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MATHEMATICS (SUBSIDIARY)

Paper I

Time - 3 hours   **Full Marks - 100**

Twelve questions to be set. Six to be answered selecting at least one from each group.

Group A
Set Theory (Two questions)

Notions of sets and their algebra, Cartesian product, Notion of relation and mapping and their classification, Equivalence relation and partition of sets, Partially ordered and totally ordered set.

Abstract Algebra (Two questions)

Binary operations, Notions of groups, sub groups, Cyclic group and permutation group, Elementary concept of ring, Integral Domain and field with examples.

Group B
Matrices (Two questions)

Matrices and its algebra, Kinds of Matrices (Symmentry, Skew Symmetry, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices), Transpose, Adjoint and inverse Matrices, Rank of a Matrix and solution of Linear equation.

Linear Programming (Two questions)

The Linear programming problem, Problem formulation, Linear programming in matrix notation, Convex set and their elementary properties, Graphical solution of L.P.P.

Group C
Trigonometry (Two questions)

Gregory's DeMoivre's theorem and its application, Complex argument, Gregory's series and Hyperbolic function.

Group D
Real Analysis (Two questions)

Definition of Sequence, Theorems on limits of sequences, Bounded and monotonic sequences, Cauchy's convergence criterion, Convergence and divergence of series, Comparison Test, Cauch's root test, D'Alembert's ratio test, Alternating series, Leibnitz's Test, Continuity and differentiability of real function of a single variable and their properties.

Books Recommended

1. Matrix & Linear Algebra – **K. B. Dutta**, Prentice Hall of India Pvt. Ltd., New Delhi 2000
2. Matrices – **Shanti Narayan**
3. Linear Programming – **Laljee Prasad**
4. Higher Trigonometry – **Das Gupta**
5. Higher Trigonometry – **Laljee Prasad**
6. Degree Level Set Theory – **Prof. K. K. Jha**
7. Set Theory – **Laljee Prasad**
8. Set Theory – **Das Gupta**
9. Abstract Algebra – **Prof. K. K. Jha**
10. Real Analysis – **Das Gupta**
11. Infinite Series – **Laljee Prasad**