

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester I)
(Introduced from June 2013 onwards)**

- (i) Paper : MT 101
(ii) Title of Paper: Algebra - I
(iii) Specific Objectives: To study group and ring theory in details and to introduce the concept of modules over a ring.
(iv) A brief note: - (Notations and concepts are taken from books given in basic reading; this should be taken in account for examination point of view).
(v) UNIT No. of Lectures

Unit I: Simple groups, simplicity of A_n ($n > 5$), Commutator subgroups, normal and subnormal series, Jordan-Holder theorem, Solvable groups, isomorphism theorems, Zassenhaus Lemma, Schreier refinement theorem.	15 Lectures
Unit II: Group action on a set, isometry subgroups, Burnside theorem, Sylow's theorems, p -subgroups, Class equation and applications.	15 Lectures
Unit III: Ring of Polynomials, Factorization of polynomials over fields, irreducible polynomials, Eisenstein criterion, ideals in $F[x]$, unique factorization domain, principal ideal domain, Gauss lemma, Euclidean Domain.	15 Lectures
Unit IV: Modules, sub-modules, quotient modules, homomorphism and isomorphism theorems, fundamental theorem for modules.	15 Lectures

(vi) Recommended Reading:

(In MLA/APA Style Sheet Format)

- a) Basic Reading:-** 1) A first course in Abstract Algebra by John Fraleigh (3rd edition) Narosa publishing house, New Delhi
2) C. Musili, Rings and Modules, Narosa Publishing house.
3) Joseph A. Gallian, Contemporary Abstract Algebra, Narosa Publication, Fourth Edition, 1999.
- b) Additional Reading:-** 1) "Basic Abstract Algebra" by Bhattacharya, Jain and Nagpal, 2nd edition, Narosa Publishing House, New Delhi.
2) Topics in Algebra, I. N. Herstein, Vikas Publishing House.
- c) References :-**
- i) Books:** Basic Algebra' by N. Jacobson, Hind Publishing Corporation 1984.
- ii) Periodicals/Journals:**

(NOTE :

- i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**
- ii) General/Specific instructions for Laboratory safety should be given wherever necessary) **Nil.**

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester I)
(Introduced from June 2013 onwards)**

- (i) **Paper :** MT 102
(ii) **Title of Paper:** Advanced Calculus
(iii) **Specific Objectives:** To study sequences of functions, multivariables differential calculus, extremum problems.
(iv) **A brief note:-** Theorems and proofs are expected to be prepared from **Mathematical Analysis by T.M.Apostol.**

(v) **UNIT** **No. of Lectures**

Unit 1 : Sequences of functions: Pointwise convergence of sequences of functions, Examples of sequences of real valued functions, Definition of uniform convergence, Uniform convergence and continuity, Cauchy condition for uniform convergence, Uniform convergence and Riemann integration, Uniform convergence and differentiation, double sequence uniform convergence and double sequences, mean convergence.

15 Lectures

Unit 2 Series of functions: Rearrangement of series, subseries, double series, Rearrangement theorem for double series, Multiplication of series, Power series, multiplication of power series, substitution theorem, reciprocal of power series, Real power series, The Taylor series generated by function, Bernstein's theorem, Binomial series, Abel's limit theorem, Taubers theorem.

15 Lectures

Unit 3 Multivariable differential Calculus: The Directional derivatives, directional derivatives and continuity, total derivative, total derivatives expressed in terms of partial derivatives, The matrix of linear function, Jacobin matrix, Chain rule, mean value theorem for differentiable functions, A sufficient condition for differentiability, sufficient condition for equality of mixed partial derivatives, Taylor's formula for functions from R^n to R^1 . The inverse function theorem (Statement only) The implicit function theorem (Statement only) and their applications. Extrema of real valued functions of one variable, Extrema of real valued functions of several variables.

15 Lectures

Unit 4 Path and line integrals, Multiple integrals Double integral (Theorems without proof) Application to area and volume.(Theorems without proof)Greens theorem in the plane. Application of Green's Theorem.Change of variables, special cases of transformation formula.Surface integral, change of parametric representation. Other notations for surface integrals, stoke's Theorem Curl and divergence of a Vector field. Gauss divergence Theorem.

