VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS)

Semesters: III and IV

Effective from June 2012

Semester	Course	Paper	Name of the Paper	Hours	Credit	Marks
III	B.Sc. (Mathematics)	**CCM-301**	Advanced Calculus–I	3	3	100 (30 Internal + 70 External)
		CCM-302	Ordinary Differential Equations	3	3	
		CCM-303	Numerical Analysis–I	3	3	
	B.Sc. (Computer Science)	**CCM-301CS**	Advanced Calculus	3	3	100 (30 Internal + 70 External)
		CCM-302CS	Discrete Mathematics–I	3	3	
		CCM-303CS	Numerical Methods	3	3	
		IDS	Group of Symmetries / Mathematical Modeling	3	2	
IV	B.Sc. (Mathematics)	**CCM-401**	Advanced Calculus–II	3	3	100 (30 Internal + 70 External)
		CCM-402	Partial Differential Equations	3	3	
		CCM-403	Numerical Analysis–II	3	3	
	B.Sc. (Computer Science)	**CCM-401CS**	Differential Equations	3	3	100 (30 Internal + 70 External)
		CCM-402CS	Discrete Mathematics–II	3	3	
		CCM-403CS	Graph Theory	3	3	
		IDS	Group of Symmetries / Mathematical Modeling	3	2	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER - III
CCM–301
(Advanced Calculus–I)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Limits and Continuity of a function of two variables, Partial Differentiation, Total Differential, Composite function, Homogeneous functions, Euler's theorem.

Unit II:
Taylor's theorem for functions of two variables, Maclaurian's expansions in power series, Jacobian.

Unit III:
Maxima-Minima for functions of two variables, Necessary and sufficient conditions for extreme points.

Unit IV:
Vector point function, Differentiation of vector point function, Gradient, Divergence and Curl, their properties.

The course is covered by the following reference books :

1. Shantinarayan & P. K. Mittal : A course of Mathematical Analysis, S.Chand and Co., New Delhi.
2. Hari Kishon : Differential Calculus, Atlantic Pub. & Distributors(P) Ltd., New Delhi.
3. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi.
4. S. C. Malik : Mathematical Analysis, Wiley-Eastern Ltd, New Delhi.
5. N. P. Bhamore & et el : Mathematics Paper–III–IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER - III
CCM–302
(Ordinary Differential Equations)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Linear Differential Equations with constant coefficients, Complimentary functions, Particular Integral, General Solution, Methods for finding Particular Integral.

Unit II:
Linear Differential Equations with variable coefficients, Homogeneous Differential Equations, Legendre's Differential Equation.

Unit III:
Second order Differential Equations: Solution in terms of known Integral, Method of Variation of Parameters.

Unit IV:
Second order Differential Equations: Solution by method of removal of first order derivatives, Method of Changing Independent Variable.

The course is covered by the following reference books :

1. D. A. Murray : An Introductory Course in Differential Equations, Orient Longmans, Bombay.
2. N.P.Bhamore & et el. : Mathematics Paper–III–IV, Popular Prakashan, Surat.
3. M. D. Rai Singhania : Differential Equations, S. Chand & Co., New Delhi.
4. Nita H. Shah : Ordinary and Partial Differential Equations : Theory and Applications, PHI Learning Pvt. Ltd, New Delhi.
5. Gorakhprasad : Differential Equations, Pothishala Pvt. Ltd., Allahabad.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER – III
CCM–303
(Numerical Analysis–I)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Error estimation: Errors and their computations, A general error formula, Error in a series approximations.

Unit II:
Numerical Solutions of Algebraic and Transcendental Equations: Bisection Method, Method of False position, Iteration Method, Newton-Raphson's Method.

Unit III:
Forward Differences, Backward Differences, Central Differences, Symbolic relation and separation of symbols, Differences of Polynomials.
Unit IV:
Newton's Forward and Backward Formulae, Gauss's Interpolation formulae.

