M.V.R. DEGREE COLLEGE
(UG And PG Courses)

(Affiliated to Andhra University)
An Institution of Priyadarshini Educational Academy)
NAAC ACCREDITED COLLEGE

Dr.V.Rama Rao, M.A.,Ph.D.,
Secretary & Correspondent

Dr.A.Balakrishna,M.Sc.,Ph.D.,
Principal

DEPARTMENT OF APPLIED MATHEMATICS

Course outcomes of all the courses offered by P.G. Applied Mathematics Department 2020-2021

SEMESTER-1

Code	Title of the Paper	Course Outcomes
AM101	Real Analysis	CO 1: Explain the concept of finite, countable and uncountable sets, metric spaces,compact sets, perfect sets, connected sets. CO 2: Limits of functions, continuous functions, continuity and compactness, continuity and connectedness, discontinuities, monotone functions, infinitelimits and limits at infinity. CO 3 :Linearity properties, integration by parts, change of variable, reduction to a Riemann integral, monotonically increasing integrators, Riemann's condition, comparison theorems, integrators of bounded variation, sufficient conditions for existence of R-S. CO 4:Integrals, necessary conditions for existence of R-S integrals, mean-valuetheorems for R-S integrals, integral as a function of interval, second fundamental theorem of integral calculus, second mean-value theorem forRiemann integrals. CO 5:Taylor's formula for real valued functions in n real variables
AM-102	Techniques Of Applied Mathematics-I	CO 1: Explain the concepts of Linear equations with variable coefficients, the wronskian and linear independence, reduction of the order of a homogeneous equations, thenon-homogeneous equations CO 2: Existence and uniqueness of solutions of 1st order equations, exact equations,Picard's method of successive approximations, existence & uniqueness of solution to systems CO 3: Euler's equations,Functional dependence on higher order derivatives variationalproblems in parametric form and applications CO 4: N-dimensional space, covariant and contravariant vectors, contraction CO 5: Second & higher order tensors, quotient law, fundamental tensor CO 6: Associate tensor, angle between the vectors CO 7: Principal directions, christoffel symbols CO 8: Covariant and intrinsic derivatives geodesics

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AM-103	Classical Mechanics	CO 1: To understand to mechanics of a system of particles, constraints, generalize cordinates generalized velocity CO 2: Some applications of Lagrangian formulation, Hamilton's principle, derivationof Lagrange's equations CO 3: Advantages of variational principle formulation, conservation theorems andsymmetry properties CO 4: Examples of canonical transformation, Poisson and Lagrange brackets and theirinvariance under canonical transformation CO 5:Hamilton Jacobi Equations for Hamilton's principal function, The CO 6: Harmonic oscillator problem as an example of the Hamilton – Jacobi method. CO 7:Relativistic formulae for composition of velocities and accelerations, propertime, Lorentz transformations form a group
AM-104	Discrete Mathematical Structures-I	To learn some definitions,problems and theorems like CO 1 :Homomorphism of semi-group and monoids, groups, subgroups andhomomorphism, cosets and Lagranges theorem, normal subgroups. CO 2 :Encoding and decoding, block codes, matrix encoding techniques, group codes, decoding tables, and Hamming codes CO 3 :Partially ordered relations, Partially ordered sets, representation and associatedterminology. CO 4 :Lattices as partially ordered sets, some properties of Lattices, Lattices as algebraic systems. CO 5:Direct product and Homomorphism, Boolean forms and free Boolean Algebras CO 6 :Defined successful mathematics learning primarily in terms of understanding the structure of mathematics together with its unifying ideas, and not just as computational skill.

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AM-105	Programming in C-	CO 1 :Identifiers and key words, Constants, C operators, Type conversion. Writing a Program in C CO 2 :Variable declaration, Statements, Simple C Programs, Simple input statement Simple output statement, Featutre of stdio.h. CO 3 :Control statements: Conditional expressions: If statement, if-else statement
LAB	C-Language Lab	CO1 : To write finding numerical integration using Simpson and Tripazodal rules. CO 2 : Solving ODE by first order Adams bashforth method. CO 3 : Solving ODE by forth order Runge Kutta method. CO 4 : Program to check a given string is a palindrome or not. CO 5: Using pointers copying a string to another string CO 6: Using pointers and functions sorting of number

SEMESTER-2

Code	Title of the Paper	Course Outcomes
AM 201	COMPLEX ANALYSIS	CO 1: Complex functions are generally supposed to have a domain that contains anonempty open subset of the complex plane CO 2: To learn about Analytic and Harmonic functions and Theorems on Analytic functions. CO 3: To find the solutions of Harmonic conjugates CO 4: To study about Cauchy integral formula,Cauchy's theorem,and problems onCauchy's theorems CO 5: To learn about Taylor's theorem and Laurent's series expansions. CO 6: To study about the Zeros,poles,singulaties and Residues of functions CO 7: Prove theorems on Liouvillie's and Morera's CO 8: Prove theorem's on Fundamental theorem of Algebra and Rouche's CO 9: To learn the concepts of conformal mappings CO 10: To study the concepts of Bilinear transformations.

