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.,   **Dr.A.Balakrishna,M.Sc.,Ph.D.,**
Secretary & Correspondent   Principal

DEPARTMENT OF APPLIED MATHEMATICS

2015-2016

Course outcomes of all the courses offered by P.G. Applied Mathematics Department
SEMESTER-1

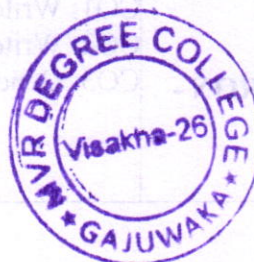| Code	Title of the Paper	Course Outcomes
AM101	Real Analysis	**Students will able to** CO1: Explain the concept of finite, countable and uncountable sets, metric spaces, compact sets, perfect sets, connected sets. CO2: Limits of functions, continuous functions, continuity and compactness, continuity and connectedness, discontinuities, monotone functions, infinite limits and limits at infinity. CO3: 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. CO4: Integrals, necessary conditions for existence of R-S integrals, mean-value theorems for R-S integrals, integral as a function of interval, second fundamental theorem of integral calculus, second mean-value theorem for Riemann integrals. CO5: Directional derivative, total derivative, Jacobian matrix, chain rule, mean-value theorem for differentiable functions CO6: Sufficient conditions for differentiability and for equality of mixed partial derivatives CO7: Taylor's formula for real valued functions in n real variables. CO8: Uniform convergence, uniform convergence and continuity, uniform convergence and integration CO9: Uniform convergence and differentiation CO10: Equicontinuous families of functions, the Stone – Weierstrass theorem.

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AM-102	Techniques Of Applied Mathematics-I	CO1: 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 CO2 : Existence and uniqueness of solutions of 1st order equations, exact equations,Picard's method of successive approximations, existence & uniqueness of solution to systems CO3: Euler's equations,Functional dependence on higher order derivatives variationalproblems in parametric form and applications CO4: N-dimensional space, covariant and contravariant vectors, contraction CO5: Second & higher order tensors, quotient law, fundamental tensor CO6: Associate tensor, angle between the vectors CO7: Principal directions, christoffel symbols CO8: Covariant and intrinsic derivatives geodesics
AM-103	Classical Mechanics	CO1: To understand to mechanics of a system of particles, constraints, generalized CO2: cordinates generalized velocity CO3: Some applications of Lagrangian formulation, Hamilton's principle, derivationof Lagrange's equations CO4: Advantages of variational principle formulation, conservation theorems andsymmetry properties CO5: Examples of canonical transformation, Poisson and Lagrange brackets and theirinvariance under canonical transformation CO6: Hamilton Jacobi Equations for Hamilton's principal function, The CO7: Harmonic oscillator problem as an example of the Hamilton – Jacobi method. CO8: Relativistic formulae for composition of velocities and accelerations, propertime, Lorentz transformations form a group

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AM-104	Discrete Mathematical Structures-I	To learn some definitions,problems and theorems like CO1: Homomorphism of semi-group and monoids, groups, subgroups andhomomorphism, cosets and Lagranges theorem, normal subgroups. CO2:Encoding and decoding, block codes, matrix encoding techniques, group codes, decoding tables, and Hamming codes CO3:Partially ordered relations, Partially ordered sets, representation and associatedterminology. CO4:Lattices as partially ordered sets, some properties of Lattices, Lattices as algebraic systems. CO5: Direct product and Homomorphism, Boolean forms and free Boolean Algebras CO6: Defined successful mathematics learning primarily in terms of understanding the structure of mathematics together with its unifying ideas, and not just as computational skill.
AM-105	Numerical MethodsAnd Programming	CO1: Most computations take place in double precision, where round-off error is reduced CO2: All of the above calculations in single precision can be repeated for double precision. CO3: To obtain the correct multiple, one uses the pivot as the divisor to the elements belowthe pivot. CO4: To facilitate computations by hand, large books were produced with formulas andtables of data such as interpolation points and function coefficients. CO5: Fortran programming preliminaries, Fortran constants and variables, Arithmetic expressions, Input-output statements, control statements, Do statements, Subscriptedvariables
LAB	FORTRON - 77	Students to do practical : CO1: Write programmes based on Matrices,Quadratic equations CO2: Write programme in generate prime numbers, CO3: Generate fibonacci sequence,Sorting of numbers.

