



Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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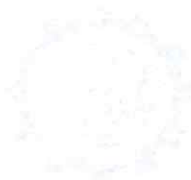
DEPARTMENT OF MATHEMATICS

Program: M. Sc. (Applied Mathematics)

Academic Year: 2019-2020

Course Code	Course Title	CO	Description of the Course Outcome
22AM1101	Real Analysis	CO-1	Describe the fundamental properties of the real numbers that lead to the formal development of real analysis.
		CO-2	Demonstrate an perceptive of limits and how they are used in sequences, series, differentiation and integration
		CO-3	Describe and apply the important properties of the limit and continuity and the differentiation and integration of the sequences and series of functions. Explain the basic properties of the Riemann integration
		CO-4	Determine the Riemann integrability of a bounded or unbounded function and prove a selection of theorems concerning integrations.
19AM1102	ORDINARY DIFFERENTIAL EQUATIONS	CO-1	Apply the existence and uniqueness conditions of solution of the homogeneous/non-homogeneous differential equation and the system of differential equations.
		CO-2	Apply the power series method of solution to second order ODE arising in mathematical physics- Gauss hyper geometric , Hermit and Chebyshev polynomials.
		CO-3	Apply Green's function method to study behavior of the Boundary Value Problems (BVP) for second order ODE.
		CO-4	Determine the oscillatory solutions of BVP and illustrate their qualitative properties.
		CO-5	Verify the solution of the ODE through MATLAB
19AM1103	Numerical Methods	CO-1	Identify the difference between solutions of system linear and roots of non-linear equations by direct, bisection methods.
		CO-2	Construct the interpolation forward and backward tables and find the Eigen values and vectors by using mat lab also.

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		CO-3	Apply Numerical differentiation and integration problems for different methods and find the values and compare the values by using mat lab also.
		CO-4	Construct numerical solutions of first and second order ordinary differential equations and compare the numerical values with mat lab also.
		CO-5	Verify the solution of the N.M. through MATLAB.
19AM1104	Introduction to Computer Programming	CO-1	Introduction to basic computer organization and computer fundamentals. Introduction to Programming language fundamentals. Illustrate and use Control Flow Statements in C++.
		CO-2	Introduction to functions in C++ and Decomposition of programs through function.
		CO-3	Interpret & Illustrate user defined C++ functions and different operations on list of data.
		CO-4	Illustrate Object Oriented Concepts and implement linear data structures
		CO-5	Develop the code for the algorithms in C++
19AM1105	MATHEMATICAL STATISTICS	CO-1	Explain the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables
		CO-2	Explain the concepts of independence, jointly distributed random variables and conditional distributions, and use generating functions to establish the distribution of linear combinations of independent random variables
		CO-3	Explain the concepts of random sampling, statistical inference and sampling distribution, and state and use basic sampling distributions. State the central limit theorem, and apply it.
		CO-4	Construct the sampling distribution of mean and variance and calculation of mean and variance of sampling distribution of mean and variance.
19AM1201	Soft Computing	CO-1	Apply A*, AO*, Branch and Bound search techniques for problem solving
		CO-2	Differentiate and classify traditional and non-additional optimization methods and Formulate an optimization problem to solve complex problems.
		CO-3	Apply Neural network methods for simple applications
		CO-4	Apply GA, PSO and ACO algorithms for various optimization problems
19AM1202	Data Structures	CO-1	Analyze and compare stack ADT and queue ADT implementations using linked list and applications.
		CO-2	Analyze the linked lists and types of Binary trees and their representations.


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		CO-3	algorithms and Analyze different Sorting Algorithms, Analyze the linked implementation of Binary, Balanced Trees and different Hashing techniques.
		CO-4	Analyze different representations, traversals, applications of Graphs and Heap organization.
		CO-5	Develop and Evaluate common practical applications for linear and non-linear data structures.
19AM1203	Statistical Inference	CO-1	Obtain estimates of parameters and identify the various methods to estimate it.
		CO-2	Apply various principles for the data reduction and draw conclusion about the population based upon samples drawn from it
		CO-3	Describe the tests of significance and draw conclusion about the population and sample using various tests.
		CO-4	Testing the hypothesis to analyze the variance and also predict the linear relationship between the two variables
19AM1204	Discrete Mathematics	CO-1	Apply the rules of Propositional logic to establish valid results and apply rules of valid inference and hence understand how to construct correct mathematical arguments, Mathematical Induction.
		CO-2	Understand the concept of relations, functions and discrete structures, Count discrete event occurrences, lattices, to represent the Boolean functions by an expression.
		CO-3	Formulate and solve recurrence relations of homogeneous and non-homogeneous relations, understand some recursive algorithms.
		CO-4	Use graph theory for various techniques to study and analyze different problems associated with computer design, logic design, Formal languages, Artificial Intelligence etc, Analysis of different traversal methods for trees and graphs.
19AM1205	Complex Analysis	CO-1	Explain the definition of continuity, differentiability, apply the concepts of analytic function and harmonic function to explain Cauchy-Riemann equations; Understanding Power Series.
		CO-2	Apply the concept of conformal mapping, and describe the mapping properties of Möbius transformations and how to apply them for conformal mappings in Fluid Dynamics, etc
		CO-3	Explain complex contour integrals; Understand simple sequences and series apply the convergence properties of a power series, and to determine the Taylor series or the Laurent series of an analytic function.


