COURSE & PROGRAM OUTCOMES OF DEPARTMENT OF MATHEMATICS

Session:2025-26

PROGRAMMEOUTCOME	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 than information for handling issues or solving problems at hand. Acquire good knowledge and understanding in advanced areas of mathematics and its applications. More specifically- • Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study. • A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning. • Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution. • Introduction to various courses like group theory, ring theory, field theory, metric spaces, number theory. • Enhancing students' overall development and to equip them with mathematical modelling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment. • Abilitytopursueadvancedstudiesandresearchinpureandappliedmathematicalscience.
PROGRAMME SPECIFIC OUTCOME	Students 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, to use computer technology appropriately to solve problems and to promote understanding, toapply mathematicalknowledge to acareer related to mathematical sciences thus cultivating a proper attitude for higher learning in mathematics. Students will be able to • Thinkinacriticalmanner. • 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.

	• Formulateanddevelopmathematicalargumentsinalogicalmanner. • Acquire good knowledge and understanding in advanced areas of mathematics and statistics,chosen by the student from the given courses. • Understand,formulateandusequantitativemodels arisinginsocialscience,Businessand other contexts.
LEARNINGOUTCOME	Studentswillbewellequippedtocriticallyanalyseagivenproblem,understandandbuilda Mathematicalmodeltorepresenttheproblem,solvetheresultingequationsandinterprettheresulting solution.Students arewell prepared for higher studies in their chosen field.

Class-B.Sc/B.A 1st year

COURSES	OUTCOMES
COURSE TITLE: CALCULUS	After completing this course, the learner will be able to: 1. Gain knowledge of the concepts and theory of limit, continuity and differentiability of functions. Attain skills of calculating the limit of functions and examining the continuity and differentiability of different types of functions, and perform successive differentiation of functions. To apply the procedural knowledge to obtain the series expansions of functions which find multidisciplinary applications. 2. Understand concepts of asymptotes and curvature, the geometrical meaning of these terms and to have procedural knowledge to solve related problems. 3. Determine singular points of a curve and classify them. Understand the concept of rectification of curves and derive the reduction formulae. 4. Have theoretical knowledge and practical skills to evaluate the area bounded by the curves, and volume and surface area of solids formed by revolution of curves. 5. Attain cognitive and technical skills required for solving different problems of calculus associated with tracing of curves, determination of curvature, and rectification of curves, volume and surface area of solids of revolution. Have technical and practical skills of solving calculus problems related to differentiation and integration of functions by using MAXIMA software.

COURSE TITLE:INTRODUCTORY MATHEMATICS(MDC 1)	After completing this course, the learner will be able to: 1. Gain the knowledge of set theory, types of sets and operations on sets. Understand various concepts of matrices and determinants, and acquire the cognitive skills to apply different operations on matrices and determinants. 2. Have the knowledge of the basic concepts of complex numbers and acquire skills to solve linear inequalities and quadratic equations. 3. Gain the knowledge of the concepts of Arithmetic progression, Geometric progression and Harmonic progression, and find A.M., G.M. and H.M. of given numbers. 4. Have the conceptual knowledge of straight lines and circles. Find out the slope of a line, angle between two lines, and know about various forms of a straight line and the standard form of a circle. 5. Attain the skills to make use of the learnt concepts of Introductory Mathematics in multidisciplinary learning contexts and to know their applications.
COURSE TITLE : ALGEBRA AND NUMBER THEORY	After completing this course, the learner will be able to: 1. Gain knowledge of the concepts of symmetric, skew-symmetric, Hermitian, skew-Hermitian, Orthogonal and Unitary matrices, Linear dependence and independence of rows and columns of a matrix. Have knowledge of procedure and cognitive skills used in calculating rank of a matrix, eigen values, characteristic equation, minimal polynomial of a matrix and technical skills used in solving problems based on Cayley- Hamilton theorem. 2. Have knowledge of the concepts used in solving problems based on relations between the roots and coefficients of general polynomial equation in one variable , solutions of polynomial equations having conditions on roots, common roots and multiple roots. Understand Descarte's rule of signs and learn cognitive and technical skills required in assessing nature of the roots of an equation and solving problems based on these. 3. Have deeper and procedural knowledge required for solving cubic and biquadratic equations used in Mathematics as well as many other learning fields of study. To understand the basic concepts of number theory and their applications in problem solving and life- long learning. 4. Have knowledge of concepts, facts, principles and theories of Linear Congruences, Fermat's theorem, Euler's theorem, Wilson's theorem and its converse, Chinese Remainder theorem. Attain cognitive skills used in solving linear Diophantine equations in two variables. 5. Attain cognitive and technical skills required to formulate and solve practical problems involving rank of a matrix, inverse of a matrix, Cardon's method, Ferrari's method, Descarte's method, Cayley-Hamilton theorem, Euler's theorem and Chinese Remainder theorem. Have technical and practical skills required for solving algebraic equations, finding inverse and eigen values of matrices by using built in functions of MAXIMA software.

