develop all formulae
- Solves linear differential equation using Laplace transform
- Explain the special functions Beta & Gamma functions its transformations & solves the examples.
- Student will able to
- Solve linear as well as non-linear partial differential equations.
- solves the partial differential equations of first degree and any order by methods Charpit's Methods & Jacobies Method.
- Determine complementary function and particular integral of given partial differential equations Solves partial differential equations of 2nd order
- Classify the 2nd order partial differential equations in canonical forms.

**Paper No.501 Real Analysis**

- Define the concepts of sets, subsets, finite, infinite power, singletons sets
- Explains all sets operations 53
- Define functions as well as different types of functions
- Define real valued, complex valued functions as well as countable & uncountable set & study all existing sets.
- Define sequences & services
- Established theorems and solve problems related to sequences & series

- Explain concept of Jacobians & solve examples on this concepts.

**Paper No. 504 Ordinary Differential Equation – I**

- Define complex number and its properties, construct theory & solve examples on it.
- Solves determinant for given system.
- Explains the linear differential equations, develop theory of homogeneous & non-homogeneous equations & solves examples on it.
- Define linear equations of 2nd order homogeneous & non-homogeneous equations.
- Solve the examples & establish the theory related to it.

**Paper No.601 Real Analysis**

- Define concept of Metric space, limit in metric space.
- Familiar with the concept of basic proof techniques & fundamental concepts such as connectedness, completeness & compactness.
- Explain the Riemann integral & its properties solve examples on it.
- Explain the concept of Fourier series & solve examples on it.

**Paper No.604 Ordinary Differential Equations –II**

- Explain the linear differential equations with variable coefficient. Develop the theory related initial value problem i.e. existence & uniqueness theorems
- Explain the concept of wroskian as well as apply theoretical concept to solve the examples
- Solves homogeneous equations with analytical coefficients
- Solve Legendre equations
- Study linear equations with regular singular points and solve examples on it.