M.A./M.Sc. Mathematics - Part - I (Sem. I)

1] Paper No. NMT 101
2] Title of the Paper - Algebra - I
3] Objectives: To study Group Theory, Ring Theory and to introduce the Modules over a ring. In particular to study in details the syllow theorems and polynomials rings.
4] Note: Theorems and proofs are expected to be prepared from A first course in Abstract Algebra by J. B. Fraleigh and Basic Abstract Algebra by Bhattacharya, Jain and Nagpaul. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1 **(15 Lectures)**

1.1 Isomorphism Theorems
1.2 Zassenhaus Lemma
1.3 Commutator Subgroups, Solvable groups
1.4 Normal and Subnormal series. Schreier Refinement Theorem Jordan-Holder Theorem Normal series.
1.5 Normal and ascending central series. Nilpotent groups.

UNIT - 2 **(15 Lectures)**

2.1 Group action on a set. Burnside Theorem
2.2 Class equation of a group, Cauchy Theorem
2.3 P Groups, Subgroups, Syllow Theorems I, II & III
2.4 Simple Groups
2.5 Examples on Syllow Theorems

UNIT - 3 **(15 Lectures)**

3.1 Polynomial Rings
3.2 Unique Factorization Domain
3.3 Principal ideal domain.
3.4 Irreducibility in R[x]
3.5 Eisenstein Criteria for irreducibility over Q

UNIT - 4 **(15 Lectures)**

4.1 Modules, Definition and Examples
4.2 Sub modules and direct sums. Simple Modules. Quotient Modules.
4.3 Homomorphism and Isomorphism theorems.
4.4 Fundamental Theorem for module homomorphism
4.5 Noetherian and Artinian Sub modules

Recommended Readings :

1] J.B. Fraleigh, A First Course in Abstract Algebra, 3rd Edition, Narosa Publishing House, New Delhi.

2] P. B. Bhattacharya, S. K. Jain, S. R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, 2005

Additional Readings :

1] I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd. New Delhi 1975
2] M. Artin, Algebra, Prentice - Hall of India 1991
3] N. Jacobson, Basic Algebra I, Hindustan Publishing Co. 1988
4] S. Lang, Algebra, Addison Wesley, 1993
5] C. Musili, Introduction to Rings and Modules, Narosa Publishing House, New Delhi 1994

M.A./M.Sc. Mathematics - Part - I (Sem. I)

1] Paper No. NMT 102
2] Title of the Paper - Real Analysis
3] Objectives: To Introduce basic notions of measure theory and to study Lebesgue theory of integration.
4] Note: Theorems and proofs are expected to be prepared from real Analysis by H. L. Roydon and Introduction to Modern Topology and Analysis by Simmons. For problems refer Measure theory and integration by de Barra,Lebesgue measure and integration by Jain & Gupta. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1 **(15 Lectures)**

1.1 Countable and uncountable sets.
1.2 Schroeder - Bernstein Theorem and its applications.
1.3 Continuum hypothesis, Cantor's Theorem, $2^{No} = c$.
1.4 Algebra and 6 - algebra of sets, Borel sets.
1.5 Outer measure of a set and its properties.
1.6 Measurable sets and its properties.

UNIT - 2 **(15 Lectures)**

2.1 Lebesgue Measure
2.2 Non-Measurable sets.
2.3 Measurable functions and their properties.
2.4 Concept of almost everywhere. Littlewood's three principles, Egoroff's theorem.
2.5 Lebesgue integral of characteristic function and simple function. Canonical representation.
2.6 Lebesgue integral of a bounded function over a set of finite measure and its properties.
2.7 Bounded Convergence theorem.

UNIT - 3 **(15 Lectures)**

3.1 Lebesgue integral of a non negative measurable function and its properties.
3.2 Fatou's Lemma, Monotone convergence theorem
3.3 General Lebesgue integral and its properties
3.4 Lebesgue convergence theorem.
3.5 Differentiation and integration
3.6 Differentiation of Monotone functions.

UNIT - 4 **(15 Lectures)**

4.1 Definition of Dini's derivatives.
4.2 Functions of Bounded variations and their properties
4.3 Differentiation of an integral.
4.4 Absolute continuity
4.5 The L^p-spaces
4.6 The Minkowski and Holder inequalities.