15 Lectures

(vi) **Recommended Reading :**

a) **Basic Reading :-** 1) Mathematical Analysis, T. M. Apostol, Second Edition, Narosa Publishing House.

2) Advanced Calculus Vol II by T. M. Apostol

b) **Additional Reading :-** 1) Principles of mathematical Analysis, Walter Rudin, third Edition, McGraw Hill book company

b) **References :-** i) **Books:** Methods of Real Analysis, Richard Goldberg, Blaisdell Publishing company

ii) **Periodicals/Journals:** NIL

NOTE : i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/tutorial/seminar**

- ii) General/Specific instructions for Laboratory safety should be given wherever necessary)
Nil

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester I)
(Introduced from June 2013 onwards)**

- (i) **Paper:** MT 103
(ii) **Title Of Paper:** Real Analysis
(iii) **Specific Objectives:** To introduce basic concepts and notions of real analysis viz. Lebesgue measure, Lebesgue integral, measurable functions etc.
(iv) **UNIT** No. of

Lectures

UNIT-I: Open Sets, Closed Sets and Borel Sets, Lebesgue Outer Measure, The sigma algebra of

Lebesgue Measurable Sets, Countable Additivity, Continuity and Borel-Cantelli Lemma, Non measurable Sets. **15**

Lectures

UNIT- II: Sums, Product and Composition of Measurable Functions, Sequential Pointwise

limits and Simple Approximation. Littlewood's Three Principles, Egoroff's Theorem

and Lusin's Theorem, Lebesgue Integration of a Bounded Measurable Function,

Lebesgue Integration of a Non-negative Measurable Function. **15**

Lectures

UNIT-III: The General Lebesgue Integral, Characterization of Riemann and

Lebesgue Integrability, Differentiability of Monotone Functions, Lebesgue's Theorem, Functions of Bounded Variations: Jordan's Theorem. **15**

Lectures

UNIT – IV: Absolutely Continuous Functions, Integrating Derivatives: Differentiating Indefinite

Integrals, Normed Linear Spaces, Inequalities of Young, Holder and Minkowski,

The Riesz-Fischer Theorem. **15**

Lectures

(vi) **Recommended Reading :**

a) Basic Reading:-

1) Royden, H. L., Fitzpatrick P.M., Real Analysis. (2009) 4th edition. Prentice Hall of India, New Delhi

b) Additional reading:-

- 1) G.deBarra. Measure Theory and Integration. (1981)Wiley Eastern Ltd.
- 2) Rana, I. K. An Introduction to Measure and Integration. (1997) Narosa Book Company.

c) References Books:

- 1) Berberian, S. K. Measure and Integration. (1965) McMillan, New York.
- 2) Jain, P. K. and Gupta, V. P. Lebesgue measure and Integration. (1986). Wiley Easter Limited.
- 3) Rudin W., Principles of Mathematical Analysis, (1964) McGraw-Hill Book Co.

Notes:i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/tutorial/seminar**
 ii) General/Specific instructions for Laboratory safety should be given wherever necessary) **NIL**

**NEW/REVISED SYLLABUS FOR
 M.A. / M. Sc. Mathematics (Part I) (Semester – I)
 (Introduced from June 2013 onwards)**

- (i)**Paper:** **MT 104**
 (ii)**Title of Paper:** **Differential Equations**
 (iii)**Specific Objectives:** **To study basic notions in Differential Equations and use the results in developing advanced mathematics.**
 (iv)**A brief note :****Theorems and proofs are expected to be prepared from An introduction to ordinary differential equations by E.A. Coddington.**
 (v) **UNIT** **No. of Lectures**

