

MAGADH UNIVERSITY

BODH-GAYA



COURSES OF STUDIES

FOR

B. A./B. Sc. HONOURS SUBSIDIARY &

GENERAL Part I, II & III Examination

IN

MATHEMATICS—1996-98 on Wards

PRICE Rs. 10/-

Magadh University

COURSES OF STUDY

B. A. / B. Sc. PART I EXAMINATION, 1996-98

MATHEMATICS (HONOURS)

PAPER—I

Twelve questions to be set. Six to be answered selecting at least one from each group. One question will be objective and it will be compulsory. This question will carry 20 marks. Rest questions are each of 16 marks.

GROUP—A

(Set theory and Trigonometry)

Sets, subsets, power set, Algebra of sets, Demorgan's laws, Cartesian product of sets, relation, equivalence relation, Definition and examples of partial and total order relation, Countable and uncountable sets, Countability of rational, real and algebraic number system, Countability of unions. (2 questions)

Hyperbolic functions, Resolution into factors.

(2 questions)

GROUP—B

(Matrices)

Sum of product of matrices, Symmetric and skew symmetric matrices, Transpose, adjoint and inverse of a

matrix. Orthogonal matrices and their properties. Rank of a matrix. Solution of a system of linear equations with three unknowns. (2 questions)

GROUP—C

(Linear Programming)

Convex sets and their properties. L. P. problems and their graphical solutions. Theory of Simplex method and their simple applications. (2 questions)

GROUP—D

(Theory of Equations)

Fundamental theory of algebra. Relation between roots and coefficients. Polynomial equations. Evaluation of symmetric functions of roots of cubic and biquadratic equations. Solution of cubic equation. Descartes' rule of signs. (3 questions)

PAPER—II

Twelve questions to be set. Six to be answered selecting at least one from each group. One question will be objective and it will be compulsory. This question will carry 20 marks and rest questions are each of 16 marks.

GROUP—A

(Differential Calculus)

Successive differentiation, Leibnitz theorem. Tangent and Normal, Curvature, Asymptotes, Partial differentiation, Euler's theorem, Exact differential, Indeterminate form, L. Hospital, rule.

(3)

GROUP—B

(Integral Calculus)

Integration of rational, irrational and trigonometric functions, Notion of integral as limit of sum, Evaluation of definite integrals, Reduction formula, Curve tracing, Areas of curves, Length of curves, Volumes and surface areas of Solids of revolution. (2 questions)

GROUP—C

(Analytical Geometry of 2 dimensions)

Condition for the general equation of second degree to represent parabola, ellipse and hyperbola and reduction into standard forms. Equations of tangents and normals in case of general equation and their forms in their particular conic section. Equation of polar, chord of contact, pair of tangents in case of parabola, ellipse, Hyperbola and their special properties. Polar equation of a conic section—Tangent and normal. (3 questions)

GROUP - D

(Analytical Geometry of 3 dimensions)

Rectangular, Spherical, Polar and cylindrical coordinates, Angle between straight lines. Equations of planes and straight Lines, Shortest distance between Lines, Sphere, Cone, Cylinder, Standard equations of conicoids. Normal and conjugate diameters of ellipsoid. (3 questions)

(4)

PAPER—III

Twelve questions will be set. Six to be answered selecting at least one from each group. One question will be objective and it will be compulsory. This question will carry 20 marks and rest questions are each of 16 marks.

GROUP—A

(Real Analysis)

Dedekind's theory of real numbers, Sequence and its convergence, Cauchy sequence, Cauchy general principle for convergence, Monotonic sequence, Cantor's construction of real numbers, Properties of real numbers.

Continuity and Differentiability of a function of one variable, Properties of continuous and discontinuous functions, Rolle's theorem, Mean value theorem, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's and Maclaurin's series of elementary functions.

(Four questions)

GROUP—B

(infinite series)

Infinite series and their convergence, Comparison test, root test, Raabe's test, Cauchy's condensation test, Integral test, Leibnitz test, Gauss test, Kummer's test, De Morgan and Bertrand's test. Absolute convergence

(5)

and rearrangement of series, Pringheim's theorem, Cauchy's multiplication of series and its convergence.

(Three questions)

GROUP—C

(Algebra)

Binary operations, Notions of group, Abelian group and non-abelian group with examples, Uniqueness of identity elements and inverse elements in a group, Different ways of defining group, Concept of sub-group and cyclic group with examples, interaction of sub-groups, Sub-group of cyclic groups, concepts of rings, integral domains and fields and their examples and general properties, Cancellation law, Divisions of Zero, A finite integral domain as a field.

Cosets, Order of an element, Lagrange's theorem, Group of residue classes, Permutation groups, Cayley's theorem, Homomorphism and Isomorphism of groups, Normal subgroups, Kernel of a group homomorphism, Isomorphism theorems for cyclic group, factor groups, Fundamental theorem of homomorphism of groups.

Ring of residue classes, Ring of matrices, Subrings, ideals, Ring homomorphism and ring isomorphism, Kernel of a ring homomorphism, Quotient rings, Fundamental theorem of homomorphism of rings.

(Four questions)