

2017-
18

Multani Mal Modi College, Patiala

Unit Planning M.Sc. Mathematics

Department of Mathematics



MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-Ist)
Subject: MM 401: ALGEBRA - I

TILLMST-I
Review of groups, subgroups, cosets, normal subgroups, quotient groups, homomorphisms and isomorphism theorems. Normal and subnormal series, Solvable groups, Nilpotent groups, Composition Series, Jordan-Holder theorem for groups. Group action, Stabilizer, orbit, Review of class equation, permutation groups, cyclic decomposition, Alternating group A_n , Simplicity of A_n .
TILLMST-II
Structure theory of groups, Fundamental theorem of finitely generated abelian groups, Invariants of a finite abelian group, Sylow's theorems, Groups of order p^2 , pq . Review of rings and homomorphism of rings, Ideals, Algebra of Ideals, Maximal and prime ideals, ideal in Quotient rings,
TILLFINAL EXAM
Field of Quotients of integral Domain.

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-Ist)

Subject: MM 402 : MATHEMATICAL ANALYSIS

TILLMST-I
Functional of several variables: Linear transformations, Derivatives in an open subset of \mathbf{R}^n , Chain Rule, Partial derivatives, Interchange of the order of differentiation, Derivatives of higher orders, Taylor's theorem, Inverse function theorem, Implicit function theorem. Algebras, σ - algebra, their properties, General measurable spaces, measure spaces, properties of measure, Complete measure, Lebesgue outer measure and its properties, measurable sets and Lebesgue measure, A non measurable set.
TILLMST-II
Measurable function w.r.t. general measure. Borel and Lebesgue measurability. Integration of non-negative measurable functions, Fatou's lemma, Monotone convergence theorem, Lebesgue convergence theorem, The general integral, Integration of series, Riemann and lebesgue integrals. Differentiation; Vitalis Lemma, The Dini derivatives, Functions of bounded variation, Differentiation of an Integral,
TILLFINAL EXAM
Absolute Continuity, Convex Fucntions and Jensen's inequality

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-Ist)

Subject: MM 403: TOPOLOGY I.

TILLMST-I
<p><u>Cardinals</u>: Equipotent sets, Countable and Uncountable sets, Cardinal Numbers and their Arithmetic, Bernstein’s Theorem and the Continuum Hypothesis.</p> <p><u>Topological Spaces</u>: Definition and examples, Euclidean spaces as topological spaces, Basis for a given topology, Topologizing of Sets; Sub-basis, Equivalent Basis. Relativization, Subspaces. <u>Elementary Concepts</u>: Closure, Interior, Frontier and Dense Sets, Topologizing with pre-assigned elementary operations</p> <p><u>Maps and Product Spaces</u>: Continuous Maps, Restriction of Domain and Range, Characterization of Continuity, Continuity at a point, Piecewise definition of Maps and Neighborhood finite families. Open Maps and Closed Maps, Homeomorphisms and Embeddings</p>
TILLMST-II
<p><u>Cartesian Product Topology</u>, Elementary Concepts in Product Spaces, Continuity of Maps in Product Spaces and Slices in Cartesian Products.</p> <p><u>Connectedness</u>: Connectedness and its characterizations, Continuous image of connected sets, Connectedness of Product Spaces, Applications to Euclidean spaces. Components, Local Connectedness and Components, Product of Locally Connected Spaces. Path Connectedness.</p> <p><u>Compactness and Countability</u>: Compactness and Countable Compactness, Local Compactness, One-point Compactification, T_0, T_1, and T_2 spaces, T_2 spaces and Sequences and Hausdorffness of One-Point Compactification.</p>
TILLFINAL EXAM
<p>Axioms of Countability and Separability, Equivalence of Second axiom, Separable and Lindelof in Metric Spaces. Equivalence of Compact and Countably Compact Sets in Metric Spaces.</p>

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-Ist)