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AM-202	Techniques Of Applied Mathematics-II	CO 1: To learn about Partial differential equations CO 2:To study about Ohogonal trajectories and pfaffian euations CO 3: Charpit's method and some special methods CO 4: Jacobi's method. Second order Partial differential equations with constant& Variable coefficients, canonical forms, CO 5: separation of variables method, Monge's method CO 6: Integral equations: Basic concepts, solutions of integral equations CO 7: Volterre's integral equations and Fredholm's integral equations CO 8: Fourier and Laplace Transforms with applications to ordinary, partialdifferential equations and Integral equations
AM-203	Elements of Elasticity and Fluid Dynamics	CO 1: To learn about Analysis of strain, deformation, affine deformation,infinitesimal affaine deformation CO 2: Geometrical interpretation of the components of strain, principaldirections, invariants CO 3: Analysis of stress, body and surface forces, stress tensor, equations ofequilibrium stress quadric of Cauchy, Mohr's diagram, examples of stress. CO 4:Kinematics of fluids, real and ideal fluids, velocity of fluid at a point,streamlines and path lines CO 5: velocity potential, velocity vector, local and particle rates of change,equation of continuity, Acceleration of fluid conditions at a rigid boundary CO 6: Equation of motion of a fluid, pressure at a point in a fluid at rest and ina moving fluid conditions at a boundary of two in viscid immiscible fluids CO 7:Euler's equations of motion, Bernoulli's equation. Discussion of the caseof steady motion under conservative body forces. CO 8:Flows involving axial symmetry. Impulsive motion. Vortex motion,Kelvin's circulation theorem. Some further aspects of vertex motion
AM-204	Advanced Numerical methods	CO 1: To study about Interpolation and Approximation: Lagrange interpolation, Hermite interpolation, Spline interpolation, Least squares approximation CO 2: Differentiation methods based on interpolation formulae, methods based on finite differences CO 3:Numerical Integration methods based on interpolation formulae, Newton – Cote's methods, Trapezoidal and Simpsons formulae CO 4: Euler method, backward Euler method, Midpoint method. Single step methods: Taylor series method CO 5: Runge-Kutta methods. Multistep methods: Predictor-corrector method, Adams Bashforth method, Adams –Moultan method CO 6: Numerical methods for solving elliptic partial differential equations: Difference methods, Dirichlet problem, Laplace and Poisson equations.

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AM-206	Mathematical Methods	CO 1: To learn about statements structures and notation, connectives, well formedformulas, tautologies, equivalences, implications. normal forms – Disjunctive and conjunctive, Principle disjunctiveand conjunctive normal forms. CO 2: Theory of inferences for statement calculus, validity using truth tables, values ofInference CO 3: Predicate calculus: predicates, predicate formulas, quantifiers, free and boundvariables CO 4: Inference theory of predicate calculus. CO 5: Recursive functions, primitive recursive functions, partial recursive functionsand Ackerman's functions CO 6: Graphs and multigraphs, subgraphs, Isomorphism and homomorphism, paths,connectivity, traversable multigraph CO 7: labeled and weighted graphs; complete, regular and bipartite graphs, tree graphs,planar graphs CO 8: sequential representation of Directed graphs, shortest path, Binary trees,Complete and extended binary trees, Representation of binary trees .traversing binary trees and binary search tree
	Viva -Voce	

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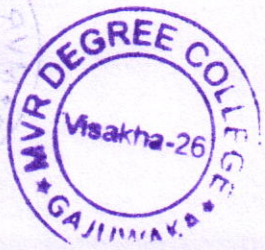
SEMESTER-3