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		CO-4	Explain properties of singularities and poles of analytic functions and apply to compute residues integrals by applying residue techniques.
19AM2101	Partial Differential Equations	CO-1	Model the relevant phenomena as a Partial differential equations and obtain the solutions
		CO-2	Understand the Nature of the higher order Partial differential equation and obtain the solutions
		CO-3	Express the Laplace equation in Various coordinate systems and solve by Fourier series method
		CO-4	Solve the Hyperbolic and Parabolic differential equations by Separation of variable method
19AM2102	RELATIONAL ALGEBRA AND DBMS	CO-1	Illustrate the functional components of DBMS, importance of data modelling in design of a database.
		CO-2	Build queries using SQL and concepts of PL/SQL
		CO-3	Apply normalization techniques and indexing to construct and access decent database.
		CO-4	Identify the importance of transaction processing, concurrency control and recovery techniques
		CO-5	Develop a good database and define SQL queries for data analysis
19AM2103	Abstract Algebra	CO-1	Define group, subgroup and quotient group with examples, and proving some preliminary lemmas.
		CO-2	Define homomorphism and automorphism of groups .Explain Cayley's and Sylow's theorems of finite groups and demonstrate the problems.
		CO-3	Define a ring, homomorphism of rings, ideal, quotient rings with examples. Explain principal ideal domain, unique factorization domain, modules over PID theorems and demonstrate the problems.
		CO-4	Define field and Polynomial ring with examples. Explain the field of Quotients of an integral domain and Euclidean and polynomial rings with problems.
19AM2104	Transform Techniques	CO-1	Apply Laplace transform techniques to solve linear differential equations in system analysis where initial conditions can be easily included to give system response.
		CO-2	Applying z- transform and Mellin transform to the analysis and characterization of Discrete Time systems.
		CO-3	Apply Fourier series to analyze various signals.
		CO-4	Apply Fourier transforms to analyze various signals.
		CO-5	Verify the solution of the Transform techniques through MATLAB.


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19AM2201	Topology	CO-1	Explain the definition of Finite, countable, uncountable sets and apply the concepts of composite function and Axiom of choice to explain Zorn's Lemma.
		CO-2	Explain the concept of open sets, closed sets and basis for a topology describe the properties of product space and apply the concept of topological space and continuous function.
		CO-3	Explain the definition of compact space and connected space and apply the concept of finite intersection property and Bolzano weierstrass property.
		CO-4	Explain the properties of Hausdorff's space and normal space and apply the Urysohn's lemma to determine the urysohn's metrization theorem, Tietze extension theorem, and tychonoff theorem.
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19AM2202	Mathematical Programming	CO-1	Apply different methods to find the optimal solution of linear programming problems and analyze the sensitivity of the solution.
		CO-2	Different methods to find the optimal solution of Transportation and Assignment problems.
		CO-3	Apply non-linear optimization methods to solve non- linear programming problems
		CO-4	Apply Search methods to solve non-linear programming problems
19AM2106	Crypto Analysis And Cyberdefense	CO-1	Understand the principles of cryptography by analyzing Various attacks and apply different classic encryption techniques.
		CO-2	Understand the principles of block cipher and analyze algorithms like DES, AES.