MM 404: DIFFERENTIAL GEOMETRY

TILLMST-I
A simple arc, Curves and their parametric representation, arc length and natural parameter, contact of curves, Tangent to a curve, osculating plane, Frenet trihedron, Curvature and Torsion, Serret Frenet formulae, fundamental theorem for space curves, helices, contact between curves and surfaces. Evolute and involute, Bertrand Curves, spherical indicatrix, implicit equation of the surface, Tangent plane. First fundamental form of a surface, length of tangent vector and angle between two tangent vectors, area of a surface
TILLMST-II
The second fundamental form, Gaussian map and Gaussian curvature, Gauss and Weingarten formulae, Codazzi equation and Gauss theorem, curvature of a curve on a surface, geodesic curvature. Geodesics, Canonical equations of geodesic, Normal properties of geodesics. Normal Curvature, principal curvature, Mean Curvature, principal directions, lines of curvature, Rodrigue formula, asymptotic directions, envelopes, developable surfaces associated with space curves,
TILLFINAL EXAM
minimal surfaces, ruled surfaces

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-1st)

MM-405(A): Computer Programming using C

TILLMST-I
<p>Problem Identification, Analysis, Flowcharts, Decision tables, Pseudo codes and algorithms, Program coding, Program Testing and execution, Modular Programming, Top-down and Bottom-up Approaches.</p> <p>Need of programming languages. C character set, Identifiers and keywords, Data types, Declarations, Statement and symbolic constants, Input-output statements, Preprocessor commands,</p> <p>Operators and Expressions: Arithmetic, relational, logical, unary operators, others operators, Bitwise operators: AND, OR, complement precedence and Associating bitwise shift operators, Input-Output: standard, console and string functions</p> <p>Control statements: Branching, looping using for, while and do-while Statements, Nested control structures, switch, break, continue statements.</p>
TILLMST-II
<p>Functions: Declaration, Definition, Call, passing arguments, call by value, call by reference, Recursion, Use of library functions; Storage classes: automatic, external and static variables.</p> <p>Arrays: Defining and processing arrays, Passing array to a function, Using multidimensional arrays, Solving matrices problem using arrays.</p> <p>Strings: Declaration, Operations on strings.</p> <p>Pointers: Pointer data type, pointers and arrays, pointers and functions.</p>
TILL FINAL EXAM
Structures:Using structures,array of structuresand array in structures ,union

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

This laboratory course will mainly comprise of exercises on what is learnt under the paper,"
Computer Programming using C".

M. M. Modi College, Patiala

UNIT PLANNING (SESSION 2017-18)
MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-I(SEMESTER-2nd)

MM 501: ALGEBRA-II (RINGS AND MODULES)

TILLMST-I
Unique Factorization Domains, Principal Ideal Domains, Euclidean Domains, Polynomial Rings over UFD, Rings of Fractions. Modules: Definition and Examples, Submodules, Direct sum of submodules, Free modules, Difference between modules and vector spaces, Quotient modules, Homomorphism, Simple modules, Modules over PID.
TILL MST-II
Modules with chain conditions: Artinian Modules, Noetherian Modules, composition series of a module, Length of a module, Hilbert Basis Theorem Cohen Theorem, Radical Ideal, Nil Radical,
TILLFINAL EXAM
Jacobson Radical, Radical of an Artinian ring.

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-2nd)

MM 502: TOPOLOGY II

TILLMST-I
<p><u>Ordinal Numbers</u> : Order types, Product of Order types, Well Ordered Sets, Similarity Mapping, Ordinal Numbers, Principle of Transfinite Induction, Comparability theorems of ordinal and cardinal numbers, Well Ordering of Ordinal Numbers, The first infinite and the first uncountable Ordinal, Statement of Well Ordering Theorem, Axiom of Choice and Zorn's Lemma. Burali-Forti Paradox. Crucial property of the first uncountable ordinal.</p> <p><u>Higher Separation Axioms</u> : Regular, Completely Regular, Normal and Completely Normal Spaces. Metric Spaces as Completely Normal T_2 Spaces. Urysohn's Lemma and The Tietze Extension Theorem. Point finite and Locally Finite families.</p> <p><u>Products</u> : Products of first countable, Regular, T_2 and Completely Regular Spaces. Non invariance of normality under products. Embedding of Tichonov spaces into paralleloptope and the Stone Cech Compactification.</p>
TILL MST-II
<p><u>Nets and Filters</u> : Nets and Subnets, Convergence and Clustering of a net, Closures and Nets, Nets and Continuity, Nets in Products, Ultrafilter, Relationship between Nets and Filters, Nets and Filter Characterization of Compactness and The Tychonoff Theorem. <u>Identification Topology</u>: Identification Topology, Identification Map, Subspaces, General Theorem, Transgression, Transitivity Spaces with Equivalence Relation, Quotient Spaces</p>
TILL FINAL EXAM
<p>Cones and Suspensions, Attaching of Spaces, Adjunction Space, The relation $K(f)$ for continuous maps and Weak Topologies.</p>