The course is covered by the following reference books :

1. S.S. Sastry : Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 4th Edition.
2. M. K. Jain, Iyenger & Jain : Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
3. Goel & Mittal : Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz : Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan & Peter R. Turner : Numerical Methods & Analysis, McGraw Hill Book Co., London.

* Use of Scientific non – Programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS OF MATHEMATICS
FOR B.Sc. (Computer Science)
SEMESTER - III
CCM–301CS
(Advanced Calculus)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Sequence, convergent sequence, limit of a sequence, bounded sequence, monotone sequence, series, convergent, divergent and oscillatory series, necessary conditions for convergent series, test of convergence of series by p series method, Ratio test.

Unit II:
Partial derivatives, limit, continuity of functions of two variables, homogeneous function, Euler's Theorem for homogeneous functions, total differentiation, Maxima-Minima, Taylor's theorem.

Unit III :
Integrable function, Riemann integration it's definition and evaluation, first mean value theorem for integrals, fundamental theorem for integral calculus.

Unit IV:
Double Integration, change of order of integration, Application of double integration, Beta and Gamma functions, their properties.

The course is covered by the following reference books :

1. Shantinarayan : Differential Calculus, S. Chand & Co., New Delhi.
2. Sharma & et el : Advanced Differential Calculus, Krishna Prakashan Media, Meerut.
3. N. P. Bhamore & et el : Mathematics Paper III-IV, Popular Prakashan, Surat.
4. H.K. Dass: Advanced Engineering Mathematics, S Chand & Company, New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS OF MATHEMATICS
FOR B.Sc. (Computer Science)
SEMESTER - III
CCM–302CS
(Discrete Mathematics-I)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:

Mathematical logic, proposition, compound proposition, propositions and truth table, logical equivalence, algebra of propositions, conditional proposition, converse, contra positive and inverse, Biconditional statement, Negation of compound statements, Tautologies and contradictions, normal forms, logic in proof, methods of proof, Fallacies, predicate calculus.

Unit II:

Recurrence relations, Application of recurrence relations viz Fibonacci sequence, Tower of Hanoi, Disarrangements etc, order of a recurrence relation, Characteristic equation, Solution of linear recurrence relation with constant coefficients, Generating function, equality of two generating functions, sum, product and multiplication by a scalar number, solution of recurrence relation using generating functions.

Unit III:

Function, classification of functions, Types of function, Composition of function, Recursively defined function, some special functions.

Unit IV:

Groupoid, semigroup and monoid, Group, sub-group, cyclic group, permutation group, Homomorphism and Isomorphism of groups.

The course is covered by the following reference books :

1. Discrete Mathematics, by Richard Johnsonbaugh Macmillan Publishing Company.
2. Foundations of Discrete Mathematics , by K. D Joshi, Wiley Eastern Limited.
3. Discrete Mathematical structuctures, by Bernard Kolman, Robert C Busby, Sharon Ross, Prentice- Hall of India.
4. A textbook of Discrete Mathematics, by SK Sarkar, S Chand & Company Ltd.
5. Discrete Mathematics ,by Harikishan, Shivraj Pundir, Sandeep Kumar, Pragati Prakashan,Meerut.
6. Discrete Mathematics for Computer Scientists & Mathematicians, by Joe L Mott, Abraham Kandel, Theodore P Baker Prentice Hall of India Pvt. Limited

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS OF MATHEMATICS
FOR B.Sc. (Computer Science)
SEMESTER - III
CCM–303CS
(Numerical Methods)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

UNIT I:
System of linear equations, Gauss elimination method Gauss Jordan method, Gauss–seidel method.

UNIT II:
Difference Equations, Linear difference equations, homogeneous difference equations, homogeneous difference equations with constant coefficients.

UNIT III:
Power series solution of ordinary differential equations, ordinary point, singular point, solution about ordinary and singular points, Frobenius method.

