College Code : 7631

ಎಸ್.ಈ.ಎ. ವಿಜ್ಞಾನ ವಾಣಿಜ್ಯ ಮತ್ತು ಕಲಾ ಕಾಲೇಜು

(ಬೆಂಗಳೂರು ಉತ್ತರ ವಿಶ್ವವಿದ್ಯಾಲಯದಿಂದ ಸಂಯೋಜನೆಗೊಂಡಿದೆ ಹಾಗೂ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಮಾನ್ಯತೆ ಪಡೆದಿದೆ)

S.E.A COLLEGE OF SCIENCE, COMMERCE & ARTS

(Affiliated to Bengaluru North University, and Recognized by Govt. of Karnataka)

NAAC Accredited with 'B' Grade

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Department of Mathematics

PROGRAMME OUTCOME, PROGRAMME SPECIFIC OUTCOME, LEARNING OUTCOME AND COURSE OUTCOME

B.Sc.(Mathematics)	
PROGRAMME OUTCOME	PO-1 Formulate and develop mathematical arguments in a logical manner. Also when there is a need for information, the student will be able to identify, locate, evaluate, and effectively use that information for handling issues or solving problems at hand. PO-2 Acquire good knowledge and understanding in advanced areas of mathematics and its applications.
PROGRAMME SPECIFIC OUTCOME	PSO-1 Will be able to apply critical thinking skills to solve problems that can be modelled mathematically, to critically interpret numerical and graphical data, to read and construct mathematical arguments and proofs. POS-2 Use computer technology appropriately to solve problems and to promote understanding, to apply mathematical knowledge to a career related to mathematical sciences thus cultivating a proper attitude for higher learning in mathematics .

LEARNING OUTCOME	LO-1 Students will be well equipped to critically analyse a given problem, understand and build a mathematical model to represent the problem, solve the resulting equations and interpret the resulting solution. LO-2 Students are well prepared for higher studies in their chosen field.
COURSE OUTCOMES (8 Theory & Practical courses)	
Mathematics-I	* Understand the concept of rank of a matrix and its relation to solution of linear system of equations, learning the idea of eigen values, eigen vectors, Cayley-Hamilton theorem. * Recognize the algebraic equations representing geometric objects such as line, plane, sphere, cylinder, cone and analyse them. * Learn the basic skills of successive differentiation, partial and total differentiation,calculation of Jacobians, recognise homogenous functions leading to Euler's theorem. Compute integrals using Reduction formulae and Leibnitz rule.
Mathematics Practical - I	* Introduced to Free and Open Source Software (FOSS Tools) like SCILAB and MAXIMA environment to perform basic mathematical operations and functions. * Learn computations with matrices, solution of linear algebraic systems (both manual and using SCILB) * Understands MAXIMA commands for differentiation(ordinary, partial), integration to find nth derivatives, partial derivatives, Jacobians and reduction formulae. * Implement vector forms of a line and plane.

Mathematics-II	* Comprehend the fundamental ideasof Binary operation on a set, Algebraic structures such as Group, Subgroup and their basic properties. * A solid foundation of Calculus –Learn to use Polar coordinates, tangents & normals , pedal equations, curvature of plane curves, Asymptotes & envelopes of plane curves leading to the skill of tracing of curves. * Develop methods of computing length of an arc, area of enclosed by a curve, surface area and volume of revolution of a curve using integration. * Learn to recognize and develop skill to solve Linear, Bernouli, Exact and non-linear differential equations. Learn to find Orthogonal trajectories of a given family of curves.
Mathematics Practical - II	* Develop skill to create simple programs in SCILAB and MXIMA to generate particular sequences , to find largest or smallest of the given numbers, to check for palindromes... * Learn to find identity, inverse of an element of a group, subgroup of a group using scilab/maxima * Plot Cartesian and polar curves . * Solve first order ordinary differential equations.(both manual and using SCILB)
Mathematics-III	* Develop an understanding of Order of an element of a group, order of a group, Cyclic group, coset decomposition of a group leading to the proof of Lagrange's theorem on finite groups and it's applications. * Understand the basic ideas of convergence and divergence of sequences and series and the methods used for their tests. Basic knowledge of summation of series. * Determine the continuity, differentiability of functions defined on subsets of the real line. Understand the mean value theorems and their proofs which lead to - the L'Hospital's rule for finding limits of functions and the Taylor's theorem and it's applications.

