Course Outcomes

B.Sc. First Year

Course: Geometry

Students will able to understand and

CO1: Describe the polar equation of parabola, ellipse and hyperbola, chord joining two points.

CO2: Define tangent, normal, pair of tangents, asymptotes and compute director circle and auxiliary circle of a conic.

CO3: Describe the various forms of equation of a plane and find the angle between planes.

CO4: Explain Bisector planes, Perpendicular distance from a point to a plane, Image of a line on a plane, Intersection of two lines.

CO5: Compute the angle between a line and a plane and length of perpendicular from a point to a line.

CO6: Find and interpret symmetrical and non-symmetrical form of equations of a line and transformation of non-symmetrical form to symmetrical form.

CO7: Calculate the Shortest distance between two lines and orthogonal projection of a point and a line on a plane.

CO8: Evaluate the Intersection of three planes and volume of a tetrahedron.

CO9: Illustrate various form of equation of cones, cylinders, central conicoid, ellipsoid and paraboloids.

CO10: Find Generating lines of a hyperboloid of one sheet and hyperbolic paraboloid and its properties.

Course: Elementary Analysis

Students will able to

CO1: Defend conclusions by proving mathematical statements inductively and defining mathematical concepts recursively.

CO2: Define tautologies, quantifiers and describe equivalence and order relations.

CO3: Study functions in detail which is a fundamental structure in all sciences and explain direct and inverse images of subsets under maps.

CO4: Learn basic properties of real numbers and its subsets (Natural Numbers, Integers, Rational/Irrational Numbers) which is backbone of Real Analysis and explain axiomatic introduction of R as a complete ordered field.

CO5: Define different types of sequence and prove properties of convergent and divergent sequence using behavior of Monotonic sequence.

CO6: Prove Cauchy's first limit theorem, Cauchy's Second limit theorem.

CO7: Explain subsequences with properties.

CO8: Explain and check existence of limit of a function.

CO9: Describe and evaluate continuity of a function, boundedness and intermediate value properties of continuous function.

CO10: Define and Illustrate differentiability of a function with geometrical interpretation.

CO11: To prove Interior extremum theorem, Rolle's theorem, Lagrange mean value theorem, Cauchy mean value theorem, Darboux theorem.

CO12: Apply notion of derivative in mean value theorem and also in higher order derivatives which arise in all applied sciences.

CO13: Calculate maxima and minima, Convexity and concavity and Curvature of curves.

Course: Ordinary Differential Equations

Students will able to

CO1: Formulate an ordinary differential equation and describe order and degree of differential equations.

CO2: Extract the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.

CO3: Find a solution of differential equations by using methods of solvable for p, x and y.

CO4: Compute all the solutions linear differential equations with constant coefficients.

CO5: Define orthogonal trajectories and mechanical applications.

CO6: Find singular solutions, fundamental system of solutions, apply variation of parameters method.

CO7: Formulate applications of damped and forced oscillations.

CO8: Evaluate gradient, divergence and curl and establish vector identities.

CO9: Illustrate orthogonal curvilinear coordinates, spherical and cylindrical polar coordinates

CO10: Find the line, surface and volume integrals along with Green's Stokes and Gauss theorems.

B.Sc. Second Year

Course: Linear Algebra

Students will able to

CO1: Learn the importance of linear transformation in Physics, Engineering, Social sciences and various branches of Mathematics.

CO2: Define Vector Space, Quotient space Direct sum, linear span and linear independence, basis and inner product.

CO3: Discuss the linear transformations, rank, nullity.

CO4: Find the characteristic equation, eigen values and eigen vectors of a matrix

CO5: Prove Cayley- Hamilton theorem, Schwartz inequality, Gram-Schmidt Orthogonalisation process.

CO6: Interpret Inner Product Space.

CO7: Solve the system of simultaneous linear equations.

CO8: Describe Bilinear forms, quadratic forms.

CO9: Classify curves and surfaces of equations of second degree.

Course: Real Analysis

Students will able to

CO1: Give examples for convergence, divergence and oscillating series.

CO2: Discuss the behavior of the geometric series.

CO3: Prove theorems on different test of convergence and divergence of a series of positive terms.

CO4: Verify the given series is convergent or divergent by using different test.

CO5: Learn Riemann Integral and its properties in detail, leading to fundamental theorem of calculus and Mean value theorems.

CO6: Study different tests for solving improper integrals of first and second kind.

CO7: Study pointwise and uniform convergence of sequences and series of functions.

CO8: To equip students with basic mathematical tools such as open & close sets, continuity, connectedness, compactness which can be used to study general topology and real & complex analysis.

