



Ready for
Every Good Work

SACRED HEART COLLEGE (AUTONOMOUS)

Tirupattur – 635 601, Tamil Nadu, S.India

Resi : (04179) 220103

College : (04179) 220553

Fax : (04179) 226423

A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

Name of the Programme: BSc. Mathematics

S No	Title of the Paper	Course Code	Course Objectives	Course Outcomes	Relevance
1	DIFFERENTIAL CALCULUS	M116	<ul style="list-style-type: none">To develop problem solving skills in Calculus and provide base for higher mathematics	<ul style="list-style-type: none">Classify the maxima and minima of the function.Demonstrate mean value theorem for differentiable functions.Developing the Euler's theorem of homogeneous function.Finding the curvature and analyze evolutes of the curve in Cartesian and Polar coordinates.Identify and build the Envelopes and Asymptotes of the curve.	Global
2	ALGEBRA AND TRIGONOMETRY	M117	<ul style="list-style-type: none">To solve various types of algebraic equations, derive trigonometric identities and find real imaginary parts of complex trigonometric expression.	<ul style="list-style-type: none">list summation of various series. understand the importance of real and complex roots of the equation.finding the roots of the equation by various methods.formulate the Trigonometric series. determine and point out the relation between circular and hyperbolic function.	Global

3	INTEGRAL CALCULUS	M214	<ul style="list-style-type: none"> To develop problem solving skills in Calculus and provide base for higher mathematics. 	<ul style="list-style-type: none"> identify the techniques to solve the integration of Rational function. understand the techniques to solve the integration of Trigonometry function. applying the Bernoulli's formula to get the solution of the integral of the function. evaluate and deduce the concept of double and triple integrals. integrate of double and triple integral by Beta and Gamma function. 	Global
4	DIFFERENTIAL EQUATIONS & FOURIER SERIES	M215	<ul style="list-style-type: none"> To help the learners to solve standard types of ordinary and partial differential equations 	<ul style="list-style-type: none"> understand the genesis of ordinary as well as partial differential equations and name the applications in real world. apply various techniques of getting exact solutions of certain solvable first order differential equations and linear differential equations of second order. find solution of first order linear partial differential equations using Lagrange's method and eliminating constant and functions.. solve second order linear partial differential equations with constant coefficients. formulate mathematical models in the form of ordinary differential equations and to get the solution of the problem. Fourier Cosine and Fourier Sine series. 	Global
5	VECTOR CALCULUS	M315	<ul style="list-style-type: none"> To develop deep understanding of key concepts followed by problems of applied mathematics, which are essential tools of modern applied mathematics 	<ul style="list-style-type: none"> understand the definition of Scalar and Vector point's functions and find the directional derivative of a Scalar point function. find the solenoidal and irrotational of the vector point function. evaluate the line integrals, surface integrals and volume integrals. 	Global

				<ul style="list-style-type: none"> describe inter-relationship among the line integral, surface integral and triple integral formulation. apply and analyze Greens', Gauss and Stokes theorem. 	
6	SOLID GEOMETRY AND TRANSFORMS	M316	<ul style="list-style-type: none"> To make the students understand the basic concepts in two dimensional, three dimensional geometry, Laplace and Fourier transforms and to make them solve problems in these fields of study 	<ul style="list-style-type: none"> relate between plane and straight line in 2D and 3D. examine the two-dimensional, three-dimensional geometry and solve problems in these areas analyze the uses of solid geometry in different scientific fields. find the solution of ODE using Laplace transforms. define the Fourier transform and its properties and convolution theorem and perform problems by Fourier transform. 	Global
7	MATHEMATICAL LOGIC (CERTIFICATE COURSE)		<ul style="list-style-type: none"> The students will acquire the knowledge of Logic and propositional calculus; Basic logical operations, truth tables, Tautologies and contradictions; The applications of mathematical logic; Conditional and bi-conditional statements; Quantifiers and negations of quantified statements 	<ul style="list-style-type: none"> learn the syntax of mathematical logic and semantics of first-order languages. understand the propositional logic and basic theorems like compactness theorem, meta theorem and post-tautology theorem. assimilate the concept of completeness interpretations and their applications with special emphasis on applications in algebra. 	Global
8	NUMERICAL METHODS	M415	<ul style="list-style-type: none"> To introduce the scientific computation techniques to the students. 	<ul style="list-style-type: none"> find numerical solution to algebraic and transcendental equation. devise numerical solutions of system of linear equations and to check the accuracy of the solution. apply various interpolating and extrapolating methods to find numerical solution. 	Global