Code	Title of the Paper	Course Outcomes
AM 301	**Measure Theory**	CO 1: Explain the concept of Measurable sets and Lebesgue measure, a nonmeasurable set, Measurable functions, Littlewood's three principles. CO 2: The Lebesgue integral of a bounded function over a set of finite measure CO 3: The integral of a nonnegative function. The general Lebesgue integral,Convergence in measure. CO 4: Differentiation of Monotone functions, Functions of bounded variation CO 5: Differentiation of an integral, Absolute continuity, Convex functions. CO 6: The Holder and Minkowski inequalities, Convergence and completeness,Bounded linear functionals on the L_p spaces.
AM-302	**Techniques Of Applied Mathematics-III**	CO 1; To learn the vibrating string, Boundary value problems of MathematicalPhysics CO 2: Eigenfunction Expansions, Upper and lower bounds of eigenfunctions. CO 3: Separation of variables. Sturm – Liouville Problems Series Solutions ofboundary value problems CO 4: One dimensional Green's function. Generalized functions. CO 5: Non/homogenous boundary value problems CO 6: Green's function in higher dimensions. Problems in unbounded regions.
AM-303	**ProgrammingLanguage-C++**	CO 1: To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs. CO 2: To practice the fundamental programming methodologies in the C/C++ programming language via laboratory experiences. Microsoft Visual Studio is the programming environment that will used. CO 3: To code, document, test, and implement a well-structured, robust computer program using the C/C++ programming language. CO 4: To write reusable modules (collections of functions).



AM-305(B)	**Optimization Techniques -I**	CO 1: To solve problems by using simplex method, artificial variables techniques, big M-method, degeneracy, revised simplex method. CO 2: The dual simplex method, Integer linear programming, Gomory's cutting plane method,branch and bound method CO 3: The traveling salesman problem, transportation models, methods for initial basic feasiblesolutions. CO 4: MODI method, degeneracy in transportation problems. CO 5: Dynamic programming, concepts of dynamic programming, Bellman's principle ofoptimality, simple models.
LAB	**C++-Language**	CO 1: To write finding numerical integration using Simpson and Tripazodal rules. CO 2: Solving ODE by first order Adams bashforth method. CO 3: Solving ODE by forth order Runge Kutta method. CO 4: Program to check a given string is a palindrome or not. CO 5: Using pointers copying a string to another string CO 6: Using pointers and functions sorting of number

SEMESTER-4

Code	Title of the Paper	Course Outcomes
AM 401	**Functional Analysis**	CO 1: Explain the concept of Topological spaces CO 2: To study about Theorems on Topological spaces CO 3: Elementary concepts, open bases and open subbases, weak topologies, function algebras Co (X, R) and Co (X, C), compact spaces product spaces, Tychonoff's theorem, separation concepts. CO 4: Definition and some examples, continuous linear transformations CO 5: Linear transformations, the Hahn-Banach theorem, the natural imbedding of N in N**, the open mapping theorem, the conjugate of an operator. CO 6: efinition and some simple properties, orthogonal complements, orthonormal sets,the conjugate space H*, the adjoint of an operator, self-adjoint operators, normal and unitary operators, projections. CO 7: Finite-Dimensional Spectral Theory: matrices, determinants and the spectrum of an operator, the spectral theorem, a survey of the situation

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AM-404(A)	**Boundary value problems-II**	CO 1: To learn Stability of linear and weakly non-linear systems, continuous dependence and stability properties of linear, non-linear and weakly non-linearsystems. CO 2: Stability by Liapunov second method, Autonomous systems, quadratic forms,Krasovski'sMethod CO 3: Construction of Liapunov functions for linear systems with constant coefficients. Selection of total energy function as a Liapunov Function,Stability based on first approximation CO 4: Analysis and Methods of non-linear differential equations, Existence theorem,extremal solutions, upper and lower solutions. Existence via upper and lower solutions, Monotone iterative Method and Method of quasilinearlization, Bihari's inequality CO 5: Oscillations of second order equation, sturms comparison theorems Elementarylinear Oscillations, comparison theorem of Hille Winter.
AM-405(B)	**Optimization Techniques-II**	CO 1: To solve problems by using Game Theory, Solution of Games with and without saddle points, minimax / maximini principle, principle of Dominance, matrix method for (m X n) Games without saddle point, algebraic method CO2: .Replacement Models: Replacement of items that deteriates with time individual replacement. Group replacement policies, recruitment and production problem. Equipment and renewal problem systems reliability. CO 3: Queuing theory: distribution in queuing systems, poison process Classificationand solutions of Queuing model, models 1-4. CO 4: Net work analysis, PERT/ CPM Techniques network diagram representation time estimates and critical path in net work analysis, uses of PERT / CPM Techniques.
	VIVAVOCE	

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AM-402	**Statistical methods**	CO 1: To learn the concept of Random variables, distribution functions, Mathematical expectation and Generating functions CO 2: Probability Distributions CO 3: Correlation and Regression CO 4: Sampling Distributions
AM-403	**Automata Theory and Formal languages**	CO 1: To study about the concept of Theory of Automata CO 2: To study about the concept of Formal languages CO 3: To study about Conext free languages CO 4: To study about Context free grammers CO 5: To study about Turing machines

Attested

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