COURSE TITLE:MATHEMATICS FOR COMMERCE AND SOCIAL SCIENCES (MDC 2)	After completing this course, the learner will be able to: 1. Understand and have the procedural knowledge of the concepts of matrices and determinants to solve simultaneous linear equations. 2. Gain the knowledge to find derivatives and integration of simple functions related to commerce and social sciences. Acquire skills to make use of derivatives and integration in realistic problems of the discipline. 3. Have the conceptual knowledge of compound interest, annuity, loan, debenture and sinking funds and attain skills to use these concepts in problem solving. 4. Gain the knowledge and understanding of the concepts of Linear programming and develop skills of formulating and solving linear programming problems based on real world problems. 5. Attain the cognitive and technical skills required for accomplishing assigned tasks relating to the chosen 34(988) components of the course. fields of learning in the context of broad multidisciplinary contexts to solve commercial and social real world problems using Mathematics.
COURSE TITLE:NUMERICAL ABILITY ENHANCEMENT SKILLS (SEC II)	After completing this course, the learner will be able to: 1. Understand real number system, fundamental arithmetical operations, use of BODMAS rule and solve typical expressions accurately and fast. 2. Acquire skill to identify types of given sequences/series and apply suitable method to find a particular term, sum of specific number of terms and practice this learning in real life mathematical problems. 3. To formulate equations for specific mathematical problem and making use of mathematical skills to solve that. 4. Have a deeper and comprehensive understanding of the basic concepts of Percentage, Profit & Loss, Alligation or mixture, Averages and acquire skill to use this knowledge in real life problems. 5. Attain cognitive and analytical skills to identify, analyze and generate solutions to realistic problems by exploring procedural knowledge associated with the problems. Have analytical skills to compare and recognize various geometrical figures available in surroundings with mathematical figures and determine areas and volumes of the same.
Class-B.Sc/B.A 2nd year	
COURSE TITLE :DIFFERENTIAL EQUATIONS	After completing this course, the learner will be able to: 1. Gain knowledge of the basic concepts of ordinary differential equations and learn various techniques of finding exact solutions of certain solvable first order differential equations. 2. Have procedural knowledge and cognitive and technical skills of solving homogeneous and nonhomogeneous second order linear ordinary differential equations with constant coefficients and with variable coefficients. 3. Gain knowledge of theory of total differential equations and basic concepts of partial differential equations. To learn methods and techniques for solving linear PDEs of first order and to acquire technical skills for accomplishing assigned tasks relating to formulation and solution of PDEs in broad multidisciplinary contexts. 4. Have knowledge of concepts and theories of second order PDEs and to apply theory of PDEs to

	determine integral surfaces through a given curve and to find orthogonal surfaces. To understand compatible systems and to learn cognitive and technical skills required for selecting and using relevant Charpit method, Jacobi method methods to assess the appropriateness of approaches for solving PDEs.5. To attain cognitive and technical skills required for selecting and using relevant methods and techniques to assess the appropriateness of approaches to solving problems associated with the differential equations. To attain technical skill of solving differential equations by using built in functions of MAXIMA software.
COURSE: ANALYTICAL GEOMETRY & VECTOR CALCULUS	After completing this course, the learner will be able to: 1. Gain knowledge of the concept of different conic sections, their classification and properties. Understand various terms related to conic sections and gain skills to use them in problem solving. 2. Have knowledge of general form of equation of a sphere and attain procedural knowledge required for solving problems related to intersection of spheres, tangent plane and line, orthogonality, length of tangent and co-axial system of spheres. Learn about equations of cones and apply knowledge for problem solving. 3. Have deeper knowledge and understanding of cylinder, enveloping cylinder, concepts of conicoids, tangent plane, director sphere, normal, envelope and to make further use thereof. 4. Understand and solve problems related to scalar and vector product of vectors, vector differentiation, directional derivatives, gradient, divergence and curl operators. Have deeper understanding of line, surface and volume integrals, their evaluation, proof of Gauss Divergence, Green's and Stoke's theorems and gain theoretical and technical knowledge in computing different surface flux integrals, volume integrals and line integrals used in other disciplines also.5. Attain cognitive and technical skills required for solving practical problems related to assessing nature of conicoid, their characteristics. Learn skills to formulate and solve real life practical problems on sphere, cone and cylinder; to generate solutions of practical problems involving complex line, surface and volume integral using Gauss Divergence theorem, Stoke's theorem, Green's theorem in a very easy manner
COURSE TITLE: MATHEMATICS FOR ALL(MDC 3)	After completing this course, the learner will be able to: 1. Gain knowledge of the concepts of sets, Venn diagrams, De-Morgan's laws, basic set operations and apply this factual knowledge to solve daily life mathematical problems which can be formulated in terms of sets. 2. Understand the concept of differentiation as the rate of change of dependent variable with respect to the change in independent variable. Gain knowledge of differentiation of various functions and apply it to the problems of its own discipline and other disciplines for computing the rate of change. 3. Acquire cognitive and technical knowledge about a variety of methods of representation of statistical data and methods of measure of central tendency. Analyze the problem and apply the best measure of central tendency to draw inferences from the available data. 4. Understand the concept of correlation, correlation methods and conclude about the type of correlation for the available data.