Recommended Reading :

1] Simmons, G.F., Introduction to topology and Modern Analysis (963), McGraw-Hill Book Company, New Delhi.
2] Royden, H.L., Real Analysis (1987), Macmillan Publishing Company, N. Y.

Additonal Readings :

1] Rana, I.K., An Introduction to Measure and integration, (1997) Narosa Book Company.
2] Jain, P.K. & Gupta V. P. Lebesgue Measure and Integration (1986) Wiley Eastern Limited.
3] Berberian, S.K. Measure and Integration (1965) McMillan, New York.
4] Halmos, P.K. Measure Theory (1950) Van Nostrand
5] Rudin, W., Principles of Mathematical Analysis (2nd Edition) (1964), McGraw-Hill Book Company.
6] G.de Barra, Measure theory and Integration, Wiley Eastern Limited, 1981

M.A./M.Sc. Mathematics - Part - I (Sem. I)

1] Paper No. NMT 103
2] Title of the Paper - Advanced Calculus
3] Objectives: To Introduce Riemann Stieltjes Integral, to introduce the tests for uniform convergence of sequences and series of functions. Also to introduce the Green's theorem, Gauss divergence theorem and stokes theorem.
4] Note: Theorems and proofs are expected to be prepared from Mathematical Analysis by Apostal and Calculus Volume II by Apostal. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1 **(15 Lectures)**

1.1 Riemann Stieltjes Integral: Definition.
1.2 Linearity Properties.
1.3 Integration by parts, Reduction to Riemann integral.
1.4 Monotonically increasing integrators, upper and lower integrals,
1.5 Riemann's condition, comparison theorems
1.6 Integrators of bounded variations, Necessary and sufficient conditions for existence of R.S. integral.
1.7 Mean value theorems for R.S. Integral.

UNIT - 2 **(15 Lectures)**

2.1 Sequences of functions: Point wise convergence of sequences of functions.
2.2 Examples of sequences of real valued functions
2.3 Uniform convergence and continuity
2.4 The Cauchy condition for uniform convergence
2.5 Uniform convergence of infinite series of functions, Weierstrass M-test.
2.6 Sufficient condition for uniform convergence of series, Dirichlet's test for uniform convergence.

UNIT - 3 Multivariable Differential Calculus (15 Lectures)

3.1 Directional derivatives and continuity.
3.2 The total derivatives.
3.3 Total derivatives expressed in terms of partial derivatives.
3.4 Jacobian matrix.
3.5 Matrix form of the chain rule.
3.6 A chain rule for vector field.
3.7 Mean value Theorems.
3.8 Sufficient condition for differentiability.

UNIT - 4 (15 Lectures)

4.1 Path and line integrals
4.2 Multiple integrals Double integral (Theorems without proof)
4.3 Application to area and volume.(Theorems without proof)
4.4 Greens theorem in the plane.
4.5 Application of Green's Theorem.
4.6 Change of variables, special cases of transformation formula.
4.7 Surface integral, change of parametric representation.
4.8 Other notations for surface integrals, stoke's Theorem
4.9 Curl and divergence of a vector field.
4.10 Gauss divergence Theorem.

Recommended Readings

1] T.M. Apostal Mathematical Analysis, 2nd edition, Narosa Publishing House.
2] T. M. Apostal Calculus Volume II,John Wiley & Sons (Asia) Pvt. Ltd.

Additional Readings :

1] W.Rudin Principles of Mathematical Analysis, 3rd edition McGraw Hill, 1976.
2] W.H.Fleming Functions and several variables, Addison Wesley Publishing Co.

M.A./M.Sc. Mathematics - Part - I (Sem. I)

1] Paper No. NMT 104
2] Title of the Paper - Differential Equations
3] Objectives: To Study methods of solutions of ordinary differential equations of various types.
4] Note: Theorems and proofs are expected to be prepared from An introduction to Ordinary Differential Equation by E.A. Coddington. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1 **(15 Lectures)**

1.1 Linear Equations with constant coefficients: The second order homogenous equation.
1.2 Initial value problems for second order equations
1.3 Linear dependence and independence.
1.4 A formula for wronskian.
1.5 The nonhomogenous equations of order two.

UNIT - 2 **(15 Lectures)**

2.1 The homogenous equation of order in
2.2 Initial value problems for n^{th} order equation
2.3 Equations with real constants
2.4 The non-homogenous equation of order n
2.5 Linear equations with variable coefficients: Initial value problems for the homogenous equation.