				<ul style="list-style-type: none"> understand the concept of numerical differentiation. define integration formulas and analyze the integrals by using Trapezoidal and Simpson's formula. 	
9	ALGEBRAIC STRUCTURES – I	M416	<ul style="list-style-type: none"> To acquire the knowledge of basic concept of some of the fundamental algebraic structures on Groups and Subgroups, Permutation Groups, Normal Subgroups and Factor Groups and Group Homomorphism's 	<ul style="list-style-type: none"> understand the fundamental concept of groups, subgroups and related theorems. define cyclic and permutation groups and its properties. establish Lagrange's theorem. categorize internal and external direct products. consider finite abelian group and develop their properties of homomorphism 	Global
10	ALGEBRAIC STRUCTURES – II	M541	<ul style="list-style-type: none"> To acquire the knowledge of basic concept of some of the fundamental algebraic structures on Rings and Integral Domains, Ideals, Factor Rings and Polynomials. 	<ul style="list-style-type: none"> analyze and demonstrate examples of ideals and factor rings. define isomorphism and homomorphism for groups and rings. categorize various canonical types of groups and rings. apply and perform the reducibility and irreducibility tests for factorization of polynomials. prove the divisibility of integral domain 	Global
11	REAL ANALYSIS – I	M542	<ul style="list-style-type: none"> To study the real number system, point set topology, limits and continuity, derivatives of real-valued functions. 	<ul style="list-style-type: none"> understand and validate the basic properties of real number system such as least upper bound properties and Archimedean properties. identify the continuity of a function. define and focus on open set, closed set, connected sets, continuous set adherent points and accumulation points. establish famous theorems such as Bolzano's theorem and Fixed point 	Global

				<p>theorem.</p> <ul style="list-style-type: none"> • evaluate derivatives of real valued function using Rolle's theorem, Mean value theorem and Taylor's formula. 	
12	MECHANICS	M543	<ul style="list-style-type: none"> • To introduce the study of the motion of particles or bodies under the influence of forces and to provide a basic knowledge of behavior of objects in motion 	<ul style="list-style-type: none"> • bringout the fundamental concepts of Kinematics. • understand Forces on a rigid body. solving the problems involving frictional forces and outline their applications. • prove rectilinear motion under varying forces. • hypothesize projectile and impact. 	Global
13	PROBABILITY AND STATISTICS	M544	<ul style="list-style-type: none"> • To develop the statistical concepts and introduce the techniques of analysis and inference used for research in social and life sciences 	<ul style="list-style-type: none"> • understand the basic concepts of probability and various probabilities. • classify and perform discrete and continuous random variable and their probability distribution. • define expectation and moment generating function and focus their properties. • establish discrete and continuous distributions such as Binomial, Poisson, normal, uniform and gamma distribution. • find the correlation coefficient, rank correlation and fitting of regression lines by least square method. 	Global
14	NUMBER THEORY (ELECTIVE)	M545A	<ul style="list-style-type: none"> • To study the divisibility, primes, congruence's and arithmetic functions in number theory. 	<ul style="list-style-type: none"> • describe the basic concepts of divisibility • perform equivalence relation establish Fermat's theorem Analyze and evaluate congruence relations • define arithmetic functions and illustrate applications 	Global

15	MATHEMATICAL MODELING WITH DIFFERENCE AND DIFFERENTIAL EQUATIONS (ELECTIVE)	M545B	<ul style="list-style-type: none"> To discuss the mathematical modeling through difference equations, differential equations, calculus of variations and dynamical programming. 	<ul style="list-style-type: none"> create mathematical models of empirical or theoretical phenomena in domains such as the physical, natural or social science. understand the analytical approach to problems in their future endeavours. assess and articulate what type of modeling techniques are appropriate for a given physical system. make predictions of the behavior of a given physical system based on the analysis of its mathematical model. recognise the power of mathematical modeling and analysis and be able to apply their understanding to their further studies. 	Global
16	FUZZY ALGEBRA (ELECTIVE)	M545C	<ul style="list-style-type: none"> This course aims to introduce fuzzy algebra, fuzzy graphs, fuzzy relations, fuzzy logic, fuzzy composition and initiate the learners into the application of these ideas 	<ul style="list-style-type: none"> describe the fuzzy set operations analyze and justify the fuzzy relations. illustrate their knowledge on algebra and their extensions and applications formulate fuzzy graphs from fuzzy relations and would relate to ordinary graphs. establish fuzzy algebraic theorems over fuzzy field. 	Global
17	MATHEMATICAL MODELING WITH SPREADSHEET		<ul style="list-style-type: none"> To analyze the long term behavior of discrete and continuous dynamical systems numerically and graphically using Spreadsheet. 	<ul style="list-style-type: none"> enhance the links between mathematics, technology and other sciences in order to enhance the power of mathematics for the simulation of physical phenomena with the help of mathematical modeling techniques with spread sheet. 	Global