- Unit – I :**Linear Equations with constant coefficients:
 The second order homogeneous equation, Initial value problems for second order equations, Linear dependence and independence, A formula for the Wronskian, The non-homogeneous equations of order two, The homogeneous equations of order n. **15 Lectures**
- Unit - II** Initial value problems for the n^{th} order equations, The non-homogeneous equation of n^{th} order. Linear Equations with variable coefficients: Initial value problems for the homogeneous equations. Solutions of the homogeneous equations, The Wronskian and linear independence, Reduction of the order of a homogeneous equation, The non-homogenous equations, **15 Lectures**
- Unit - III** Greens function, Sturm Liouville theory, Homogeneous equations with analytic coefficients, The Legendre equations. Linear Equations with regular singular points: The Euler equations, Second order equations with regular singular points. **15 Lectures**
- Unit – IV** The Bessel equation, Regular singular points at infinity,Existence and uniqueness of solutions: The method of successive approximations, The Lipschitz condition of the successive approximation. Convergence of the successive approximation. **15 Lectures**

(vi) **Recommended Reading :**
(In MLA/APA Style Sheet Format)

- a) **Basic Reading:-** 1) E.A.Coddington: An introduction to ordinary differential equations. (1974) Prentice Hall of India Pvt.Ltd. New Delhi.
 2) G. Birkoff and G.G.Rota: Ordinary Differential equations, John Willey and Sons

b) **Additional Reading:-** G.F. Simmons Differential Equations with Applications and Historical note, McGraw Hill, Inc. New York. (1972)

c) **References**

Books:- 1. E.A. Coddington and Levinson: Theory of ordinary differential equations McGraw Hill, New York(1955)

2.E.D. Rainvills :Elementary differential equations,TheMacmillan company, New York. (1964)

NOTE :

i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week is for problem solving/ tutorials/seminars.**

ii) General/Specific instructions for Laboratory safety should be given wherever necessary)
Nil.

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester I)
(Introduced from June 2013 onwards)**

(i) **Paper – MT 105**

(ii) **Title of Paper: Classical Mechanics**

(iii) **Specific Objectives:** To study the mathematical artifact and learn sometime about the art of applying mathematical knowledge to solve problems arises in the real world.

(iv) **A brief note: - Theorems and proofs are expected to be prepared from books given basic readings.**

(v) **UNIT**

No. of Lectures

UNIT – I: Mechanics of a particle, Mechanics of a system of particles, conservation theorems, conservative force with examples, constraints, Generalised co-ordinates, D' Alembert's Principle, Lagrange's equations of motion, the forms of Lagrange's equation for non conservative system and partially conservative and partially non-conservative system, Lagrangian for charged particle in electromagnetic field, Kinetic energy as a homogeneous function of generalised velocities, Non-conservation of total energy due to the existence of non-conservative forces. Cyclic co-ordinates and generalised momentum, conservation theorems, motion of a particle under central force and first integral.

15 Lectures

UNIT – II Functionals, basic lemma in calculus of variations, Euler- Lagrange's equations, first integrals of Euler- Lagrange's equations, the case of several dependent variables Undetermined end conditions, Geodesics in a plane and space, the minimum surface of revolution, the problem of Brachistochrone, Isoperimetric problems, problem of maximum enclosed area, shape of a hanging rope. Hamilton's Principle for conservative and non-conservative systems, Derivation of Hamilton's principle from D' Alembert's principle, Lagrange's equations of motion for conservative and non-conservative systems from Hamilton's principle. Lagrange's equations of motion for non-

conservative systems (Method of Lagrange's undetermined multipliers),

15 Lectures

UNIT – III Hamiltonian function, Hamilton's canonical equations of motion, Derivation of Hamilton's equations from variational principle, Physical significance of Hamiltonian, the principle of least action, Jacobi's form of the least action principle, cyclic co-ordinates and Routh's procedure. Orthogonal transformations, Properties of transformation matrix, infinitesimal rotations.

15 Lectures

UNIT – IV The Kinematics of rigid body motion: The independent co-ordinates of a rigid body, the Eulerian angles, Euler's theorem on motion of rigid body, Angular momentum and kinetic energy of a rigid body with one point fixed, the inertia tensor and moment of inertia, Euler's equations of motion, Cayley- Klein parameters, Matrix of transformation in Cayley- Klein parameters, Relations between Eulerian angles and Cayley- Klein parameters.

