MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
FIRST YEAR   B. Sc. MATHEMATICS   2016-17

PAPER-I
ALGEBRA

Duration: 3 Hours   **Max. Marks: 75**

UNIT-I

Symmetric, Skew Symmetric, Hermition and skew Hermition matrices. Linear independence of row and column matrices. Row rank, column rank and rank of a matrix. Equivalence of column and row ranks.
Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding inverse of a matrix. Theorems and examples of consistency of a system of linear equations.

UNIT- II

Relation between the roots and coefficients of general polynomial equation in one variable. Transformation of equations. Descarte's Rule of signs, solution of Cubic equations (Cardon method). Biquadratic equations. Horner's Method, Ferrari's Method.

UNIT-III

Groups and their defining theorems. Various examples, order of an element and related theorems, Permutation Groups, even and odd permutations, cyclic groups, subgroups, union, intersection of two and finite subgroups and various examples, product of two subgroups.

UNIT –IV

Left and right cosets and their properties, Lagrange's theorem, index of a subgroup. Normal subgroups their examples and elementary basic theorems, Quotient group. Simple group, centre of group, Normalizer of an element and that of a subgroup, Conjugacy relation, class equation for finite groups.

UNIT-V

Group homomorphism and isomorphism with elementary basic properties, Cayley's theorem for finite groups, fundamental theorem of homomorphism in groups. The three isomorphism theorems of groups. Automorphisms and inner automorphisms.

References:
1. I. N. Herstein   : Topics in Algebra, Wiley Eastern Ltd., New
                                  Delhi, 1975.
2. R. S. Agrawal   : A Textbook on Modern Algebra.
3. K. B. Datta   : Matrix and Linear Algebra Prentice Hall of
                                  India Pvt. Ltd., New Delhi, 2000.
4. H. S. Hall and S.R. Knight : Higher Algebra, H.M. Publications, 1994.
5. Bansal, Bhargava, Agrawal : Amurt Beej Ganita.
6. Chandrika Prasad   : Text book on Algebra and Theory of Equations,
                                  Pothishala Pvt. Ltd, Allahabad.
7. Gokhroo, Saini   : Elements of Abstract Algebra
8. Sharma, Purohit   : Elements of Abstract Algebra

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PAPER-II
CALCULUS

Duration: 3 Hours   **Max. Marks: 75**

UNIT-I

Polar coordinates and derivatives of arc, polar subtangent and subnormal, pedal-equation, Roll's Theorem, Mean Value Theorems, Taylor's Theorem, their proofs, verifications and applications.

UNIT -II

Asymptotes, curvature, Test of concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar coordinates.

UNIT – III

Beta Gamma functions and their properties. Quadrature, Rectification.

UNIT - IV

Degree and order of a differential equation. Equations of first order and first degree, Equations in which the variables are separable, Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations.

UNIT - V

First order and higher degree equations solvable for x,y,p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations and the equations reducible in homogeneous form.

References:

1. Gorakh Prasad   : A Text book on differential calculus (Pothi shala)
2. Gorakh Prasad   : A Text book on Integral calculus and
                               Differential Equations (Pothi shala).
3. E. A. Codignton   : An introduction to ordinary Differential
                               Equations Prentice Hall of India, 1961.
4. P.K. Jain and   : An Introduction to Real Analysis, S. Chand &
    S. K. Kaushik   Co., New Delhi-11, 2000.
5. Bansal, Bhargava   : Avakalan Ganita-II
6. Bansal, Bhargava   : Samakalan Ganita-Il
7. Gokhroo, Saini   : Uchch Avakalan Ganita.
8. Gokhroo, Saini   : Uchch Samakalan Ganita.
9. Bansal, Bhargava &   : Avkal Samikaran I .
    Agrawal
10. Gokhroo, Saini, Kumbhat : Avkal Samikaran.

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PAPER –III
GEOMETRY

Duration: 3 Hours   **Max. Marks: 75**

UNIT -I

General equation of second degree, nature of conic, eccentricity and foci of conic, Tracing of different conics. Ellipse : Tangent, normal, Chord of contact of the tangents, pole and polar, eccentric angle, auxiliary circle, director circle, equation of chord in term of middle point, pair of tangents, conjugate lines, diameter and conjugate diameters and their properties.

UNIT - II

Hyperbola: Parametric coordinates, tangent, normal, chord of contact of tangents, pole and polar etc. asymptotes, conjugate hyperbola, conjugate diameters, rectangular hyperbola, equation of hyperbola referred to its asymptotes. Polar Equations: Polar equation of conic, polar equations of tangent, perpendicular lines and normal, director circle of the conic.

UNIT-III

Plane and straight line: Equation to represent two planes and angle between them, projection on a plane area of a triangle and volume of tetrahedron. Equations of line intersecting two lines, skew lines, shortest distance between two lines, intersection of three planes and three lines.

UNIT- IV

Sphere: General Equation, Tangent Plane, Pole and Polar, Intersection of two spheres, Radical plane, Radical line, Radical centre, Co-axial spheres, Limiting points.

Cone: Enveloping cone, Tangent plane, Reciprocal cone, Three mutually Perpendicular generators, Right circular cone.

Cylinder: Right circular cylinder, Enveloping cylinder

UNIT-V

General equation of second degree in three dimensions. Intersection of a line and a conicoid. Tangent lines and Tangent plane. Condition of tangency, plane section with a given centre. Diametral plane. Principal planes, principal directions and plane sections.

References:
1.   Gorakh Prasad and H.C. Gupta : A Text book of coordinate Geometry (Pothishala)
2.   S.L.Loney   : The Elements of coordinate Geometry; Mack-Millan and Company, London.
3.   R.J.T. Bell   : Elementary Treatise on coordinate Geometry of Three Dimensions.
4.   P.K. Jain and Khalil Ahmed   : A Textbook of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd., 1999.
5.   N.Saran and R.S.Gupta   : Analytical Geometry of Three Dimentions.(Pothhishala)
6.   Bansal, Bhargava   : Dwivim Nirdeshank Jyamiti
7.   Gokhroo, Saini   : Dwivim Nirdeshank Jyamiti
8.   Gokhroo, Saini   : Trivim Nirdeshank Jyamiti
9.   Bansal, Bhargava   : Trivim Nirdeshank Jyamiti.
10. Golas, Tandon, Bhargava   : Analytical solid Geometry.