SULLAMUSSALAM SCIENCE COLLEGE, AREEKODE

B Sc Mathematics

Programme Specific Outcomes

• 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 statistics, chosen by the student from the given courses.

• Understand, formulate and use quantitative models arising in social science, business and other contexts.

Course Outcomes

Course Outcome of Analytical Geometry 3D and Vector Calculus

Students will be 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

• 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 Outcome of Theory of Equation, Theory of Numbers and Inequalities

Students will be able to

• Describe the relation between roots and coefficients

• Find the sum of the power of the roots of an equation using Newton's Method.

• Transform the equation through roots multiplied by a given number, increase the roots, decrease the roots, removal of terms

• Solve the reciprocal equations.

• Analyze the location and describe the nature of the roots of an equation.

• Obtain integral roots of an equation by using Newton's Method.

• Compute a real root of an equation by Horner's method.

• Illustrate the Division and Euclidean Algorithm

• Describe the properties of prime numbers

• Show that every positive integer can be expressed as product of prime power in unique way

• Write a formula for the number of positive integers less than n that are relatively prime to n

• Define congruences and describe the properties of congruences

• Find the Sum, product of all the divisors of N.

• Find the smallest number with N divisors.

• Solve the system of linear congruences

• State Chinese Remainder Theorem, Fermat's and Wilson's theorem

Course Outcome of Complex Analysis

Students will be able to

• Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers.

• Calculate exponentials and integral powers of complex numbers.

• Write equation of straight line, circle in complex form

• Define reflection points, concyclic points, inverse points

• Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.

• Determine whether a given function is analytic.

• Define Bilinear transformation, cross ratio, fixed point.

• Write the bilinear transformation which maps real line to real line, unit circle to unit circle, real line to unit circle.

• Find parameterizations of curves, and compute complex line integrals directly.

• Use Cauchy's integral theorem and formula to compute line integrals.

• Represent functions as Taylor, power and Laurent series.

• Classify singularities and poles.

• Find residues and evaluate complex integrals, real integrals using the residue theorem.

Course Outcome of Modern Analysis

Students will be able to

• Define countable, uncountable sets

• Write Holders and Minkowski inequality

• Define and recognize the concept of metric spaces, open sets, closed sets, limit points, interior point.

• Define and Illustrate the concept of completeness

• Determine the continuity of a function at a point and on a set.

• Differentiate the concept of continuity and uniform continuity

• Define connectedness

• Describe the connected subset of R.

• Define compactness

• Characterize the concept of compactness in metric space.

• Construct rigorous mathematical proofs of basic results in modern analysis

Course Outcome of Linear Algebra

Students will 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 Outcome of Numerical Analysis

Students will 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 differencial 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

Course Outcome of Sequence and Series

Students will be able to

• Define different types of sequence.

• Discuss the behavior of the geometric sequence.

• Prove properties of convergent and divergent sequence.

• Verify the given sequence in convergent and divergent by using behavior of Monotonic sequence.

• Prove Cauchy's first limit theorem, Cesaro's theorem, Cauchy's Second limit theorem.

• Explain subsequences and upper and lower limits of a sequence.

• Give examples for convergence, divergence and oscillating series.

• Discuss the behavior of the geometric series.

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

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

Course Outcome of Differential equations and its applications

Students will be 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.

• Form partial differential equations.

• Find the solution of First order partial differential equations for some standard types.

• Use inverse Laplace transform to return familiar functions

• Apply Laplace transform to solve second order linear differential equation and simultaneous linear differential equations.

Course Outcome of Graph Theory

Students will be able to

- Describe the origin of Graph Theory.
- Illustrate different types of graph theory.
- Explain independent sets and covering sets and some basic theorems.
- Discuss degree sequences and operations on graphs.
- Explain connectedness and components and some theorems.
- Characterize tree.
- Derive some properties of planarity and Euler's formula.
- Find chromatic number and chromatic polynomials for graphs.
- Explain basic properties of directed graphs.

Course Outcome of Integral Calculus and Fourier Series

Students will 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 Outcome of Differential Calculus and Trigonometry

Students will be able to

- Find Maxima and minima of function of two variables.
- Explain subtangent and subnormal.
- Find angle of intersection of two curves.
- Find circle, radius and centre of curvature.
- Define hyperbolic functions.
- Define inverse hyperbolic functions.

Course Outcome of Linear Programming

Students will be able to

- Define basic feasible solutions, Slack and Surplus variable.
- Explain simplex method.
- Demonstrate Big-M method
- Illustrate two phase method
- Prove dual of the dual is primal.
- Interpret dual simplex method.
- Define transportation problem.
- Find a basic feasible solution to the transportation problem by using North west corner rule, Vogel's approximation method.
- Illustrate Assignment problem and Traveling salesman problem.

Course Outcome of Statistics

Students will be able to

- Define Moments, Skewness and Kurtosis.
- Fit a straight line.

- Calculate the correlation coefficient for the given data.
- Compute Rank correlation for the given data.
- Define attributes, consistency of data, independence of data.
- Find index numbers for the given data.
- Define Probability, Conditional probability.
- Derive Baye's theorem.

Course Outcome of Modern Algebra

Students will be 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 subgroups, 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.