

Department of Mathematics

Programme Outcomes: B. Sc. Mathematics

Department of Mathematics	After successful completion of three year degree program in Mathematics a student should be able to;
Program outcomes	PO-1: Learn the fundamental principles underlying the major areas of mathematics. PO-2: Develop problem solving skills PO-3: Use their mathematical knowledge to solve various types of problems PO-4: Able to develop depth thinking skills in a critical manner PO-5: Undertake future study related to mathematics
Program Specific outcomes	PSO-1 : Acquire good knowledge and understanding in advanced area of mathematics PSO-2: Develop mathematical argument in a logical manner PSO-3: Demonstrate the use of mathematical reasoning by justifying and generalizing patterns and relationships PSO-4: Students will be able to write and critique mathematical proof

Course outcomes of B.Sc. Mathematics

B.Sc. Sem-I

Course	Outcomes
MAT 101: Calculus and Matrix Algebra	After completion of these courses students should be able to; CO-1: Find nth derivative of functions using standard results and Leibnitz theorem CO-2: Understand the concept of convergence and divergence of series and apply various tests of convergence to problems CO-3: Use Taylor's theorem and maclaurin's theorem to find power series of functions CO-4: Evaluate rank of a matrix using different methods CO-5: Find eigenvalue and eigenvector of matrix CO-6: Apply Cayley-Hamilton theorem to find the inverse of a matrix CO-7: Discuss the consistency of linear system by matrix method
MAT 102: Practicals based on MAT 101	CO-1: Draw graphs of trigonometric and inverse trigonometric functions CO-2: Integrate by different methods viz. Substitution, by parts, partial fractions, limit of sums CO-3: Verify Cayley-Hamilton theorem CO-4: Find solutions of linear equations by Cramer's rule CO-5: Apply Gauss-Jordan method to find the inverse of a matrix

B.Sc. Sem-II

Course	Outcomes
MAT 103: Differential Equations and Matrix Algebra	After completion of these courses students should be able to; CO-1: Find solution of first order and first degree differential equations by methods- separable, homogeneous, linear. CO-2: Obtain solution of first order and higher degree differential equations CO-3: Apply the concept of differential operator to obtain general solution of differential equations of higher order and degree one CO-4: Find equation of sphere using conditions CO-5: Understand type of central and non-central conicoids CO-6: Discuss the relationship among spherical, cartesian and cylindrical coordinates CO-7: Obtain equations of enveloping cone and cylinder CO-8: Find equations of right circular cone and cylinder
MAT 104: Practicals based on MAT 103	CO-1: Draw graphs of curves (circle, parabola, ellipse, hyperbola, estroid, logarithmic function, exponential function) CO-2: Apply reduction formula to evaluate certain type of integrals CO-3: Find length of arc, surface area of surface, volume of solid under given conditions CO-4: Transform equations from cartesian to polar form and vice versa.

B.Sc. Sem-III

Course	Outcomes
MAT 201: Advanced Calculus-I	<p>After completion of these courses students should be able to;</p> <p>CO-1: Find the limits of a functions using definition and check the continuity of any functions and find the points of discontinuity of function</p> <p>CO-2: Find the partial derivatives of functions in any direction by directional derivative</p> <p>CO-3: Check the differentiability of any function and prove young's theorem and Schwartz theorem</p> <p>CO-4: Prove Euler's theorem for homogeneous functions and find the extreme values of the function</p> <p>CO-5: Expand the functions of two variables using Taylor's theorem and maclaurin's theorem</p>
MAT 202: Linear Algebra-I	<p>CO-1: Define vectorspace, subspace, span.</p> <p>CO-2: Understand addition, union, intersection of subspace, Span and their properties.</p> <p>CO-3: Differentiate the LI and LD set and find interlinked of its properties</p> <p>CO-4: Find coordinate vector relative to basis and use this concept to obtain matrix associated with linear map.</p> <p>CO-5: Prove dimension theorem and verify it.</p> <p>CO-6: Discuss linear transformations and real life applications.</p> <p>CO-7: Understand range, kernel of a linear map, inverse of a linear map.</p> <p>CO-8: Understand the proof of Rank-Nullity theorem in connection with dimension theorem and verify it</p>
MAT 203: Numerical Methods-I and Practicals based on MAT 201 & MAT 202	<p>CO-1: To find missing terms from the given table and to express a polynomial in terms of factorial notations</p> <p>CO-2: Understand the concept of interpolation and study various interpolation methods for equispaced and nonequispaced data points</p> <p>CO-3: Apply direct and indirect method to solve linear algebraic equations</p> <p>CO-4: understand the process of curve tracing and apply it</p>