UNIT - 3 **(15 Lectures)**

3.1 Solution of the homogenous equation
3.2 The wronskian and linear independence
3.3 Reduction of the order of a homogenous equation.
3.4 Homogenous equations with analytic coefficients, The Legendre equations
3.5 Linear equations with regular singular points: Euler Equation.
3.6 Second order equations with regular singular points.

UNIT - 4 **(15 Lectures)**

4.1 The Bessel Equation.
4.2 Regular singular points at infinity.
4.3 The method of successive approximations
4.4 The Lipschitz condition.
4.5 Convergence of successive approximations.

Recommended Readings :

1] E.A.Coddington, An Introduction to ordinary Differential Equations, Prentice - Hall of India Pvt.Ltd. New Delhi (2003)

Additional Readings :

1] G.F. Simmons Differential Equations with Applications and Historical Notes, McGraw Hill, New York, 1972

2] E.D.Rainville Elementary Differential Equations, Mac Millan Company New York, 1964

M.A./M.Sc. Mathematics - Part - I (Sem. I)

1] Paper No. NMT 105
2] Title of the Paper - Classical Mechanics
3] Objectives: To study mathematical techiniques needed in quantum mechanics and modern physics.
4] Note: Theorems and proofs are expected to be prepared from given basic readings. This should be taken in to account for examination point of view.
5] Content of the syllabus:

UNIT - 1 (15 Lectures)

1.1 Mechanical of system of particles
1.2 Mechanics of system of particles.
1.3 Conservation theorems conservative forces with examples.
1.4 Constraints, Generalized co-ordinates. D. Alembert's principle
1.5 Lagrange's equations of motion. The forms of Lagrange's equations of motion for non conservative systems and partially conservative and partially non conservative systems.
1.6 Kinetic energy as a homogeneous function of generalized velocities.
1.7 Simple applications of the Lagranian formulation.

UNIT - 2 (15 Lectures)

2.1 Cyclic co-ordinates and generalized momentum conservation Theorems.
2.2 Calculus of variation, Euler Lagrange's equation.
2.3 First integrals of Euler Lagrange's equation, the case of several dependent variables.
2.4 Geodesics in a plane, the minimum surface of revolution, Brachistochrome problem.
2.5 Isoperimetric problems, problems of maximum enclosed area.

UNIT - 3 (15 Lectures)

3.1 Hamilton's Principle for conservative systems, Lagrange's equation from Hamilton principle for conservative system.
3.2 Hamiltonian function. Hamiltonian canonical equations of motion.
3.3 Derivation of Hamiltonian equation from variational principle.
3.4 Physical significance of Hamiltonian
3.5 The principle of least actio2qn.Jocobi's form of the least action principle.
3.6 Cyclic co-ordinates and Routh's procedure.

UNIT - 4 **(15 Lectures)**

4.1 The independent co-ordinates of a rigid body.
4.2 Orthogonal transformations.
4.3 Properties of transformation matrix.
4.4 Infinitesimal rotations, The Eulerian angles
4.5 The Calyley-Klein parameters, Eulers theorem on motion of rigid body.
4.6 Angular momentum and kinetic energy of motion of a rigid body about a point.

Recommended Reading :

1] Basic Reading:
   i] Goldstein H. Classical Mechanics (1980) Narosa Publishing (Second edition) (Third Edition) House
   ii] Weinstock calculus of various with applications to physics and Engineering (International Services in pure and applied Mathematics) (1982) McGraw.

Additional Reading :

1] Whittakar E.T. A treatise on the Analytical Dynamics of particles & rigid bodies (1965) Cambridge University Press
2] Goldstein Pooler & Saflco Classical Mechanics Pearson Educations.
3] References
   i. Mondal C.R. Classical Mechanics (001) Prentice Hall of India.
   ii. J. C. Upadhyaya - Classical Mechanics, Himalaya Publishing House (1999)
   iii. N.C. Rana & P.S.Jog Classsical Mechanics, Tata Mc.Graw Hill (1992)

M.A./M.Sc. Mathematics - Part - I (Sem. II)

1] Paper No. NMT 201
2] Title of the Paper - Algebra - II
3] Objectives: To introduce basic notions in field extensions & Galois Theory
4] Note: Theorems and proofs are expected to be prepared from Topics in Algebra by Herstein. For problems refer Basic Abstract Algebra by Nagpaul, Jain and Bhattacharya and Algebra byM. Artin. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1

(15 Lectures)

1.1 Extension fields, Finite field extensions.
1.2 Algebraic elements and algebraic extensions Algebraic numbers.
1.3 Field adjunction
1.4 Simple extensions Minimal polynomial of an element over a field.

