VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B.Sc.

Mathematics
MATH 301
(REAL ANALYSIS)

To be in force from June 2006J

Series of real numbers:
Convergence and divergence, Series with non-negative terms, Alternating series, conditional and absolute convergence, Series whose terms form a non-increasing sequence.

Metric Spaces:
Definition & examples of metric spaces. Cauchy sequence in metric space, Equivalent metrics, Open hall in R ,)pen hall in metric space, Functions continuous on metric spaces,)pen sets, Limit points. Closure of a set, Closed sets, Homeomorphism of metric spaces, Dense set.

Connectedness, Completeness and Compactness:
More about open sets, Connected sets, Bounded sets, Totally bounded sets, Complete metric spaces, Contraction mapping. Picard's fixed point theorem, Compact metric spaces, Open covering. Heine-Borel property. Flnite Intersection property.

Rremann Integratration:
Sets of measure zero, Definition and existence of Riemann Integral, Properties of Riemann Integral. Fundamental theorems of integral calculus.

The course is covered by the following reference hooks :

1. R.R. Goldberg : Method of real :Analysis, Oxford & 11311 Pub. Co. Ltd. New Delhi.
2 T.M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3 S. Lang :Undergraduate Analysis. Springer-Verlag, New York, 1983.
4. D. Som Sundaram & 13. Chaudhari : A first course in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. P.K. Jain & S.K. Kaushik : An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.
6. Copson : Metric Spaces,Cambridge University Press, 1968.
7. P.K. Jarn & K. Ahmed : Metric Spaces, Narosa Pub. House, New Delhi, 1996.
8. G.F. Simmons : Introduction to Topology & Modern Analysis, McGraw Hill, 1963.

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T.Y. B.Sc.

Mathematics
MATH 302
(ABSTRACT ALGEBRA)

Integers :
Divisors Greatest common Divisors common multiple. Prime numbers, Unique factorization theorem, Congruence relation, Equivalence classes.

Group Theory :
Definition & examples of group. Properties, Subgroups, Lagrange's theorem and its - applications,Euler theorem,Fermat theorem, A counting principle, Normal subgroups & Quotient groups, Homomorphisms, Isomorphisms, Automorphisms, Cayley's theorem, Permutation group, Even & Odd permutations, Alternating group.

Ring Theory
Definitron & examples of Rings, Some special classes of rings, I Homomorphisms, Ideals & Quotient rings, More ideals & quotient rings, Euclidean ring.

The course is covered by the following reference hooks :

1. I.N. I let-stein : Topics in Algebra, Wiley Eastern Ltd. New Delhi, 1983.
2 L.H.Sheth : Abstract Algebra.Ahmedabad.
3. N.B Gᵒpalkrishna : University Algebra. Wiley Eastern Ltd.
4. P.R. Bhattacharya, S.K. Jain and S.R. Nagpaul : Basic Abstract Algebra, Cambridge University Press. Indian Edition 1997.
5. Shantinarayan : Modem Algebra. Chand & Co.
6. Serge Lang : Algebra, ed. Addition Wesley, 1993.
7 . Surjeet & Kazi Zameeruddin : Modern Algebra, Vikas Publishing House.
8. I.S. Luther & **1.13.5.** Passi, Algebra Vol. I-Groups, Vol. II-Rings, Narosa Publishing House.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y. B.Sc.

Mathematics
MATH 303
(NUMERICAL ANALYSIS)

Errors in numerical calculations :
Numbers and their accuracy, Errors and their analysis. Absolute, Relative and percentage errors, a general formula, Error in a series approximation.

Solution of Algebraic & Transcendental Equations :
Bisection Method, Convergence of Bisection Method, Iteration method, Method of False position, Convergence of False position method, Newton-Raphson Method, Condition of convergence for Newton-Raphson Method.

Interpolation :
Finite Differences, Forward and backward differences, Central differences, Symbolic relations. Newton's forward c backward interpolation formula, Gauss' Interpolation formulae, Stirling's formula. Bessel's formula. Interpolation with unequal intervals, Newton divided differences and Newton divided difference interpolation formula.

Numerical Differentiation :
Numerical Differentiation formulae, Maximum and minimum value of a tabulated function.

Numerical Integration :
General quadrature formula Weddle's Rule, Trapezoidal rule, Simpson's I/3-rule, Simpson's 3,8-rule, Newton-Cotes formula, Gauss quadrature formula..

Numerical solution of ordinary differential equations :
Solution b\ Taylor's series method, Euler's method, Modified-Euler's method, Runge-Kutta methods (2 and 4"r orders).

The course is covered by the following reference books :

1 . S.S. Sastry :in methods of Numerical .`Analysis, Prentice-. Hall of India Pvt. Ltd.; 3rd Ed.
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. C.E. Froherg : Introduction to Numerical Analysis, Addition Wesley.
5. Kaiser A. Kunz : Numerical Analysis, McGraw Hill Book Co. London.
6. James 1. Buchanan & Peter R. Turner : Numerical methods & Analysis, McGraw Hill Book Co. London.
7. J. Krishnamurthy Computer oriented Numerical Methods, ELBS pub Co.
8. J. Krishnamurthy Computer based Numerical Algorithm, ELBS pub Co.