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		CO-3	Understand and apply different algorithms of public key crypto system for ensuring secured communication.
		CO-4	Apply Security engineering principles and respective algorithms to achieve authentication, integrity and digital certification.
		CO-5	Implement various cryptographic algorithms so as to analyze the achievability of security goals like Confidentiality, integrity, authentication and also Justify the possibility of Cryptanalysis attack with each algorithm.
19AM2204	COMPUTER NETWORKS AND SECURITY	CO-1	Understand network security issues and apply key distribution techniques.
		CO-2	Apply user authentication and Transport layer Security techniques.
		CO-3	Understanding Wireless Network Security
		CO-4	Applying Email and IP Security concepts
		CO-5	Implementing the various Network Security concepts and analyse their performance using various networking tools
19AM2205	Crypto currencies & Block chain Technologies	CO-1	Understand crypto currencies and Markets, Mining and Crypto currencies
		CO-2	Understand block chain technology, Transactions, Blocks and Hashes
		CO-3	Applying Hash cryptography, Encryption vs hashing. Analyzing Transactions, Digital signature, Information technology programs
		CO-4	Analyzing Security and safeguards: protecting block chain from attackers.
		CO-5	Creation of Merkle trees, block chain, Wallet structure, address structure
19AM2107	STATISTICS WITH R-PROGRAMMING	CO-1	Understand the basic functions in R programming and identify the operators using in it.
		CO-2	Simulating data using R
		CO-3	Apply various probability distributions to the real world problems using R
		CO-4	Analyze the data using various linear and nonlinear lines using R
19AM2206	Big Data Analytics	CO-1	Illustrate the concepts of big data, Initial exploration of analysis of data and Data visualization.
		CO-2	Demonstrate Initial exploration of data and advanced data analytics by using R
		CO-3	Examine advanced algorithms & Statistical modeling for big data using HDFS, HIVE, and PIG.


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		CO-4	Apply advanced SQL functions for in- database analytics by MADlib, Greenplum along with common deliverables of analytics life cycle project
		CO-5	To implement Lab experiments using Hadoop
19AM2207	CLOUD COMPUTING	CO-1	Identify the appropriate cloud services for a given application
		CO-2	Understand authentication, confidentiality and privacy issues in Cloud computing environment.
		CO-3	Justify financial and technological implications for selecting cloud computing platforms
		CO-4	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.
		CO-5	Develop applications using VariousCloud Platforms
19AM2108	ContinuumMechanics-1	CO-1	Apply the basic concepts of generalized co-ordinates, unilateral and bilateral constraints; principle of virtual work, D'Alemberts principle.
		CO-2	Apply the methods of variational principle, problems of calculus of variations, shortest distance, minimum surface of revolution, Brachistochrone problem iso-perimetric problem, geodesic.
		CO-3	Analyze Lagranges equation of first kind and of second kind, uniqueness of solution, Energy equation of conservative fields, generalized equations
		CO-4	Analyze the principle of least action, Routh's equation, Hamilton-canonical equation of Motion.
19AM2208	ContinuumMechanics-2	CO-1	Apply various parameters such as Body force, Surface force, Cauchy's stress principle. Stress vector, State of stress at a point, relationship. These basics are essential for firther analysis and to know the composition of fluid structure
		CO-2	Analyze force and moment equilibrium, Stress tensor symmetry, Stress quadric of Cauchy, Stress transformation laws, Principal stress, Stress invariant, Stress ellipsoid.
		CO-3	Analyze the concepts of deformation Gradients, Displacement Gradient, Deformation tensor, Finite strain tensors, Small deformation theory—
		CO-4	Analyze finite strain interpretation, principal strains, strain invariant, cubical dilatation, Compatibility equation for linear strain, Strain energy function. Hook's Law. Methods and Solutions of Navier-Stocks Equations.


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19AM2209	Computational Fluid Dynamics	CO-1	Understand the concepts of Computational Fluid Dynamics and Principles of Conservation: Continuity Equation, Navier Stokes Equation, Energy Equation. and General Structure of Conservation Equations, Approximate Solutions of Differential Equations:
		CO-2	Apply the concepts of steady state Diffusion Problems, Boundary Condition Implementation. Discretization of Unsteady State Problems, FTCS (Forward time central space) scheme,
		CO-3	Apply the basic features of Finite Volume Discretization of 2-D unsteady State Diffusion type Problems, Solution of Systems of Methods, Iterative Methods, - Diffusion Equations:
		CO-4	Analyze the nature of Navier Stokes Equations: Stream Function Vorticity approach and Primitive variable approach, SIMPLE Algorithm, SIMPLER Algorithm,
		CO-5	To analyze the analytical solution and compare with that of numerical solution for a meaningful interpretation
19AM1106	Seminar-1	CO-5	Organize mathematical concepts and results effectively in written and oral form
19AM1206	Seminar-2	CO-5	Organize mathematical concepts and results effectively in written and oral form
19AM2105	Seminar-3	CO-5	Organize mathematical concepts and results effectively in written and oral form.
19AM2203	Dissertation	CO-5	Performing dissertation work and presentation.


Academic Professor I/C


HOD-MATHEMATICS

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