B.Sc. Sem-IV

Course	Outcomes
MAT 204: Advanced Calculus-II	After completion of these courses students should be able to; CO-1: Find the double and triple integrals , also change the order of integrals CO-2: Evaluate the definite integral using beta gamma functions CO-3: Find the line integral, surface integral and volume integral CO-4: Prove Green's theorem stoke's theorem and the divergence theorem and verify it CO-5: Form partial differential equations by the method of elimination of arbitrary constant and method of elimination of arbitrary functions
MAT 205: Abstract Algebra-I	CO-1: Apply algebraic way of thinking CO-2: Understanding of fundamental concepts including groups, subgroups, normal subgroups, homomorphisms and isomorphism CO-3: Prove fundamental theorems/results using appropriate techniques
MAT 206: Numerical Methods-I and Practicals based on MAT 204 & MAT 205	CO-1: Understand the relation between roots and coefficients of equation CO-2: Solve polynomial equation by Cardon's method, Ferrari's method and Graphical method CO-3: Apply Newton's Raphson method, fixed point iteration method, Bisection method to solve nonlinear equation. CO-4: Solve IVP by Euler's method, Picard's method and Taylor series method, Runge-Kutta method of order 2 and 4 CO-5: Integrate by numerical methods- Trapezoidal rule, Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule, Weddle's rule CO-6: Draw lattice diagram of cyclic group and its subgroups

B.Sc. Sem-V

Course	Outcomes
MAT 301: Linear Algebra- II	<p>After completion of these courses students should be able to;</p> <p>CO-1: Able to find solution of operator equation and dual basis of basis. CO-2: Using Gram Schmidt process able to find orthogonal and orthonormal basis of vectors. CO-3: Able to diagonalize the symmetric matrix and non symmetric matrix. CO-4: Understand the concept of Cayley Hamilton theorem and can reduce the quadric to their principal axis. CO-5: Understand the different way to solve the determinant .</p>
MAT 302: Analysis-I	<p>CO-1: Describe fundamental properties of real numbers CO-2: Construct rigorous mathematical proofs of basic results CO-3: Understand the concept of convergence of sequence and results link to continuity CO-4: Differentiate the concepts of continuity and uniform continuity CO-5: Understand intermediate value property of derivatives</p>
MAT 303: Complex Variables & Fourier Series	<p>CO-1: Understand the basic concepts of complex variables CO-2: Prove theorems on limits, differentiability, CO-3: Relate analytic functions and harmonic functions by theorem CO-4: Find the image of under linear transformations CO-5: Apply Fouriser series to find series in sines and cosines CO-6: Prove Bessel's inequality, Riemann-Lebesgue theorem</p>
MAT 304: Mathematical Programming	<p>CO-1: To formulate LP model of real life situation CO-2: Using Simplex method , big- M method and two-phase method to optimize a given LPP CO-3: Construct dual problem from primal problems and using dual simplex method to optimize a given LPP CO-4: Using transportation problem they are able to minimize transportation cost CO-5: Using Hungarian method they can assign jobs to the appropriate workers so that profile Should be maximized</p>
MAT 305: Discrete Mathematics (Subject	<p>CO-1: Define different types of relation and can give examples of relation CO-2: Define lattice and lattice as a poset and give examples of lattices and theorem of lattices</p>

Elective Course)	CO-3: Define boolean algebra and give examples of boolean algebra CO-4: Find sum of products and product of sum canonical form CO-5: Find the values of Boolean expression
MAT 306: Practicals (bases on MAT 301 to 304)	CO-1: Apply theory to solve problems based on MAT 301 CO-2: Apply theory to solve problems based on MAT 302 CO-3: Apply theory to solve problems based on MAT 303 CO-4: Apply theory to solve problems based on MAT 304

B.Sc. Sem-VI

Course	Outcomes
MAT 307: Abstract Algebra-II	After completion of these courses students should be able to; CO-1: Understand the concept of ring, field and integral domain. CO-2: Understand the fundamental theorem of Homomorphism. CO-3: Able to give example of ring, subring and field. CO-4: Learn concept of polynomial ring ,factor theorem and remainder theorem. CO-5: Able to check the Reducibility and irreducibility of polynomials
MAT 308: Analysis-II	CO-1: Discuss and understand of existence of Riemann integral CO-2: Able to test convergence of series with positive terms CO-3: Understand absolute convergence and conditional convergence of series CO-4: Expand exponential, logarithmic, trigonometric functions CO-5: Find power series solution of differential equations
MAT 309: Analysis-III	CO-1: Define metric, metric space, open sets, closed sets CO-2: Discuss convergence, completeness and Baire's theorem CO-3: Prove rigorous theorem of continuity, compactness and connectedness CO-4: Understand uniform convergence and apply to term by term differentiation and integration CO-5: Apply uniform convergence to power series, Abel's limit theorem
MAT 310: Graph Theory	CO-1: Explain the concept of graph theory CO-2: To find whether the graph is connected or not using adjacency matrix , fusion method CO-3: Easily find minimal spanning tree using different algorithms CO-4: Find the shortest path between two vertices using different algorithms CO-5: Determine whether the graph is Hamiltonian or Eulerian
MAT 311: Operations Research (Subject Elective Course)	CO-1: Reduce the total cost of inventory management by using EOQ model CO-2: Understand to construct project network, project planning and project Controlling. CO-3: Using project network can find critical path to know activity time and costs. CO-4: Inventory provides services to the customer at a short time. CO-5: A game theory provides a series of mathematical models

	<p>that may be useful in explaining interactive decision-making concept.</p> <p>CO-6: Two or more competitors are involved under conditions of conflict and competition.</p>
<p>MAT 312: Practicals (bases on MAT 307 to 310)</p>	<p>CO-1: Apply theory to solve problems in MAT 307 CO-2: Apply theory to solve problems in MAT 308 CO-3: Apply theory to solve problems in MAT 309 CO-4: Apply theory to solve problems in MAT 310</p>