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T.Y. B.Sc.

Mathematics
MATH 304
(DISCRETE MATHEMATICS)

Binary relations, Properties of hinar relations, Partition, Equivalence relation, Partial ordered relation, Partially ordered sets, I lasse Diagram,Upper bounds, Lower bounds, GLB & LUB of sets, Totally ordered sets, Well ordered sets.

Lattices, Properties of lattices, Lattice as an algebraic system, Homomorphism between two lattices, Distributive, Complemented and Bounded lattices, Bounds of a lattice, Boolean Algebra as an algebraic system. Boolean expressions (forms), Different representation of Boolean forms, Sum of products canonical form and product of sums canonical forms of Boolean expressions, Value of Boolean expressions, Boolean functions, Minimization of Boolean functions by Karnaugh Map method and Quine-McCluskey algorithm, AND, OR & NOT gates. reduction of switching circuit diagram.

Graphs. Applications and various type of graphs, Incidence and Degree, Isolated and pendent vertices, Subgraphs, Operations on graphs, Isomorphism between two graphs, Walks, Paths, Circuits, Connected graphs, Disconnected graphs, Components of graphs, Euler graphs, lamiltonian graphs.

Trees, Properties of trees, Pendent vertices in a tree, Distance between two vertices, Centre, Radius and Diameter of a Tree. Rooted & Binary trees, Spanning Trees. Fundamental circuits. Planar graphs, Kuratowski's two non -planar graphs, Different representation of planar graphs, Regions,Euler's formula.

The course is covered by the following reference books:

1. J.P. Tremblay & R. Manohai : Discrete mathematical Structures with Applications to Computer Science. McGraw Hill Book: Co. 1999
2. Narsingh Deo : Graph Theory., with applications to Engineering & Computer Science, Prentice I [all of India Pvt.Ltd. 2000
3. S. Witala : Discrete mathematics – A unified approach, McGraw Hill Book Co.
4. C'.1. Liu : Elements of Discrete Mathematics, McGraw HiH Book' Co. 2000
5. B. Kolman, R. C. Busby & S. Ross : Discrete Mathematical Structures, Prentice Hall Of India Pvt. Ltd. 3rd ed. 2001
6. R.J. Wilson : Introduction to Graph Theory Academic Press, New York 1972
7. E Harray Graph Theory .:Add son Wesley Pub. Co. Reading Mass 1969
8. C. Berge : The Theory of Graphs and its Applications, John Wiley & Sons *1962*
9. .J.A. Bondy & U.S.R. Murthy Graph Theory with Applications, American Elsevier Pub.Co. New York 1976

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T.Y. B.Sc.

Mathematics

MATH 305 (P)

[Two practical each of 3 periods per division per week]

PRACTICAL :1

1 & 2. Convergence and Divergence of Series of real numbers.

3 Metric spaces – Illustrations.

4. Equivalent metrics.

5. Determination of open sets and closed sets in a metric space.

6. The Homeomorphism of metric spaces.

7 & 8. Riemann Integrals.

9. Solution of Algebraic and Transeendental equations :

Bisection Method. Method of The alse Position.

10 Solution of Algebraic and Transeendental equations : Newton -- Raphson Method.

11. Solution of Algebraic and TTranseendental equations : Iterative method.

12. Numerical solution of the systems of linear equations :
Gauss Elimination method, Gauss-Jacobi method.

13. Numerical solution of the systems of linear equations : Gauss-Seidal iteration method.

14. Newton's forward and backward difference Interpolation formulae.

15. Newton's divided difference a id The Lagrange's interpolation formulae.

16. Numerical Integration : Trapezoidal rule, Simpson's 1/3 rule.

17. Numerical Integration : Simpson's 3/8-rule.

18. Numerical Solution of IVP ;fuler's method and Filler's Modified method.

19. Numerical Solution of IVP : Runge-kutta 2nd order method.

20. Numerical Solution of IVP ; Runge-Kutta 4th order method.

PRACTICAL : 2

1. GAD and LCM of integers.
2. Groups -- Illustrations.
3. Subgroups and Application based on Lagrange's Theorem.
4. Normal Subgroups.
5. Quotient Groups.
6. The Homomorphism, Isomorphism and Automorphism of Group.
7. Permutations.
8. Rims : Illustrations.
9. Ideals.
10. 10 Euclidean Rings.
11. Associates and Prime elements in kuclidean Ring.
12. Relations and Posets.
13. Lattices : Illustrations.
14. Hasse Diagrams.
15. Classification of Lattices.
16. Boolean Algebra : Illustrations.
17. Minimization of Boolean functions.
18. Construction or Complete and Regular graphs and Spanning tree.
19. Isomorphism of Graphs.
20. Shortest-path problem.