MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

SEMESTER II M. Sc. MATHEMATICS 2016-17

M2 MAT 01-CT06

ALGEBRA-II

L-T-P	4-1-0

TIME: 3 hours

External Assessment 80
Internal Assessment 20

UNIT I

Prime fields of characteristic zero and of prime number, Polynomial rings, Factorization theory in Integral domain, Prime and irreducible elements, Greatest common divisor and least common multiple, Euclidean domain, Principle ideal domain and Unique Factorization domain and their related theorems, Product of ideals and nilpotent ideals.

UNIT II

Definition and examples of Modules, sub module, Sub module generated by a set, Sum and direct sum of two sub modules, Quotient Modules, R-Homomorphism, Kernel, Fundamental, Theorems of Homorphism and isomorphism. Three isomorphism theorems in modules.

UNIT III

Simple, free, cyclic and Finitely generated modules, Fundamental theorem on finitely generated modules over Euclidean rings, Noetherian and Artinian modules, maximal element and theorems based on it's.

UNIT IV

Field extension: finite and infinite, examples, Algebraic and transcendental extensions, Splitting field Separable and inseparable extensions, Normal Extensions, Perfect fields, Finite fields, primitive elements.

UNIT V

Automorphisms, Galois Theory of field extensions and its fundamental theorem, Solution of polynomial equations by radicals, Abel's theorem.

Books recommended:

1. Surjeet Singh and Quazi Zameeruddin : Modern Algebra
2. I.N.Herstein : Topics in algebra
3. R.S.Agrawal : Algebra
4. N. Jacobson : Basic Algebra Vol. I, II
5. S. Lang : Algebra IIIrd Edition
6. P.B. Bhattacharya S.K. Jain and Etc. : Basic Abstract Algebra (IInd Edition)

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

SEMESTER II M. Sc. MATHEMATICS 2016-17

M2 MAT 02-CT07

COMPLEX ANALYSIS

L-T-P	4-1-0

TIME: 3 hours

External Assessment 80
Internal Assessment 20

UNIT I

Complex numbers, Algebra of complex functions, differentiability of complex function, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Power series, radius of convergence , circle of convergence.

UNIT II

Conformal transformation, Linear & Bilinear transformations, fixed points, cross ratio, inverse points, critical points Exponential, Trigonometric transformations.

UNIT III

Complex integration : Riemann definition of integration, complex integral as the sum of line integrals, Cauchy's fundamental theorem, extension of Cauchy's theorem to multi-connected region, Cauchy's integral formula, Cauchy's integral formula for multi-connected region, Cauchy's integral formula for higher order derivatives.

UNIT IV

Morera's theorem, Liouville's theorem , Maximum Modulus theorem, Poisson's integral formula, Development of Analytic function as power series : Taylor's Series, Laurent's Series.

UNIT V

Singularities and Zeroes of an Analytic function, residues, Cauchy's theorem of residues and Evaluation of definite integrals.

Books Recommended :

1. E.G.Phillips : Functions of a complex variable.
2. E.T.Copson : An introduction to the Theory of functions of a Complex variable.
3. Zill Shanahan : A First Course in Complex Analysis with Application
4. T. Pati : Functions of a Complex Variable

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SEMESTER II M. Sc. MATHEMATICS 2016-17

M2 MAT 03-CT08

SPECIAL FUNCTIONS

L-T-P	3-1-0

TIME: 3 hours

External Assessment 80
Internal Assessment 20

UNIT I

Series solutions and Hypergeometric equations: Singularities in second order ordinary differential equations with constant coefficients and variable coefficients, radius of convergence. Series solutions of second order homogeneous ordinary differential equations. Frobenius method. Hypergeometric Series. Hypergeometric functions. Confluent Hypergeometric function and solution of confluent Hypergeometric equation.

UNIT II

Legendre's polynomial Functions: Legendre's differential equation and associated Legendre's differential equations.

UNIT III

Simple properties of Legendre's functions of first and second kind and the associated Legendre's function of integral order.

UNIT IV

Bessel functions, Generating function, Integral formula, Recurrence relations; addition formula and other properties of Bessel functions.

UNIT V

Classical Orthogonal Polynomials, Generating functions and other properties, associated with the Laguerre, Legendre and Hermite Polynomials.

Books recommended:

1. Rainville, E.D. : Special Functions.
2. Sneddon, I.N. : Special Functions.
3. S.P. Goyal : Special Functions.
4. Bansal, J.L. : Differential Equations Vol. II

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

SEMESTER II M. Sc. MATHEMATICS 2016-17

M2 MAT 04-CT09

MECHANICS-II

L-T-P	4-1-0

TIME: 3 hours

External Assessment 80
Internal Assessment 20

UNIT I

Rigid Dynamics: Moments and products of inertia, Principal axes theorem, Parallel axes, Momental ellipsoid.

UNIT II

D'Alembert's principle and the equation of motion. Motion about fixed axes.

UNIT III

Motion in two dimensions under finite forces including sliding and rolling friction, Impulsive motion in two dimensions.

UNIT IV

Principles conservation of momentum and energy.

UNIT V

Lagrange's equations in generalized coordinates under finite and impulsive forces.

Books Recommended:

1. S.L.Loney : Dynamics
2. A.S.Ramsay : Dynamics
3. Bansal, Sharma & Goyal : Dynamics of a Rigid Body
4. Ray & Sharma : A Text Book of dynamics of a Rigid Body

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SEMESTER II M. Sc. MATHEMATICS 2016-17

M2 MAT 05-CT10

DIFFERENTIAL GEOMETRY-II

L-T-P	3-1-0

TIME: 3 hours

External Assessment 80
Internal Assessment 20

UNIT I

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.

UNIT II

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.

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.

UNIT III

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.

UNIT IV

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.

UNIT V

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. Raj Bali : Advanced Tensor Analysis.
4. N. Saran & R. S. Gupta : Analytical Geometry of Three Dimension.
5. Raj Bali : Advance Differential Geometry