UNIT IV:
Numerical solution of partial differential equations, introduction, Finite Difference Approximations to derivatives, standard five point formula, solution of Laplace equation by Jacobi's method.

The course is covered by the following reference books :

1. S.S. Sastry: Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 4th Edition.
2. M. K. Jain, Iyenger & Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
3. Goel & Mittal: Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz: Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan & Peter R. Turner: Numerical Methods & Analysis, McGraw Hill Book Co., London.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER - IV
CCM–401
(Advanced Calculus–II)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Beta-Gamma functions: Relation between Beta and Gamma functions, Properties, Applications of Beta-Gamma function.

Unit II:
Double and Triple Integrals: Change of order of Double integrals, Area.

Unit III:
Laplace Transform of elementary functions, Properties of Laplace Transform, Differentiation and Integration of Laplace Transform, Laplace Transform of derivatives and integrals.

Unit IV:
Inverse of Laplace Transform, Method of Partial fractions, Properties of inverse Laplace Transform.

The course is covered by the following reference books :

1. David V. Widder : Advanced Calculus, PHI Learning Pvt. Ltd, New Delhi
2. Kreysig: Advanced Engineering Mathematics, John Wiley, New York, 1999.
3. N.P.Bhamore & et al : Mathematics Paper-III-IV, Popular Prakashan, Surat.
4. Shantinarayan & P. K. Mittal : A course of Mathematical Analysis, S.Chand and Co., New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER - IV
CCM–402
(Partial Differential Equations)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Formation of Partial Differential Equation, Solution of Partial Differential Equations, Equations solvable by direct integral.

Unit II:
Partial Differential Equations of first order, Nonlinear Partial Differential Equations of first order, Some special methods.

Unit III:
Homogeneous linear equations with coefficient, Rule of finding Partial Differential Equation, Integral, Working methods to solve homogeneous linear equations of any order.

Unit IV:
Non-homogeneous Differential Equations, Nonlinear equations of second order.

The course is covered by the following reference books :

1. I. N. Sneddon : Elements of Partial Differential Equations, McGraw Hill Book Company.
2. B. S. Grewal : Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3. D. A. Murray : An Introductory Course in Differential Equations, Orient Longmans, Bombay.
4. Nita H. Shah : Ordinary and Partial Differential Equations : Theory and Applications, PHI Learning Pvt. Ltd, New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER – IV
CCM–403
(Numerical Analysis–II)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Finite difference with unequal interval, Lagrange's Interpolation Formula, Divided Differences, Newton's General Interpolation Formula.

Unit II:
Numerical Differentiation: 1^{st} and 2^{nd} order derivatives based on Newton's forward difference interpolation formula, Newton's backward difference interpolation formula and Gauss's formulae.

Unit III:
Numerical Integration: General Integration formula, Trapezoidal Rule, Simpson's $\frac{1}{3}$-Rule, Simpson's $\frac{3}{8}$-Rule.

Unit IV:
Solution of Ordinary Differential Equations by Taylor's series method, Picard's approximation method, Euler's method.

The course is covered by the following reference books :

1. S.S. Sastry : Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 4^{th} Edition.
2. M. K. Jain, Iyenger & Jain : Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
3. Goel & Mittal : Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz : Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan & Peter R. Turner : Numerical Methods & Analysis, McGraw Hill Book Co., London.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS OF MATHEMATICS
FOR B.Sc. (Computer Science)
SEMESTER - III
CCM–401CS
(Differential Equations)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:
Linear ordinary differential equations with constant and variable coefficients, Complimentary functions, Particular integrals, linear dependence and independence of functions.

Unit II:
Formation of Partial differential equations by the elimination of arbitrary constants and arbitrary functions, solution of PDE by direct integration, Lagrange's linear Partial Differential equations of the first order, Solution of PDE by the method of multipliers, solution of linear homogeneous PDE of n^{th} order with constant coefficients.

Unit III:
Types of PDE, solution of heat equation, wave equation and Laplace equation by method of separation of variables.