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-2nd)

MM 503: DIFFERENTIAL EQUATIONS-I

TILLMST-I
Existence of solution of ODE of first order, initial value problem, Ascoli's Lemma, Gronwall's inequality, Cauchy Peano Existence Theorem, Uniqueness of Solutions. Method of successive approximations, Existence and Uniqueness Theorem. System of differential equations, nth order differential equation, Existence and Uniqueness of solutions, dependence of solutions on initial conditions and parameters. Linear system of equations (homogeneous & non homogeneous). Superposition principle,
TILLMST-II
Fundamental set of solutions, Fundamental Matrix, Wronskian, Abel Liouville formula, Reduction of order, Adjoint systems and self adjoint systems of second order, Floquet Theory. Linear 2 nd order equations, preliminaries, Sturm's separation theorem, Sturm's fundamental comparison theorem, Sturm Liouville boundary value problem, Characteristic values & Characteristic functions,
TILLFINAL EXAM
Orthogonality of Characteristic functions, Expansion of a function in a series of orthonormal functions.

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-2nd)

MM 504: FUNCTIONAL ANALYSIS

TILLMST-I
<p>Normed Linear spaces, Banach spaces, Examples of Banach spaces and subspaces. Continuity of Linear maps, Equivalent norms. Normed spaces of bounded linear maps. Bounded Linear functional. Hahn-Banach theorem in Linear Spaces and its applications.</p> <p>Hahn-Banach theorem in normed linear spaces and its applications. Uniform boundedness principle, Open mapping theorem, Projections on Banach spaces, Closed graph theorem</p>
TILL MST-II
<p>The conjugate of an operator. Dual spaces of l_p and $C[a,b]$, Reflexivity. Hilbert spaces, examples, Orthogonality, Orthonormal sets, Bessel's inequality, Parseval's theorem. The conjugate space of a Hilbert spaces. Adjoint operators, Self-adjoint operators, Normal and unitary operators. Projection operators. Spectrum of an operator, Spectral Theorem, Banach Fixed Point Theorem, Brower's Fixed Point Theorem. Schauder Fixed Point Theorem, Picards Theorem.</p>
TILLFINAL EXAM
<p>Applications of Fixed point theorem in differential equations and integral equations.</p>

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-I(SEMESTER-2nd)

MM 505: COMPLEX ANALYSIS

TILLMST-I
Function of complex variable, Analytic function, Cauchy-Riemann equations, Harmonic function and Harmonic conjugates, Branches of multivalued functions with reference to $\arg z$, $\log z$ and z^c , Conformal Mapping. Complex Integration, Cauchy's theorem, Cauchy Goursat theorem Cauchy integral formula, Morera's theorem, Liouville's theorem, Fundamental theorem of Algebra, Maximum Modulus Principle. Schwarz lemma.
TILLMST-II
Taylor's theorem. Laurent series in an annulus. Singularities, Meromorphic function. Cauchy's theorem on residues. Application to evaluation of definite integrals. Principle of analytic continuation, General definition of an analytic function. Analytic continuation by power series method, Natural boundary, Harmonic functions on a disc, Schwarz Reflection principle,
TILLFINAL EXAM
Mittag-Leffler's theorem (only in case when the set of isolated singularities admits the point at infinity alone as an accumulation point)..

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

MULTANI MAL MODI COLLEGE, PATIALA**UNIT PLAN****Class – M.Sc.-II(SEMESTER-3rd)****MM 601 : DIFFERENTIABLE MANIFOLDS**

TILLMST-I
Differentiable Manifolds, examples of differentiable manifolds, Differentiable maps on manifolds, tangent vectors and tangent space, cotangent space, Vector Fields, Lie-bracket of vector fields. Jacobian of a map. Integral curves, Immersions and embeddings. Tensors and forms. Exterior product and Grassman algebra, Connections, Difference tensor, existence of parallelism and geodesics, covariant derivative, exterior derivative, Contraction, Lie-derivative.
TILLMST-II
Torsion tensor and curvature tensor of a connection, properties of torsion and curvature tensor, Bianchi's identities, Structure equations of Cartan. Riemannian manifolds, Fundamental theorem of Riemannian geometry, Riemannian connection. Riemannian curvature tensor and its properties. Bianchi's identities, Sectional curvature,
TILLFINAL EXAM
Theorem of Schur. Sub-manifolds and hyper-surfaces, Normals, induced connection, Gauss and Weingarten formulae.