	Comprehend the skills of curve fitting. 5. Attain a range of cognitive and technical skills to differentiate and integrate various functions. Use procedural knowledge to solve simple first order differential equations. Have technical and practical skills required for selecting and using suitable methods for data representation and measure of central tendency.
COURSE TITLE: QUANTITATIVE APTITUDE(SEC 3)	After completing this course, the learner will be able to: 1. Comprehend the formulation of equations for specific mathematical problems and use mathematical skills to solve those. 2. Acquire the procedural knowledge to analyze and solve problems related to work & time , work and wages and apply those in real life situations. 3. To get deeper knowledge and understanding of concepts of Simple interest, Compound Interest, Partnership, Work and time and use this procedural knowledge to perform assigned tasks of solving such problems. 4. Familiarize and get acquainted with various measures of central tendency and using cognitive skills to choose better of these for the available data and draw the inferences/results. 5. Attain a range of cognitive and technical skills to analyze and comprehend various numerical concepts, e.g., Formulation of equations, S.I. & C.I., Work & time, Work & Wages, Set theory etc. and apply these learned skills and techniques to solve daily life mathematical problems accurately, logically and well in time.
Class-B.Sc/B.A 3rd year	
COURSE TITLE : SEQUENCE & SERIES	After completing this course, the learner will be able to:1. Understand basic concepts of real number system, set theory and preliminary results on neighborhoods of apoint, interior and limit points, open sets, closed sets etc. 2. Learn about denumerability of subsets of real numbers,sequences, their limits, boundedness and convergence. Determine the convergence and divergence of asequence. Understand Cauchy sequence and Cauchy general principle of convergence of sequence.3. Attain skills to determine convergence of a series of real numbers by applying various tests.4. To know absolute and conditional convergence of alternating series and apply theory to check theconvergence of arbitrary series. 5*Attain cognitive and technical skill required to checkthe convergence of sequences and infinite series and verify the same by applying various available tests and tools.
COURSE TITLE : NUMERICAL ANALYSIS	1. The course will also develop an understanding of the elements of error analysis for numerical methods and certain proofs.2. The main objective of this course is to provide students with an introduction to the field of numerical analysis.3. Derive appropriate numerical methods to solve interpolation based problems.4. Derive appropriate numerical methods to solve probability based problems.5. Prove results for various numerical root finding methods.
COURSE TITLE : BUSINESS MATHEMATICS I	After completing this course, the learner will be able to: 1. understand set theory, logical statements and truth tables. 2. learn the logarithms and arithmetic and geometric progressions and their applications. 3. familiarize with the concepts of matrices and determinants. Learn to solve system of

	simultaneous linear equations. 4. have the conceptual knowledge of Compound interest, annuity, loan, debenture and sinking funds and attain skills to use these concepts in daily life.
COURSE TITLE :BUSINESS MATHEMATICS II	After completing this course, the learner will be able to: 1. gain the knowledge to find derivatives simple functions related to commerce problems, attain skills to use application of derivatives in evaluating maxima and minima. 2. learn to find integration of simple functions related to commerce and economic problems, attain skills to use application of integration in business and commerce problems. 3. apply binomial theorem, learn the concept and applications of permutations and combinations. 4. learn the concept of Linear programming and formulation of linear programming problems related to business and commerce.
COURSE TITLE :BBA MATHEMATICS I	After completing this course, the learner will be able to:1. Understand set theory, logical statements and truthtable. Find the solution of linear equations.2. Determine the solution of quadratic equations. Learnthe concept and applications of permutations and combinations.3. Apply binomial theorem. Understand the conceptsrelated to functions, limit and continuity andappropriately apply the concepts of differentialcalculus to solve related problems. 4. Understand the matrix algebra and its application tobusiness problems. Find the solution of system ofsimultaneous linear equations using determinants andmatrices.
COURSE TITLE : BBA MATHEMATICS II	After completing this course, the learner will be able to:1. Understand the application of Average, Ratio and Proportion, Percentage, Profit and Loss, Commission, Discount, Broke in business organisation.2. Understand simple interest and compound interest and annuities.3. Understand indices & logarithms.4. Understand applications of linear programming insolving business problems.

DEPARTMENT OF MATHEMATICS

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