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Course Outcomes of All The Courses Offered By P.G. Applied Mathematics Department
SEMESTER-2

Code	Title of the Paper	Course Outcomes
AM 201	COMPLEX ANALYSIS	CO1: Complex functions are generally supposed to have a domain that contains anonempty open subset of the complex plane
		CO2: To learn about Analytic and Harmonic functions and Theorems on Analytic functions.
		CO3: To find the solutions of Harmonic conjugates
		CO4: To study about Cauchy integral formula,Cauchy's theorem,and problems onCauchy's theorems
		CO5: To learn about Taylor's theorem and Laurent's series expansions.
		CO6: To study about the Zeros,poles,singulaties and Residues of functions
		CO7: Prove theorems on Liouvillie's and Morera's
		CO8: Prove theorem's on Fundamental theorem of Algebra and Rouche's
		CO9: To learn the concepts of conformal mappings
		CO10: To study the concepts of Bilinear transformaions.
AM-202	Techniques Of Applied Mathematics-II	CO1: To learn about Partial differential equations
		CO2: To study about Ohogonal trajectories and pfaffian euations
		CO3: Charpit's method and some special methods
		CO4: Jacobi's method. Second order Partial differential equations with constant& Variable coefficients, canonical forms,
		CO5: separation of variables method, Monge's method
		CO6: Integral equations: Basic concepts, solutions of integral equations
		CO7: Volterre's integral equations and Fredholm's integral equations
		CO8: Fourier and Laplace Transforms with applications to ordinary, partialdifferential equations and Integral equations

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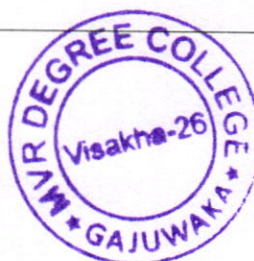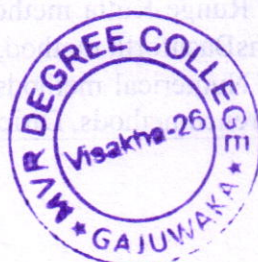| AM-203	Elements of Elasticity and Fluid Dynamics	CO1: To learn about Analysis of strain, deformation, affine deformation,infinitesimal affaine deformation CO2: Geometrical interpretation of the components of strain, principaldirections, invariants CO3: Analysis of stress, body and surface forces, stress tensor, equations ofequilibrium CO4: stress quadric of Cauchy, Mohr's diagram, examples of stress. CO5: Kinematics of fluids, real and ideal fluids, velocity of fluid at a point,streamlines and path lines CO6: velocity potential, velocity vector, local and particle rates of change,equation of continuity, Acceleration of fluid conditions at a rigid boundary CO7: 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 CO8: Euler's equations of motion, Bernoulli's equation. Discussion of the caseof steady motion under conservative body forces. CO9: Flows involving axial symmetry. Impulsive motion. Vortex motion,Kelvin's circulation theorem. Some further aspects of vertex motion

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AM-204	Discrete Mathematical Structures-II	CO1: To learn about statements structures and notation, connectives, well formedformulas, tautologies, equivalences, implications.
		normal forms – Disjunctive and conjunctive, Principle disjunctive and conjunctive normal forms.
		CO2: Theory of inferences for statement calculus, validity using truth tables, values ofInference
		CO3: Predicate calculus: predicates, predicate formulas, quantifiers, free and boundvariables
		CO4: Inference theory of predicate calculus.
		CO5: Recursive functions, primitive recursive functions, partial recursive functionsand Ackerman's functions
		CO6: Graphs and multigraphs, subgraphs, Isomorphism and homomorphism, paths,connectivity, traversable multigraph
		CO7: COlabeled and weighted graphs; complete, regular and bipartite graphs, tree graphs,planar graphs
		CO8: sequential representation of Directed graphs, shortest path, Binary trees,Complete and extended binary trees, Representation of binary trees
		CO9: traversing binary trees and binary search tree
AM-205	Advanced Numerical methods	CO1: To study about Interpolation and Approximation: Lagrange interpolation, Hermiteinterpolation, Spline interpolation, Least squares approximation
		CO2: Differentiation methods based on interpolation formulae, methods based on finitedifferences
		CO3: Numerical Integration methods based on interpolation formulae, Newton – Cote'smethods, Trapezoidal and Simpsons formulae
		CO4: Euler method, backward Euler method, Midpoint method. Single step methods:Taylor series method
		CO5: Runge-Kutta methods. Multistep methods: Predictor-corrector method, AdamsBashforth method, Adams –Moultan method
		CO6: Numerical methods for solving elliptic partial differential equations: Differencemethods, Dirichlet problem, Laplace and Poisson equations
	VIVA –VOCE	

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SEMESTER-3

Code	Title of the Paper	Course Outcomes
AM 301	Measure Theory	CO1:Explain the concept of Measurable sets and Lebesgue measure, a nonmeasurable set, Measurable functions, Littlewood's three principles. CO2: The Lebesgue integral of a bounded function over a set of finite measure CO3: The integral of a nonnegative function. The general Lebesgue integral,Convergence in measure. CO4: Differentiation of Monotone functions, Functions of bounded variation CO5: Differentiation of an integral, Absolute continuity, Convex functions. CO6: The Holder and Minkowski inequalities, Convergence and completeness,Bounded linear functionals on the L_p spaces.
AM-302	Techniques Of Applied Mathematics-III	CO1: To learn the vibrating string, Boundary value problems of MathematicalPhysics CO2: Eigenfunction Expansions, Upper and lower bounds of eigenfunctions. CO3: Separation of variables. Sturm – Liouville Problems Series Solutions ofboundary value problems CO4: One dimensional Green's function. Generalized functions. CO5: Non/homogenous boundary value problems CO6: Green's function in higher dimensions. Problems in unbounded regions.