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-II (SEMESTER-3rd)

MM 604: CATEGORY THEORY - I

TILLMST-I
<p>Categories: Introduction with Functions of Sets, Definition and examples of Categories: Sets, Pos, Rel, Mon, Groups, Top, Dis (X),. Finite Category, The category of modules, The concept of functor and the category Cat, Functors of several variables. Isomorphism. Constructions: Product of two categories, The Dual Category, The Arrow Category, The Slice and Co- Slice Category. The Category of Graphs. Free Monoids and their UMP.</p> <p>Abstract Structures: Epis and mono, Initial and Terminal objects, Generalized elements, Sections and Retractions, Product diagrams and their Universal Mapping Property, Uniqueness up to isomorphism, Examples of products: Hom-Sets, Covariant representable functors, Functors preserving</p>
TILLMST-II
<p>Duality: The duality principle, Coproducts, Examples in Sets, Mon, Top, Coproduct of monoids, of Abelian Groups and Coproduct in the category of Abelian Groups. Equalizers, Equalizers as a monic, Coequalizers, Coequalizers as an epic. Coequalizer diagram for a monoid.</p> <p>Limits and Co-limits: Subobjects, Pullbacks, Properties of Pullbacks, Pullback as a functor, Limits, Cone to a diagram, limit for a diagram, Co-cones and Colimits. Preservation of limits, contra variant functors. Direct limit of groups. Functors Creating limits and co-limits.</p>
TILLFINAL EXAM
<p>Naturality: Exponential in a category, Cartesian Closed categories, Category of Categories, Representable Structure, Stone Duality; ultrafilters in Booleanm Algebra, Naturality, Examples of natural</p>

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-II(SEMESTER-3rd)

MM 605: NUMERICAL ANALYSIS-I

TILLMST-I
<p>Solution of Differential Equations: Taylor's series, Euler's method, Improved Euler method, Modified Euler method, and Runge-Kutta methods (upto fourth order), Predictor Corrector methods. Stability and convergence of Runge-Kutta and Predictor Corrector Methods.</p> <p>Parabolic Equation: Explicit and Implicit schemes for solution of one dimensional equations, Crank-Nicolson, Du fort and Frankel schemes for one dimension equations. Discussion of their compatibility, stability and convergence. Peaceman-Rachford A.D.I. scheme for two dimensional equations.</p>
TILLMST-II
<p>Elliptic Equation: Finite difference replacement and reduction to block tridiagonal form and its solution; Dirichlet and Neumann boundary conditions. Treatment of curved boundaries; Solution by A.D.I. method.</p> <p>Hyperbolic equations: Solution by finite difference methods on rectangular and characteristics grids and their stability.</p> <p>Approximate methods: Methods of weighted residual, collocation, Least-squares and Galerkin's methods. Variational formulation of a given boundary value problem,</p>
TILLFINAL EXAM
<p>Ritz method. Simple examples from ODE and PDE.</p>

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-II(SEMESTER-3rd)

MM 609-ANALYTIC NUMBER THEORY

TILLMST-I
Arithmetical functions: Mobius function, Euler’s totient function, Mangoldt function, Liouville’s function, The divisor functions, Relation connecting φ and μ , product formula for $\varphi(n)$, Dirichlet product of arithmetical functions, Dirichlet inverses and Mobius inversion formula, Multiplicative functions, Dirichlet multiplication, The inverse of a completely multiplicative function, Generalized convolutions. Averages of arithmetical functions: The big oh notation, Asymptotic equality of functions, Euler’s summation formula. Elementary asymptotic formulas, Average order of $d(n)$, $\varphi(n)$, $\sigma_\alpha(n)$, $\mu(n)$, $\Lambda(n)$, The Partial sums of a Dirichlet product, applications to $\mu(n)$ and $\Lambda(n)$, Legendre’s identity.
TILLMST-II
Some elementary theorems on the distribution of prime numbers: Chebyshev’s functions $\psi(x)$ & $\theta(x)$, Relation connecting $\theta(x)$ and $\pi(x)$, Abel’s identity, equivalent forms of Prime number theorem, inequalities for $\pi(n)$ and P_n , Shapiro’s Tauberian theorem, applications of Shapiro’s theorem, Asymptotic formula for the partial sums $\sum_{p \leq x} (1/p)$. Elementary properties of groups, Characters of finite abelian groups, The character group, Orthogonality relations for characters, Dirichlet characters, Dirichlet’s theorem for primes of the form $4n-1$ and $4n+1$,
TILLFINAL EXAM
Dirichlet’s theorem in primes on Arithmetical progression, Distribution of primes in Arithmetical progression.