UNIT - 2 **(15 Lectures)**

2.1 Roots of Polynomials. Multiple roots.
2.2 Splitting field of a polynomial
2.3 More about roots. Simple extensions
2.4 Separable element. Separable extension of a field
2.5 Perfect fields.

UNIT - 3 **(15 Lectures)**

3.1 Construction with straight edge and compass.
3.2 Impossibility of (a) Trisection of angles (b) Duplication of cube (c) Squaring a circle.
3.3 Elements of Galois Theory. The group G (K, F) and its properties.
3.4 Normal extension of fields.
3.5 Symmetric Functions

Unit 4 **(15 Lectures)**

4.1 Fundamental Theorem of Galois Theory.
4.2 Solvability of radicals
4.3 Finite fields and its constructions (4, 8, 9.....)
4.4 Properties of finite fields.
4.5 Primitive roots of a prime.

Recommended Readings :

1] Herstein I.N. Topics in Algebra, 2nd edition Wiley Eastern Ltd. 1993

Additional Readings :

1] J.B. Fraleigh First course in Abstract Algebra, 3rd edition, Narosa Publishing House 1988.

2.] P.B.Bhattachrya, S.K.Jain, S.R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, 2005.

3] N.Jacobson, Basic Algebra I, Hindustan Publishing Corporation (India) Delhi, 1984

4] M.Artin Algebra, Prentice Hall of India, 1996.

M.A./M.Sc. Mathematics - Part - I (Sem. II)

1] Paper No. NMT 202
2] Title of the Paper - Complex Analysis
3] Objectives: To Introduce basic notions in complex Analysis and to use the results in developing advanced mathematics.
4] Note: Theorems and proofs are expected to be prepared from Functions of One complex Variable by J. B. Conway. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1 **(15 Lectures)**

1.1 Analytic functions as mappings.
1.2 Mobius transformations (Bilinear / Fractional)
1.3 Power series representation of analytic functions
1.4 Zeros of an analytic functions.

UNIT - 2 **(15 Lectures)**

2.1 The index of a closed curve.
2.2 Cauchy's theorem and integral formula
2.3 Counting Zeros
2.4 The open mapping theorem.

UNIT - 3 **(15 Lectures)**

3.1 Goursats theorem
3.2 Singularities and classification of singularities.
3.3 Residues
3.4 Problems.

UNIT - 4 **(15 Lectures)**

4.1 The argument principle
4.2 The maximum modulus theorem.
4.3 The maximum principle
4.4 Schwarz lemma

Recommended Readings :

1] J.B.Conway, Functions of One Complex variable, 3rd Edition, Narosa Publishing House.

Additoinal Readings :

1] Alfors L.V. Complex Analysis, McGraw Hill, 1979

2] H.Silverman, Complex Variables.

M.A./M.Sc. Mathematics - Part - I (Sem. II)

1] Paper No. NMT 203
2] Title of the Paper - General Topology
3] Objectives: To Introduce basic notions of topology and to study different types of topological spaces.
4] Note: Theorems and proofs are expected to be prepared from Foundations of General Topology by W.J. Pervin. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1 **(15 Lectures)**

1.1 Definition and examples of topological spaces.
1.2 Closed sets and closure.
1.3 Interior and exterior operators and Neighborhoods.
1.4 Bases and Sub bases.
1.5 Relative Topologies.

UNIT - 2 **(15 Lectures)**

2.1 Connected sets and components
2.2 Compact and countably compact spaces.
2.3 Continuous functions.
2.4 Homeomorphisms.

UNIT - 3 **(15 Lectures)**

3.1 Separation axioms: T_o, T_1, T_2 spaces and sequences
3.2 Axioms of countability, Lindelof space, Separable space.
3.3 Regular and Normal spaces.
3.4 Completely regular spaces.

UNIT - 4 **(15 Lectures)**

4.1 $T_{3,}$ $T_{3\ 1/2}$, T_4, spaces
4.2 Properties and examples.
4.3 Product spaces: Finite product.
4.4 Product invariant properties.