15 Lectures

(vi) **Recommended Reading :**

- a) **Basic Reading :-** 1) Goldstein, H. Classical Mechanics. (1980), Narosa Publishing House, New Delhi.
2) Weinstock: Calculus of Variations with Applications to Physics and Engineering (International Series in Pure and Applied Mathematics). (1952), Mc Graw Hill Book Company, New York.

- b) **Additional Reading :-** 1) Whittaker, E. T. A treatise on the Analytical Dynamics of particles and rigid bodies. (1965), Cambridge University Press.
2) Rana, N.C. and Joag, P. S. Classical Mechanics. (1991) Tata McGraw Hill, New Delhi.

c) **References :-**

- i) **Books** 1) Bhatia, V. B. Classical Mechanics with Introduction to Non-linear Oscillation and Chaos.(1997), Narosa publishing House.
2) Gupta, A. S. Calculus of Variations with Applications (1997), Prentice Hall of India.
3) Gelfand, I. M. and Fomin, S. V. Calculus of Variations (1963), Prentice Hall of India.
4) Mondal, C. R. Classical Mechanics (2001), Prentice Hall of India.

ii) **Periodicals/Journals: Nil**

NOTE :

The details of fieldwork, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/tutorial/seminar**

ii) General/Specific instructions for Laboratory safety should be given wherever necessary)

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester II)
(Introduced from June 2013 onwards)**

- (i) **Paper –** MT- 201
(ii) **Title of Paper:** Linear Algebra
(iii) **Specific Objectives:** To introduce basic notions in Linear Algebra and use the results in developing advanced mathematics.
(iv) A brief note: Theorems and proofs are expected to be prepared from Topics in Algebra by Herstein I.N. and Linear Algebra by Hoffman, Kenneth and Kunze R.

(v) UNITS	No. of Lectures
Unit I. Direct sum of a vector space, Dual Spaces. Annihilator of a subspace, Quotient Spaces. Algebra of Linear transformations.	15 Lectures
Unit II Adjoint of a linear transformation, Inner product spaces, Eigen values and eigenvectors of a linear transformation. Diagonalization. Invariant subspaces.	15 Lectures
Unit III Canonical forms, Similarity of linear transformations, Reduction to triangular forms, Nilpotent transformations, Primary decomposition theorem, Jordan blocks and Jordan forms, Invariants of linear transformations.	15 Lectures
Unit IV Hermitian, Self adjoint, Unitary and normal linear transformation, Symmetric bilinear forms, skew symmetric bilinear forms, Group preserving bilinear forms.	15 Lectures

(vi) Recommended Reading:

(In MLA/APA Style Sheet Format)

- a) Basic Reading:-** 1) Herstein I. N. : Topics in Algebra, 2nd Edition, Willey eastern Limited
2) Hoffman, Kenneth and Kunze R: Linear Algebra, Prentice Hill of India Private Limited., 1984.
b) Additional Reading: Sahi and Bist, Linear Algebra, Narosa Publishing House.
c) Reference Books: 1. A. R. Rao and P. Bhimashankaran, Linear Algebra, Hidustan Book Agency(200)
2. Surjit Singh, Linear Algebra, Vikas publishing House (1997)

ii) Periodicals/Journals: Nil

(NOTE :

- i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/ tutorial/ seminar**
ii) General/Specific instructions for Laboratory safety should be given wherever necessary) Nil

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester II)
(Introduced from June 2013 onwards)**

(i) Paper : MT 202

(ii) Title of Paper : Topology

(iii) Specific Objectives: To introduce several topological spaces with their different properties.

(iv) A brief note:-Theorems and proofs are expected to be prepared from Foundations of General Topology by W. J. Pervin

Unit I: Topological spaces, Examples, Limit points, Closed sets and closure, Interior, exterior, Neighborhoods, Different ways of defining topologies , Bases, Subbases, Subspaces of topological space. Hereditary properties

15 Lectures

Unit II: Connected Spaces, Components, Connected subspaces of real lines, Compact Spaces, Continuous Functions, Homeomorphisms, Topological properties.