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AM-303	Programmin gLanguage-C	CO1: To learn the fundamental programming concepts and methodologies which are essential to building good C programs. CO2: To practice the fundamental programming methodologies in the C programming language via laboratory experiences. Microsoft Visual Studio is the programming environment that will used. CO3: To code, document, test, and implement a well-structured, robust computer program using the C programming language. CO4: To write reusable modules (collections of functions).

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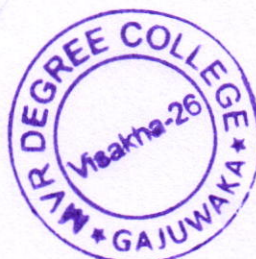**(Affiliated to Andhra University)**
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AM-305	**Boundary value problems-II**	CO1: To solve Mappings on metric spaces, Existence anduniqueness theorem viathe principle of contraction CO2: The adjoint nth order equation, The relationship between scalar and vectoradjoints. CO3: Real distinct eigenvalues, The general solution. Direct solutions, Realsolutions associated with complex eigenvalues. CO4: The two point homogeneous boundary value problem, the adjoint boundaryvalue problem CO5: The non-homogeneous boundary value problem and Green's matrix CO6: The nth order non-homogeneous boundary value problems and Green's function. CO7: Controllability and Polynomials, linear feed back, state observers, Relization ofconstant systems.
AM-308	**Optimization Techniques -I**	CO1: To solve problems by using simplex method, artificial variables techniques, big M-method, degeneracy, revised simplex method. CO2: The dual simplex method, Integer linear programming, Gomory's cutting plane method,branch and bound method CO3: The traveling salesman problem, transportation models, methods for initial basic feasiblesolutions. CO4: MODI method, degeneracy in transportation problems. CO5: Dynamic programming, concepts of dynamic programming, Bellman's principle ofoptimality, simple models.
LAB	**C-Language**	CO1: To write finding numerical integration using Simpson and Tripazodal rules. CO2: Solving ODE by first order Adams bashforth method. CO3:VSolving ODE by forth order Runge Kutta method. CO4: Program to check a given string is a palindrome or not. CO5: Using pointers copying a string to another string CO6: Using pointers and functions sorting of number

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

SEMESTER-4

Code	Title of the Paper	Course Outcomes
AM 401	Functinal Analysis	CO1: CO1: Explain the concept of Topological spaces CO2: To study about Theorems on Topological spaces CO3: 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. CO4: Definition and some examples, continuous linear transformations CO5: Linear transformations, the Hahn-Banach theorem, the natural imbedding of N in N**, the open mapping theorem, the conjugate of an operator. CO6: Definition 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. CO7: Finite-Dimensional Spectral Theory: matrices, determinants and the spectrum of an operator, the spectral theorem, a survey of the situation
AM-402	Statistical methods	CO1: To learn the concept of Random variables, distribution functions, Mathematical expectation and Generating functions CO2: Probability Distributions CO3: Correlation and Regression CO4: Sampling Distributions CO5:Sampling and Large sample Tests, Exact sampling distributions,Chi Square ,t,F distributions and their applications
AM-403	Theoretical computer science	CO1: To study about the concept of Theory of Automata CO2: To study about the concept of Formal languages CO3: To study about Conext free languages CO4: To study about Context free grammers CO5: To study about Turing machines

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AM-405	Boundary value problems-II	CO1: To learn Stability of linear and weakly non-linear systems, continuous dependence and stability properties of linear, non-linear and weakly non-linearsystems. CO2: Stability by Liapunov second method, Autonomous systems, quadratic forms,Krasovski'sMethod CO3: Construction of Liapunov functions for linear systems with constant coefficients. Selection of total energy function as a Liapunov Function,Stability based on first approximation CO4: 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 CO5:Oscillations of second order equation, sturms comparison theorems Elementarylinear Oscillations, comparison theorem of Hille Winter.
AM-408	Optimization Techniques-II	CO1:To solve problems by using Game Theory, Solution of Games with and without saddle points, minimax / maximini principle, principle of Dominance, matrix ethod 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. CO3: Queuing theory: distribution in queuing systems, poison process. Classificationand solutions of Queuing model, models 1-4. CO4:Net work analysis, PERT/ CPM Techniques network diagram representation time estimates and critical path in net work analysis, uses of PERT / CPM Techniques.
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