Recommended Reading :

1] W.J. Pervin, Foundations of General Topology, Academic Press, London, 1964

Additional Reading :

1] Munkers J.R. Topology - A first Course, Prentice Hall of India Pvt. Ltd., 1996

2] Joshi K.D. Introduction to General Topology, Wiley Eastern Ltd., 1983

3] Simmons G.F. Introduction to Topology and Modern Analysis, Mc Graw Hill Book Company, New Delhi 1963

4] Murdeshwar M.G. General Topology, Wiley Eastern Ltd., 1983

M.A./M.Sc. Mathematics - Part - I (Sem. II)

1] Paper No. NMT 204
2] Title of the Paper - Differential Geometry
3] Objectives: To introduce the curves and surfaces in E^3 and to study their nature with the help of vector calculus.
4] Note: Theorems and proofs are expected to be prepared from Elementary Differential Geometry by B.O'Neill. This should be taken into account for examination point of view.
5] Content of the Syllabus

UNIT - 1 **(15 Lectures)**

1.1 Tangent vectors and vector fields, frame fields
1.2 Directional Derivatives.
1.3 Directional Derivatives w.r.t. vector field
1.4 Reparametrization of curves.
1.5 Speed of a curve.

UNIT - 2 **(15 Lectures)**

2.1 Isometries of E^3
2.2 Translation, Rotation, Orthogonal transformations.
2.3 Covariant derivatives.
2.4 Frenet Frame fields, Frenet formula's for unit speed curve.
2.5 Frenet formula's for arbitrary speed curve.
2.6 Frenet approximation of curve.

UNIT - 3 **(15 Lectures)**

3.1 Calculus on Surfaces: Co-ordinate patches.
3.2 Surfaces in E^3 Surface of revolution.
3.3 Patch Computation.
3.4 Parameterization of a region X(D) in M
3.5 Tangent and normal vector fields on a surface

UNIT - 4 **(15 Lectures)**

4.1 Shape operator on surfaces.
4.2 Normal curvature.
4.3 Gaussion and Mean Curvature
4.4 Computational techniques.
4.5 Special curves on surface, principal curves.
4.6 Asymptotic curves, Geodesics.

Recommended Readings :

1] B.O'Neill Elementary Differential Geometry, Academic Press,London 1966

Additional Readings :

1] Nirmala Prakash Differential Geometry, Tata Mc Graw Hill 1981

2] Millman & Parker G.D. Elements of Differential Geometry, Prentice - Hall of India Pvt. Ltd.,1977.

M.A./M.Sc. Mathematics - Part - I (Sem. II)

1] Paper No. NMT 205
2] Title of the Paper - Numerical Analysis
3] Objectives: To Analyses methods used to solve mathematical problems numerically.
4] Note: Theorems and proofs are expected to be prepared from Introductory Methods of Numerical Analysis by S.S.Sastry and Numerical Methods for Scientific and Engineering Computation by Jain and Iyengar and Jain.

UNIT - 1 **(15 Lectures)**

Errors in numerical calculations and solution of algebraic and transcendental equations.

1.1 Numbers and their accuracy
1.2 Mathematical preliminaries.
1.3 Errors & their computation: Absolute, relative & percentage errors.
1.4 A general error formula
1.5 Error in series approximation.
1.6 The iteration method & it's rate of convergence.
1.7 The method of false position & its rate of convergence
1.8 Secant method & its rate of convergence.
1.9 Newton Raphson method and its rate of convergence. Generalized Newton's Method.
1.10 Newton's Raphson Method for system of non linear equations.
1.11 Lin Bairstow's method.

UNIT 2 : Interpolation and Numerical Differentiation. **(15 Lectures)**

2.1 Errors in polynomial Interpolation.
2.2 Finite Differences: Forward, Backward & Central Differences, Symbolic relations & separation of symbols.
2.3 Newton's Formula for interpolation.
2.4 Lagrange's Interpolation formula and error in Lagrange's interpolation formula.
2.5 Divided differences & their properties.
2.6 Newton’s general interpolation formula.
2.7 Numerical differentiation (up to 2nd order derivative) with forward and backward difference formula.

UNIT 3 : (15 Lectures)

Numerical solutions of system of linear equations & Eigen values.

3.1 Gaussian elimination method.
3.2` Method of factorization (LU decomposition)
3.3 Iterative Method: Gauss Seidal Method.
3.4 Eigen value problem: Householder's method.
3.5 Eigen values of symmetric tridiagonal matrix.
3.6 Power method for largest Eigen value.