18	LINEAR ALGEBRA	M643	<ul style="list-style-type: none"> To study the transformations, Matrices, Systems of Linear Equations, Determinants and Diagonalization in Vector Space 	<ul style="list-style-type: none"> understand the concept of vector spaces and its bases. analyze the matrix representation of the linear transformation. find the rank of the matrix establish Cayley Hamilton theorem define the orthonormal basis and develop Gram-Schmidt orthogonalization process. 	Global
19	REAL ANALYSIS II	M644	<ul style="list-style-type: none"> To study on infinite series, test of convergence, rearrangement of Series, sequence of functions, uniform convergence and power series 	<ul style="list-style-type: none"> understand properties of the real line and that of sequence and infinite series. apply the ratio, root, alternating series and various tests to determine convergence and absolute convergence of an infinite series of real numbers. define the properties of rearrangement of series, and its infinite products. find the uniform convergence of a sequence of functions. outline the concept of power series and formulate related results. 	Global
20	COMPLEX ANALYSIS	M645	<ul style="list-style-type: none"> Upon completing this course the students will be able to use C-R equations to test for analyticity and compute a derivative, work with standard complex functions (mapping properties, derivatives), compute contour integrals using definition and Cauchy integral theorems, compute Taylor and Laurent series expansions of functions and apply the Residue theorem in the evaluation of integrals 	<ul style="list-style-type: none"> understand the significance of differentiability and analyzing of complex function leading to the Cauchy-Riemann equations. define the concept of conformal mapping and cross ratio and fixed points of bilinear transformation. learn the role of Cauchy theorem and Cauchy integral form in evaluation of contour integrals, apply Liouville's theorem in fundamental theorem of algebra . express the Taylor and Laurent series expansion of analytic function. 	Global

				<ul style="list-style-type: none"> • categorize the nature of singularities, poles and residues and perform the application of Cauchy residue theorem. 	
21	RESOURCE MANAGEMENT TECHNIQUES (ELECTIVE)	M646A	<ul style="list-style-type: none"> • To develop the skill of formulation of LPP and different techniques to solve it. To know the applications of Transportation and Assignment problems. To study the optimizing problems in Sequencing, Networking and Inventory control. 	<ul style="list-style-type: none"> • describe the concepts involved in solving linear programming problems which are widely used in business operations. • apply mathematical techniques used in optimizing transportation and assignment problems. • solve job sequencing problems. breakdown different inventory models evaluate PERT, CPM problems and develop applications 	Global
22	GRAPH THEORY (ELECTIVE)	M646B	<ul style="list-style-type: none"> • To study the basic concepts of Graph Theory such as Trees, planarity, Coloring, directed graphs and know the applications to Travelling Salesman Problem, teleprinter's problem, maximum network flow and arborescence 	<ul style="list-style-type: none"> • define the graphs along with types and their examples . • understand the types of tree. establish the coloring theorems for graphs and make graph matching. • classify and analyze types of digraphs. assess the real world problems using graphs. 	Global
23	DISCRETE MATHEMATICS (ELECTIVE)	M646C	<ul style="list-style-type: none"> • Prepare students to develop mathematical foundations to understand , create mathematical arguments and focuses on the Formal languages , Automata, Lattices, Boolean Algebra and Graph Theory 	<ul style="list-style-type: none"> • analyze and perceive various graph theoretic concepts and familiarize with their applications. • describe about partially ordered sets, Boolean algebra, lattices and their types. apply Karnaugh map for simplifying the Boolean expression demonstrate the skill to construct simple mathematical proofs and to validate . • achieve greater accuracy , clarity of thought and language. 	Global

24	MATHEMATICAL STATISTICS	M647	<ul style="list-style-type: none"> To apply statistical techniques for interpreting and drawing conclusion for business problem 	<ul style="list-style-type: none"> calculate the partial and multiple correlation coefficients for three variables. time series data, its applications to various field and components of time series, fitting of trend by moving average method, Measurement of seasonal indices by ratio and trend, ratio to moving average methods. define random sample from a distribution, sampling distribution.. understand one way and two way analysis of variance. testing of goodness of fit and evaluate the test of independence. 	Global
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