CO9: To generalize the notion of distance, convergent sequence and continuity of functions.

CO10: To increase problem solving ability by solving examples and counter-examples of various concepts involved.

Course: Mechanics

Students will able to

CO1: Study and illustration about common catenary, virtual work and stability of equilibrium.

CO2: Illustrate rectilinear motion, simple harmonic motion, under resisting media and motion of varying mass.

CO3: Describe and classify motion in plane into kinematics and kinetics.

CO4: Explain and Compute constrained motion.

CO5: Find and interpret motion under central forces, energy equation, Kepler's law of planetary motion.

B.Sc. Third Year

Course: Abstract Algebra

Students will able to

CO1: Define Groups, subgroup, center, Normalizer of a subgroup.

CO2: Find cycles and transpositions of a given permutations.

CO3: Prove Lagrange's theorem, Euler's theorem and Fermat's theorem.

CO4: Define cyclic groups.

CO5: Prove a group has no proper subgroup if it is cyclic group of prime order.

CO6: Define normal subgroups, quotient groups and index of a subgroup.

CO7: Define Group action, class formula with special reference to inner conjugation, classification of groups of order p^2 and upto order 8.

CO8: Define homomorphism, kernel of a homomorphism, isomorphism.

CO9: Prove Cayley's theorem, the fundamental theorem of homomorphism for groups.

CO10: Define rings, zero divisors of a ring, integral domain, field and prove theorems.

CO10: Learn linear congruences and algorithms to find solutions of linear congruence.

CO11: Prove Chinese Remainder Theorem, Euler's criterion, Gauss quadratic reciprocity theorem and study Euler's phi function, Divisor function, Moebius function and their properties.

Course: Advanced Analysis

Students will able to

CO1: Describe limit of a function between metric spaces.

CO2: Define continuity and characterization of continuity in terms of open and close sets.

CO3: Define compact metric spaces, prove Lebesgue covering, uniform continuity, completeness of metric spaces.

CO4: Explain the notion of derivatives in partial and directional sense.

CO5: Apply differentiability in functions of several variables, composite functions.

CO6: Prove Mean value theorem for real valued functions, Young's and Schwarz Theorem, Taylor theorem.

CO7: Illustrate applications of partial differentiation, maxima and minima for real valued function of several variables.

CO8: Evaluate Jacobian matrix and determinants and explain functional dependence.

CO9: Study pointwise and uniform convergence of sequence and series of functions with their properties and related theorems.

CO10: Study and explain Power series with its properties.

CO11: Learn about convergence of power series over C, analyticity, Cauchy-Riemann equations, complex standard functions and their representations in terms of real functions.

Course: Advanced Mechanics

Students will able to

CO1: Describe forces in three dimensions, central axis and wrench, null line and null plane, conjugate forces and conjugate lines.

CO2: Explain and illustrate moment and product of inertia of some standard bodies.

CO3: Describe Momental ellipsoid of a body and principal axes.

CO4: Study D-Alembert's principle, general equation of motion.

CO5: Compute motion of the effective forces about the axis of rotation, kinetic energy of the body rotating about a fixed axis.

CO6: Evaluate velocity and acceleration of a moving particle in cylindrical and spherical polar coordinates.

CO7: Learn about Lagrangian and Eulerian approaches of motion of fluid particles, equation of continuity in different coordinate system, boundary surfaces and stream lines.

CO8: Derive Euler's equation of motion and Bernoulli's equation.

CO9: Illustrate motion in two dimensions, stream function, sources and sinks.

CO10: Find image of a system of a simple source with respect to a plane, image system of a doublet with regard to a plane and prove sphere circle theorem.

Course: Numerical Analysis

Students will able to

CO1: Describe the need for numerical methods, floating point representation, rounding off rules.

CO2: Find solutions of arbitrary equations by several methods like fixed point iteration method, Bisection method, Regula-Falsi method, Newton-Raphson method.

CO3: Describe interpolation, operators and their relationship, forward, backward and central difference tables and several interpolation formulas.

CO4: Explain cubic spline interpolation, clamped and natural splines.

CO5: Compute differentiation using interpolation, quadrature, trapezoidal and Simpson one third and three-eight formulas.

CO6: Find and interpret numerical methods for ODE, incremental methods, predictor corrector pairs for first order equations.

CO7: Derive Taylor series and Runge-Kutta-Nystrom method for second order equations.

CO8: Learn and solve system of equations by Gauss elimination, LU factorization, Cholesky's method, Gauss-Jacobi and Gauss-Siedel methods.

CO9: Illustrate curve fitting by least square method.

CO10: Find eigenvalues and eigenvectors by iteration methods.