MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
M. A. / M. Sc. MATHEMATICS (Previous)
2016-17
Non-Collegiate

All papers are compulsory

Paper	Paper Name	Max. Marks	Exam. Hours	Teaching Hours
Paper I	Advanced Abstract Algebra	100	3 Hrs.	6
Paper II	Real and complex Analysis	100	3 Hrs.	6
Paper III	Differential Equations	100	3 Hrs.	6
Paper IV	Geometry	100	3 Hrs.	6
Paper V	Any one of the following: (a) Mechanics (b) Continuum Mechanics	100	3 Hrs.	6

Note:

* **Scheme of Examination:**

Question Paper Pattern for Examination: 100 marks

Section A: Total 10 Question will be set from five units i.e. two question from each unit. These questions require very short answer. Each question will be of one (1) mark (Total 10 marks). All the questions in section A are compulsory.

Section B: Total 10 questions will be set from five units i.e. two question from each unit. Students are required to attempt at least one question from each unit. Each question carries 10 marks (Total 50 marks). The answer of each question should be given approximately in 250 words.

Section C: Total 4 descriptive question will be set from five units of the paper, not more than one question from each unit. Each question may also have two sub-division. Students are required to answer two questions in about 500 words. Each question carries 20 marks (Total 40 marks).

** The right to information act, 2005 is applicable.

PAPER – IV
GEOMETRY

TIME: 3 hours   **Max. Marks: 100**

UNIT-I

The Axes of Plane Sections: Circular sections, Axes of central sections of a central conicoid, Axes of any section of a central conicoid, Axes of section of a paraboloid, Circular sections, Umblics.

UNIT-II

Generating Lines, The section of a surface by a tangent plane, Systems of generators of a central hyperboloid, Locus of the points of intersection of perpendicular, generators, The projection of generators, Generators' of the hyperbolic paraboloid.

Confocal Conicoids: The three confocals through a point,- Elliptic coordinates, confocal touching a given plane, confocal touching a given line, The parameter of the confocals through a point on a central conicoid, The normals. The self polar tetrahedron, The axes of an enveloping cone, The equation to the conicoid.

UNIT-III

Tensors; Transformation of coordinates, Contravariant and covariant vectors, second order tensors, Higher order tensors. Addition, subtraction and multiplication of tensors, Contraction, Quotient Law, symmetric and skew symmetric tensors: Conjugate symmetric tensors of the second order, Fundamental tensor, Associated tensors, Christoffel symbols, Transformation law of Christoffel symbols, Covariant differentiation of vectors and tensors.

UNIT-IV

Conoids; Equation to a conoid, surface in general, The degree of a surface, tangents and tangent planes, The inflexional tangents; the equations $\zeta=f(\xi,\eta)$. The indicatrix and representation by parameters. Curves in space, Equation to a curve, The tangent and its direction cosines, The normal plane-, contact of a curve and surface, Oscilating plane, Principal normal and binormal curvature, torsion, spherical indicatrices, frenet's formulae, signs of the curvature and torsion, formula for direction cosines of the principal normal and binormal , radius of torsion the relation $\sigma = + \eta \tan \alpha$ Circle of curvature, The osculating sphere and coordinates in terms of the arc.

UNIT-V

Envelopes: Envelopes of a system of surfaces with one parameter and its relation with characteristic, The edge of regression and its relation with characteristic, Envelope of a system of surfaces with two parameters and its relation with characteristic, skew and developable surface, Tangent plane to a ruled surface, Generators of developable surface, envelope of a plane with one parameter: criterion for $\zeta = f (\xi,\eta)$ to represent a developable surface and properties of a generator of a skew surface.

Curvature of surfaces, Curvature of normal sections through elliptic and hyperbolic points, Umblics, Curvature of an oblique section, radius of curvature of a given section through any point of a surface, Principal radii at a point of an ellipsoid: Lines of curvature of an ellipsoid, Lines of curvature on a developable surface, Normals to a surface at points of a line of a curvature, Lines of curvature on a surface of revolution, Principal radii and lines of curvature through a point of the surface,determination of umblics, Curvature at points of a generator of a skew surface, The measure of curvature at a point and expressions for the measure of curvature, Curvilinear coordinates, Linear element principal radii and lines of curvature.

Books recommended:
1. L. Robert, J-T.Bell   : Coordinate Geometry of the three dimensions.
2. Bansal &Sharma   : Differential Geometry.
3. B.Spain   : Tensor Calculus.
4. J.L.Bansal   : Tensor Analysis.