15 Lectures

Unit III: Separation axioms: T_0 , T_1 , T_2 -spaces, First and second axioms spaces, Separable Spaces, Lindelof spaces, Regular and T_3 -Spaces, Normal and T_4 -Spaces.

15 Lectures

Unit IV: Completely Regular and $T_{3\frac{1}{2}}$ -Spaces , Completely Normal and T_5 -Spaces , Product Spaces (For T_0 , T_1 , T_2 , compact, and connected spaces), Urysohn lemma and Urysohn metrization theorem.

15 Lectures

(vi) Recommended Reading :

a) Basic Reading :- W. J. Pervin, Foundations of General Topology, Academic Press, New York, 3rd edition, 1970.

b) Additional Reading :-

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

2) J. R. Munkers, Topology: A First Course, Prentice Hall of India Pvt. Ltd.

3) K. D. Joshi, General Topology.

4) Willard, Topology, Academic press.

NOTE : The details of fieldwork, seminar, Group Discussion and Oral examination be given wherever necessary. **1 hr per week for problem solving/tutorials/seminars**

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester II)
(Introduced from June 2013 onwards)**

- (i) **Paper:** MT 203
(ii) **Title of Paper:** Complex Analysis
(iii) **Specific Objectives:** To introduce basic notions in Complex analysis and use the

results in developing advanced mathematics.

- (iv) **A brief note :-** Theorems and proofs are expected to be prepared from Functions of One Complex Variable by J. B. Conway; this should be taken in to account for examination point of view.

Unit 1: Power series, Radius of convergence, analytic functions, Cauchy-Riemann equations, Harmonic functions, Mobius Transformations, line integral.

15 Lectures

Unit 2: Power series representation of analytic functions, zeros of an analytic function, Liouville's Theorem, Fundamental theorem of algebra, maximum modulus theorem. the index of a closed curve, Cauchy's theorem and integral formula, Morera's Theorem.

15 Lectures

Unit 3: Counting zeros, open Mapping theorem, Goursat's Theorem, classification of singularities, Laurent series development, Casorati-Weierstrass theorem, residues, residue theorem, evaluation of real integrals.

15 Lectures

Unit 4: The argument principle, Rouché's theorem, the maximum principle, Schwarz's lemma and its application to characterize conformal maps, Normal families, Hurwitz theorem, Riemann mapping theorem.

15 Lectures

- (vi) **Recommended Reading :**

a) **Basic Reading :-** J. B. Conway: Functions of One Complex Variable (3rd Edition) Narosa Publishing House.

b) **Additional Reading :-** Alfors L. V.: Complex Analysis, McGraw 1979.

c) **References :-**

i) Herb Silverman, Complex Analysis

ii) S. Ponnusamy, Herb Silverman, Complex Variables with Applications Analysis, Birkhauser, 2006

iii) S.Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House.

Note: The details of fieldwork, seminar, Group Discussion and Oral examination be given wherever necessary. **1 hr per week for problem Solving /tutorial / seminar**

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester II)
(Introduced from June 2013 onwards)**

- (i) **Paper:** MT 204
(ii) **Title of Paper:** Numerical Analysis
(iii) **Specific Objectives:** To analyze methods used to solve mathematical problems numerically.

(iv) **A brief note:** Theorems and proofs are expected to be prepared from 'Numerical methods for scientific and Engineering Computation' M. K. Jain, S. R. K. Iyengar, R. K. Jain.