UNIT 4: (15 Lectures)

Numerical Integration and Solutions of ordinary differential equations

4.1 Numerical Integration: Trapezoidal rule Simpson's 1/3rd rule and Simpson's 3/8 th rule.
4.2 Errors in the above methods.
4.3 Solution of differential equation by Taylor's series: Euler's method and Euler's modified method.
4.4 Runge - Kutta Method for 2nd and 4th order (Derivation of 2nd order method only).

Recommended Readings :

1] S.S.Sastry Introductory Methods of Numerical Analysis, 3rd edition, Prentice Hall of India, 2001

2] M.K.Jain, S.R.K.Iyengar, R.K.Jain, Numerical Methods for scientific and Engineering computation, 3rd edition, Wiley Eastern Ltd., 1992

Additional Readings :

1] Atkinson K. E., An Introduction to Numerical Analysis, John Wiley and Sons,N.Y.,1978.
2] Froberg C.E., Introduction to Numerical Analysis, Addison Wesley,1952.
3] Scarborough J. B., Numerical mathematical Analysis, Johns Hopkins University Press, Baltimore, 1950.

M.A./M.Sc. Mathematics - Part - I (Sem. II)

1] Paper No. NMT 205
2] Title of the Paper - Relativistic Mechanics
3] Objectives: To Introduce basic notions of relativity
4] Note: Theorems and proofs are expected to be prepared from Introduction to special relativity by R. Resnick & a Text book of Matrix and Tensor by G. Paria.

5] Contents of the Syllabus.

UNIT - 1 Relativistic Kinematics (15 Lectures)

Galilean transformations, Newtonian Relativity, Electromagnetism & Newtonian Relativity, Inertial frames, postulates of special relativity Derivation of the Lorentz Transformation equations, Consequences of the Lorentz Transformation equations, viz. Lorentz-Fitzgerold contraction, time dilation , simultaneity and co locality of events. Invariance of electromagnetic wave equation. The relativistic addition of velocities (Einstein's formula) Lorentz velocity and acceleration transformation equations, relativistic aberration formula and Doppler affect.

UNIT - 2 Relativistic Dynamics (15 Lectures)

Variation of mass of a moving particle, relativistic momentum, force work and energy. The equivalence of mass and energy. The transformation properties of momentum, energy, mass and force Minkowski space-time, four velocity vectors four momentum, Light cone, Relativistic Lagrangian and Hamiltonian.

UNIT - 3 Electromagnetism (10 Lectures)

The interdependence of electric and magnetic fields. The transformation for electric and magnetic fields, the fields of a uniformly moving point charge. The invariance of Maxwell’s equations.

UNIT - 4 Tensor Analysis (20 Lectures)

Transformation of co-ordinates Laws of transformation of contra variant, covariant and mixed tensors of different ranks. Cartesian tensor, metric tensors Algebra of tensors, associate tensors, raising and lowering of indices physical components of tensors.

Christoffel Symbols, covariant derivative of tensors, covariant derivation of second order, Riemann Christoffel tensor, Ricci Tensor, Einstein Tensor, Local inertial co-ordinate system, Bianchi identities, contracted Bianchi identities.

Recommended Books :

1] Introduction to special Relativity by R. Resnick (1968)
2] A Text Book of Matrix and Tensor byParia G.Scholan's Publication, Indore

Reference Books :

1] Relativeity and Gravitation by Philippa Tourrence (1972) Cambridge University Press.

Equivalence for the Papers in Old Syllabus and New Syllabus for M.Sc. Part-I (Mathematics) Sem.-I & Sem.II is given below-

Old Syllabus		New Syllabus	
Sem.-I		**Sem.-I**	
NM101.	Algebra-I	NMT:	Algebra-I
NM102.	Advanced Calculus	NMT103:	Advanced Calculus
NM103.	Differential Equation	NMT104:	Differential Equation
NM104.	Differential Geometry	NMT102:	Real Analysis
NM105	Classical Mechanics	NMT105:	Classical Mechanics
Sem.II		**Sem.II**	
NM201:	Algebra-II	NMT201:	Algebra-II
NM202:	Real Analysis	NMT204:	Differential Geometry
NM203:	General Topology	NMT203:	General Topology
NM204:	Complex Analysis	NMT202:	Complex Analysis
NM205:	Relativistic Mechanics or Computational Algorithm	NMT205:	Relativistic Mechanics or Computational Algorithm