Mathematics Practical - III	* Develop understanding and verification of Lagrange's theorem on finite groups and calculation of cosets of a subgroup of a group using FOSS tools. * Learn the method of analysing convergence of sequences and series, summation of series using Maxima. * Write Scilab/Maxima programs to illustrate continuity, differentiability of functions, mean value theorems, calculate limits using L'Hospital's rule.
Mathematics-IV	* Comprehend the important concepts of Normal subgroup, Quotient group, Homomorphism of groups, proof of FTH, permutation groups and the Cayley's theorem and it's proof. * Learn the skill of finding the full & half range Fourier series expansion of a given function. * Develop ability to test continuity and differentiability of functions of more than one variable and to extend the Taylor's series expansion for them. Determine the maxima & minima of functions of two variables. * Learn the mathematical tool of Laplace transform and its properties to solve linear differential equations which govern LC-R circuits. * Computational skill of finding all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.
Mathematics Practical - IV	* Verify normality of a subgroup, test for homomorphism and isomorphism of groups using Maxima. * Find Fourier series expansion of the given periodic functions. * Find Laplace and Inverse Laplace transforms of some standard functions using maxima and use them to solve linear differential equations . * Solve 2^{nd} order linear differential equations by finding CF and PI (maxima progam) * Find maxima and minima of functions of two variables.
Mathematics-V	* Gain knowledge in Ring theory-- comprehend the ideas of subrings, Ideals, quotient rings, Field, homomorphism, proof of FTH.

	* Understands the ideas of scalar field and vector field and computation of gradient, divergence, circulation and Laplacian and their geometric and physical interpretations . * Develop basic skills of Numerical Methods: finite differences, interpolation of different data structures, Numerical integration.
Mathematics Practical - V	* Understand different types of Rings and their verification through maxima programs * Learn calculation of gradient, divergence, curl, Laplacian of scalar and vector fields and their identities using maxima programs. * Use scilab tool to do interpolation and numerical integration.
Mathematics-VI	* Develop an understanding and knowledge of basic ideas of 'calculus of variations' such as – functional, variational problem, Euler's equation, Geodesics, Brachistochrone problem and Isoperimetric problems. * Understand the ideas of Line and Multiple Integrals and develop skills to evaluate them and apply them to solve geometric problems of finding areas and volumes of surfaces and solids. * Learn the important Integral theorems – Green's theorem, Gauss theorem, Stokes' theorem – and their proofs and some problems there on.
Mathematics Practical - VI	* Understand use of Euler's equation to solve variational problems such as Brachistochrone problem, isoperimetric problems through hand computation and maxima programs. * Evaluate line and multiple integrals of different types using maxima commands. * Verify integral theorems, evaluate given integrals through maxima programs.

Mathematics-VII	* Analyse vectors in R^n geometrically and algebraically, Recognize the concepts of the terms span, linear independence, basis, and dimension, and apply these concepts to various vector spaces and subspaces. Use matrix algebra to represent linear transformations and find rank , nullity, singularity. * Learn basic concepts of ‘curvilinear’ coordinate systems and their inter-relation, conversion. * Acquire skill to solve total and simultaneous differential equations . * Develop thorough understanding of the basic ideas of formation,classification and solution of ‘Partial differential
	equations’ of first & second order and application to one dimensional Heat and Wave equations.
Mathematics Practical - VII	* Comprehend through practical calculation(and also using maxima) the important ideas of linear algebra such as span, linear independence, basis, and dimension, matrix of linear transformations and verify rank- nullity theorem . * Solve total and simultaneous differential equations. * Develop skill to solve different types of partial differential equations . * Learn solution of one dimensional wave and heat equations under Dirichlet conditions .
Mathematics-VIII	* Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers.Write equation of straight line, circle in complex form • Understand the significance of differentiability of complex functions and be familiar with the Cauchy-Riemann equations and 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 parametrizations of curves, and compute complex line integrals directly.Use Cauchy’s integral theorem and formula to compute line integrals. * Learn ‘Numerical methods’ of solving algebraic and transcendental equations, systems of linear algebraic equations, computing largest eigen value of a square matrix and solution of ordinary differential equation of first by Euler, Taylor and Runge-Kutta methods.

Mathematics Practical - VIII	* Write maxima programs to verify check analyticity of complex functions, use Milne-Thomson method to construct analytic functions, check orthogonality and hormonicity of real and imaginary parts of analytic functions. * Learn the important ideas of bilinear transformations, cross ratios and their preservance under bilinear transformation. * Evaluate integrals using Cauchy's Integral theorem.(using scilab) * Solve using different numerical methods algebraic equations, system of equations. Find largest eigen value .(using scilab) * Solve ODEs using Euler's method and Runge Kutta method (using scilab)