VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

S.Y. B.Sc.

Mathematics at

IDS
(MATHEMETICAL METHODS)

July 2004 (1/2 Paper)

Solution of algebraic equations, Bisection method, Method of False Position, Newton Raphson method. Iteration method .

Interpolation, Finite differences, Forward & Backward differences, Divided differences, Netwton's formula for forward back ward and divided differences, Lagrange's formula.

Solutions of linear system, Gauss – Elimination method. Malthusian and Logistic laws of population model, Model for the spread of technological innovations, Models diffusion of Glucose or Medicine in the blood stresm.

The course is covered from the following Reference Books:

1. S.S. Sastry :Int. methods of Numerical Analysis, Prentice- Hall of India Pvt. Ltd.
2. Goel & Mittal : Numerical Analysis, Pragati Prakashan, Meerut.
3. J.N. Kapur : Mathematical Modeling.
4. A.P. Verma : Differential Equations Models.
5. R.N. Desai : Granitik Models (in Gujarati).

* Use of Scientific non – Programmable calculator is allowed.

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GROUP OF SYMMETRIES
Mathematics at IDS

Definition of group, its elementary properties subgroup, conditions that a subset is a subgroup, Examples of groups including finite groups, Infinite groups – cycle group, Abelian group.

Symmetry elements and symmetry operations in space. Identity operation , rotation symmetries, Reflection symmetry, inversion symmetry, improper rotation symmetry, product of two symmetries.

Formation of groups of symmetries (in space) of the following Plane figures (regarded as rigid objects) :

1. An isosceles triangle (cyclic group C_2 of order 2)
2. An equilateral triangle (the group S_3 of order 6)
3. A rectangle (the group V_4 of order 4)
4. A square (the group D_4 of order 4)
5. A regular hexagon (the group D_6 of order 12)

Concept of isomorphism of groups, Isomorphism of the multiplicative group with the group C2 of the symmetries of an isosceles triangle and of the group (1,3,5,7) under multiplication mod 8 with the group V4 if the symmetries of a rectangle.
Formation of group of symmetries of the following chemical molecule (configuration of atoms) and identification of these groups With previously constructed troups.

1. H_2O (The group V_4)
2. $H_2\ O_2$
3. Trans – N_2 – F_2 (the group V_4)
4. NH_3, PCL_3, $CHCL_3$ (the group S_3)
5. C3 H4 (the group D_4)
6. PF5 (Trigonal Bipyramidal) (the group D_6)

The course is covered by the following reference book.

1. F.A. Cotton : Chemical application of group theory, Wiley Inter Science, Wiley Eastern Ltd., New Delhi.
2. G.Davidson : Introductory group theory for chemists ,Applied Science Publisher.