Programme Specific Outcomes of B.Sc. Mathematics

- Think in a critical manner.
- Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
- Formulate and develop mathematical arguments in a logical manner.
- Acquire good knowledge and understanding in advanced areas of mathematics and physics, chosen by the student from the given courses.
- Understand, formulate and use quantitative models arising in physics, chemistry & computer science.

Course Outcomes

Course I: Differential equations

After studying the course the students are able to

- Extract the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.
- Find a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y.
- Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.
- Solve simultaneous linear equations with constant coefficients and total differential equations.

Course II: Analytical Geometry 3D

After studying the course the students are able to

- Describe the various forms of equation of a plane, straight line, Sphere, Cone and Cylinder.
- Find the angle between planes, Bisector planes, Perpendicular distance from a point to a plane, Image of a line on a plane, Intersection of two lines
- Define coplanar lines and illustrate
- Compute the angle between a line and a plane, length of perpendicular from a point to a line
- Define skew lines
- Calculate the Shortest distance between two skew lines.

Course III: Modern Algebra

After studying the course the students are able to

- Define subgroup, center, Normalizer of a subgroup.
- Find cycles and transpositions of a given permutations.
- Prove Lagrange's theorem ,Euler's theorem and Fermat's theorem
- Define cyclic groups.
- Prove a group has no proper subgroup if it is cyclic group of prime order.
- Define normal sub groups, quotient groups and index of a subgroup.
- Define homomorphism, kernel of a homomorphism, isomorphism.
- Prove Cayley's theorem, the fundamental theorem of homomorphism for groups
- Define rings, zero divisors of a ring , integral domain , field and prove theorems

Course IV: Real Analysis

After studying the course the students are able to

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

Course V: Vector Calculus

After studying the course the students are be able to

- Find and interpret the gradient curl, divergence for a function at a given point.
- Interpret line, surface and volume integrals.
- Evaluate integrals by using Green's Theorem, Stokes theorem, Gauss's Theorem.

Course VI: Linear Algebra

After studying the course the students are be able to

- Define Vector Space, Quotient space direct sum, linear span and linear independence, basis and inner product.
- Discuss the linear transformations, rank, nullity.
- Find the characteristic equation, eigen values and eigen vectors of a matrix.
- Prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt orthogonalisation process.
- Solve the system of simultaneous linear equations.

Course VII: Laplace Transform

After studying the course the students are be able to

- Find the Laplace transform of a function by definition and by use of a table.
- Find the inverse Laplace transform of a function.
- Write piecewise functions using the unit step function.
- Find transforms using the first and second translation theorems.
- Find the convolution of two functions and the transform of a convolution.
- Find the transforms of derivatives and integrals.
- Find the transform of a periodic function.
- Solve a basic differential equation using the Laplace transform.
- Solve linear differential equations with constant coefficients and unit step input functions using the Laplace transform.

Course VIII (A): Integral Calculus and Fourier Series

After studying the course the students are be able to

- Solve Basic Integral Calculus problems.
- Explain properties of definite integrals.
- Prove reduction formulae and solve some problems by using this formulae.
- Evaluate double and triple integrals.
- Apply change variable method to find the value of double and triple integral.
- Explain properties of Beta functions.
- Derive relation between Beta and Gamma functions.
- Evaluate integrals by using Beta and Gamma functions.
- Find Fourier series expansions for given functions.
- Find Cosine and Sine series expansions for given functions.

Course VIII (B): Numerical Analysis

After studying the course the students are be able to

- Define Basic concepts of operators Δ,E, ∇
- Find the difference of polynomial
- Solve problems using Newton forward formula and Newton backward formula.
- Derive Gauss's formula and Stirling formula using Newton forward formula and Newton backward formula.
- Find maxima and minima for differential difference equation.
- Derive Simpson's 1/3 & 3/8 rules using trapezoidal rule.
- Find the solution of the first order and second order equation with constant coefficient.
- Find the summation of series finite difference techniques
- Find the solution of ordinary differential equation of first by Euler, Taylor and Runge-Kutta methods.