SYLLABUS, TDC-II

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MATHEMATICS (HONS.) PAPER-III

Time: 3 Hours **Full Marks: 100**

Group-A

Real Analysis

Dedekinds' constructions of real numbers, Dedekind's theorem. Sequence and itsconvergence, Cauchy general principal of convergence, Monotonic sequences.

Canter's constructions of real numbers.

(One questions from Dekind's and Cantor's theory of real numbers and one question from sequence portion).

Continuity and differentiability of a function of one variable, Properties and continuous and discontinuous, Rolle's theorem, mean value theorem, Taylor's theorem with Lagrange's and Cauchy's forms of reminder. Taylor's and Maclaurin's series of elementary functions. (Two questions).

Group-B

Infinite Series

Infinite series and its convergence, comparison test, Root test, Ratio test, Raabe's test, Cauchy's condensation test, for alternating series, Kummer's test, Cauchy's test, De Morgen and Bertrand's test, Higher Logarithmic test, Absolute convergence.

Group-C

Abstract Algebra

Binary operation Definitions of group, Uniqueness of identity and inverse element in a group Cancellation law and solvability of equation in a group in a group Concepts of sub- group and cyclic groups, concepts of rings integral domain and field and their examples and general properties, Cancellation law in a ring, divisor of zero. A finite integral domain as field.

Cosets, Order of an element in a group, Lagrange's theorem, Group of residue classes, Homeomorphism and isomorphism of groups, Karnal of a group homomorphism isomorphism theorem for a cyclic group. Ring of residue classes, Ring of matrices, subrings, homomorphism and isomorphism.

Books:

(1) Topics in real analysis: Mukherjeee S.
(2) Abstract Algebra: Bhattacharya R.

MATHEMATICS (HONS.) PAPER-IV

Time: 3 Hours **Full Marks: 100**

Group-A

Vector Calculus

Product of three and four vectors, Differentiation of vector functions, differentiation of products of two vectors, Gradient, Divergence and Curl of a vector function and simple deductions of, Work done by a force, moment of a localised vector about a point,scalar moment of vector about a directed line.

Group-B

Differential Equation

Formation and solution of a differential equations, differential equation of the first order, separation of variable, homogeneous equation exact differential equations of the first order but of the higher degree including Clairaut's form orthogonal trajectories singular solutions liner differential equations of seconds order with constant coefficients complementary functions and particular integral.

Group-C

Statistics

Resultant of a system of coplanar forces, equations of line of actions of the result of coplanar forces conditions of equilibrium of a number of coplanar forces.

Definition of virtual work, principal of virtual work, converse of the principal of virtual work for a system of particles and rigid body.
Common catenary.

Group-D

Dynamics

Rectilinear motion, uniformly accelerated motion, simple harmonic motion Hook's law.
Motion in a plane – component of velocity and acceleration in Cartesian coordinates radial and transverse velocity and acceleration tangential and normal velocity and acceleration.
Motions of the particle under a Central force differential equation of a Central orbit in reciprocal polar and pedal coordinates, Kepler laws of motion deduced from newtons law gravitation.

MATHEMATICS (SUBSIDIARY)

Time: 3 Hours **Full Marks: 100**

Group-A

Differential Calculus

Leibnitz's theorem Taylor's series and Maclaurin's series partial derivatives, Euler theorem indeterminate forms Equations of tangents and normal asymptotes formulae of radius of curvature in different coordinates systems Maxima and minima of functions of single variable.

Integral calculus

Integrations by summation method Reduction's formula rectification and quadrature with simple examples volume and surface of revolution moment of inertia simply used of double and triple integration of Gama and beta functions.

Differential Equations

Differential equations of 1^{st} order and 1^{st} degree separation of variables Homogeneous equation and linear differentiation equation of first order and higher degree Calidrids form linear