(v) UNITS	No. of Lectures
Unit 1 Transcendental & polynomial equations: Bisection method, Iteration methods based on First degree equation (Secant method, Regula Falsi method, Newton Raphson method), Rate of Convergence, Iteration methods, Birge – Vieta method, Bairstow method,	15 Lectures
Unit 2 System of linear algebraic equations and eigen value problems: Iteration methods (Jacobi iteration method, Gauss seidel iteration method) convergence analysis, Matrix factorization methods (Doo little reduction, Crout reduction), Eigen values and eigenvectors, Gerschgorin theorem, Brauer theorem, Jacobi method for symmetric matrices, Householder's method for symmetric matrices, power method.	15 Lectures
Unit 3 Interpolation differentiation and integration: Lagrange and Newton interpolation, Truncation error bounds, Newtons divided difference interpolation, finite difference operators, numerical differentiation, methods based on interpolation,, numerical integration, Error analysis, methods based on interpolation Newton cotes methods, Error estimates for trapezoidal and Sampson's rule.	15 Lectures
Unit 4 Numerical solution of differential equations: Euler's method, analysis of Euler's method, Backward Euler's method, order of Euler's method, Explicit Runge – Kutta method of order two and four, mid point method, Taylor series method, convergence and stability of numerical methods, Truncation error, error analysis.	15 Lectures

(vi) **Recommended Reading:**

a) **Basic Reading:** 'Numerical methods for scientific and Engineering Computation' M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International Limited Publishers 1993.

b) **Additional Reading :** 1. Numerical Mathematics, Numerical solutions of Differential Equations by M. K. Jain

2. Introductory methods of Numerical Analysis' S. S. Sastry, Prentice Hall of India New Delhi.

c) **References :**

i) **Books**

ii) **Periodicals/Journals:**

NOTE: The details of fieldwork, seminar, Group Discussion and Oral examination be given wherever necessary. **1 Hr per week for problem solving/tutorial/seminar**

ii) General/Specific instructions for Laboratory safety should be given wherever necessary)

Nil

**NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester II)
(Introduced from June 2013 onwards)**

- (i) **Paper:** MT - 205
- (ii) **Title of Paper:** Differential Geometry
- (iii) **Specific Objectives:** To study the geometry of curves and to develop the calculus on the surfaces we introduce curves and basic notions of surfaces.
- (iv) A brief note: Theorems and proofs are expected to be prepared from O'Neill, B. Elementary Differential geometry, Academic Press, Revised Edition 2006.

(v) **UNIT** **No. of Lectures**

Unit – I Vector space, Euclidean space \mathbb{R}^3 . Tangent vectors and vectors fields, Frame fields, Natural frame fields, Directional derivative, Curves in \mathbb{R}^3 and reparametrization of curves, standard curves, Speed of curve, length of curve. 1- forms, differential forms.

No. of Lectures 15

Unit – II The Frenet Formulae for unit speed curve. Frenet approximation of curves, Arbitrary speed curves, Frenet formulas for arbitrary speed curve, Covariant Derivative. Isometries of \mathbb{R}^3 , Orthogonal transformations.

No. of Lectures 15

Unit – III Coordinate patches, surface in \mathbb{R}^3 , simple surface, cylinder surface, surface of revolution, parametrization of a region, parametrization of cylinder and surface of revolution, smooth overlapping patches, tangent and normal vector fields on a surface.

No. of Lectures 15

Unit – IV The shape operator of surface M in \mathbb{R}^3 , normal curvature, principal curvatures, Gaussian and mean curvatures, Umbilic points, fundamental forms of a surface, computational techniques, special curves on surface, asymptotic and geodesic curves.

No. of Lectures 15

(vi) **Recommended Reading : (In MLA/APA Style Sheet Format)**

1. **Basic Reading:** O'Neill, B.: Elementary Differential geometry, Academic Press, Revised Edition 2006.

References Books:

1. D. Somasundaram: Differential Geometry- First Course, Narosa Publishing House, New Dehli, 2010.
2. Nirmala Prakash: Differential Geometry, Tata Mcgraw Hill, 1981.
3. K. S. Amur and etl.: Differential Geometry, Narosa Publishing House, 2010.
4. Millman, R. and Parker, G. D. Elements of Differential Geometry, Prentice-Hall of India Pvt. Ltd. 1977.
5. Hicks, N. : Notes of differential geometry, Princeton University Press (1968)

NOTE:

- i) The details of field work, seminar, Group Discussion and Oral examination be given wherever necessary.
- ii) General/Specific instructions for Laboratory safety should be given wherever necessary)