Unit IV:
Laplace Transform, Laplace transform of standard functions like e^t, sin$t$, cos$t$, t^n, sinh$t$, cosh$t$ etc, first shifting theorem, second shifting theorem, change of scale.

The course is covered by the following reference books :

1. Gupta, Malik & Mittal : Ordinary Differential Equations, Pragati Prakashan, Meerut.
2. D. A. Murray: Introductory Course of Diff. equations, Orient Longman (2^{nd} ed.).
3. N. P. Bhamore & et el : Mathematics Paper III-IV, Popular Prakashan, Surat.
4. I. N. Sneddon : Elements of' Partial Diff. Equations, McGraw Hill Book Co.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS OF MATHEMATICS
FOR B.Sc. (Computer Science)
SEMESTER - III
CCM–402CS
(Discrete Mathematics - II)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:

Relations, Binary relations, it's properties, inverse relation, Closure of a relation and it's properties, Converse of a relation, Relation matrix, Equivalence relation, congruence modulo m relation and the solution of the equations involving congruence relation, Composition of Binary relation.

Unit II:

Partial order relation, Partially ordered set, Hasse diagram, Well order set, Totally ordered set, Lattices, Properties of Lattices, Lattice Homomorphism, Sub lattices, Complete lattice, modular lattice, Isomorphic Lattice, Bounded Lattice, Distributive Lattice, Complemented Lattice.

Unit III:

Boolean algebra, Definition, Properties of Boolean algebra, Sub Boolean algebra, Boolean homomorphism, Join irreducible elements, Boolean functions, Boolean expressions, equivalence of Boolean expressions and Boolean functions, sum of product canonical forms, product of sum canonical forms.

Unit IV:

Symmetric expressions, characteristics of symmetric expressions, minimization of Boolean functions by Karnaugh map method.

The course is covered by the following reference books :

1. Narsingh Deo: Graph Theory with applications to Engineering and Computer Science, PHI, New Delhi.
2. J P Trambley and R Manohar: Discrete Mathematical Structures with applications to computer Science,Mc Graw International Ed.
3. Discrete Mathematics by B S Vatsava, Wishva Prakashan, Delhi.
4. Olympia Nicodemi : Discrete Mathematics, CBS-Publisher and Distributor, Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS OF MATHEMATICS
FOR B.Sc. (Computer Science)
SEMESTER - III
CCM–403CS
(Graph Theory)
Effective from June 2012
Marks: 100 (30 internal + 70 external)
(3 hours / Week–Credits: 3)

Unit I:

Graph, subgraph, Graph of relation, self loop, parallel edges, simple graph, application of graph, viz Konigsberg bridge problem , Utility problem, seating problem, degree of vertices and it's properties, walk, path, circuit, planar graph, non planar graph, properties of planar graph, connected graph, disconnected graph, components of graph, Complete graph, Regions, Euler's formula for regions of planar graph, weighted graph.

Unit II:

Operations of graph, Euler's path and circuit, Euler's graph, conditions of a graph to be a Euler Graph, Hamiltonian path and circuits, Hamiltonian graph, regular graph.

Unit III:

Directed graph, types of directed graphs, digraphs and binary relations, directed path and connectedness, Euler digraph, incidence matrix, adjacency matrix, circuit matrix

Unit IV:

Trees and it's properties, rooted tree, Binary tree, properties of trees, spanning tree, Minimal spanning tree, Prims algorithm to construct minimal spanning tree.

The course is covered by the following reference books :

1. Narsingh Deo: Graph Theory with applications to Engineering and Computer Science, PHI, New Delhi.
2. J P Trambley and R Manohar: Discrete Mathematical Structures with applications to computer Science,Mc Graw International Ed.
3. Discrete Mathematics by B S Vatsava, Wishva Prakashan, Delhi.
4. Olympia Nicodemi : Discrete Mathematics, CBS-Publisher and Distributor, Delhi.