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-II (SEMESTER-3rd)

MM 610-OPTIMIZATION TECHNIQUES-I

TILLMST-I
<p>Introduction: Definition of operation research, models in operation research, general methods for solving O.R. models, Elementary theory of convex sets.</p> <p>Linear Programming Problems: Definition of LPP, examples of LPPs, mathematical formulation of the mathematical programming problems, Graphical solution of the problem. Simplex method, Big M method, Two Phase method, problem of degeneracy.</p> <p>Duality in linear programming: Concept of duality, fundamental properties of duality, duality theorems, complementary slackness theorem, duality and simplex method, dual simplex method.</p> <p>Sensitivity Analysis: Discrete changes in the cost vector, requirement vector and co-efficient matrix, addition of a new variable, deletion of a variable, addition of new constraint, deletion of a constraint.</p> <p>Integer Programming: Introduction, Gomory's all-IPP method, Gomory's mixed-integer method, Branch and Bound method.</p>
TILLMST-II
<p>Transportation Problem: Introduction, mathematical formulation of the problem, initial basic feasible solution using North West Corner Method, Least Cost Method and Vogel's Approximation Method, Optimal solution using MODI method, degeneracy in transportation problems, some exceptional cases in transportation problems,</p> <p>Assignment Problems: Introduction, mathematical formulation of an assignment problem, assignment algorithm, unbalanced assignment problems, Travelling Salesman problem</p>
TILLFINAL EXAM
<p>Games & Strategies: Definition & characteristics of Games. Two person zero sum games, Maximin-minimax principle, Games without saddle points, Mixed Strategies, Graphical method for solving and games, Concept of Dominance, Reducing the game problem to LPP, Limitations.</p>

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-II (SEMESTER-4th)

MM 702 -THEORY OF LINEAR OPERATOR

TILLMST-I
Spectral theory in normed linear spaces, resolvent set and spectrum. Spectral properties of bounded linear operator. Properties of resolvent and spectrum. Spectral mapping theorem for polynomials, spectral radius of bounded linear operator on a complex Banach space. Elementary theory of Banach algebras. Resolvent set and spectrum. Invertible elements, Resolvent equation. General properties of compact linear operators
TILLMST-II
Spectral properties of compact linear operators on normed space. Behaviour of compact linear operators with respect to solvability of operator equations. Fredholm type theorems. Fredholm alternative theorems. Spectral properties of bounded self-adjoint linear operators on a complex Hilbert space. Positive operators. Monotone sequence theorem for bounded self-adjoint operators on a complex Hilbert space.
TILLFINAL EXAM
Square roots of positive operators. Spectral family of a bounded self-adjoint linear operator and its properties, Spectral theorem.

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLANNING (SESSION 2017-18)
MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-II (SEMESTER-4th)

MM 703 - GEOMETRY OF DIFFERENTIABLE MANIFOLDS

TILLMST-I
Topological groups, Lie groups and Lie algebras. Product of two Liegroups, One parameter subgroups and exponential maps. Examples of Lie groups, Homomorphism and Isomorphism, Lie transformation groups, General Linear groups.
Principal fibre bundle, Linear frame bundle, Associated fibre bundle, Vector bundle, Tangent bundle, Bundle homomorphism.
TILLMST-II
Sub-manifolds, induced connection and second fundamental form. Normals, Gauss formulae, Weingarten equations, Lines of curvature, Gauss and Mainardi–Codazzi equations. Almost Complex manifolds, Nijenhuis tensor,
TILLFINAL EXAM
Contravariant and covariant almost analytic vector fields, F-connection.

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLANNING (SESSION 2017-18)
MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-II (SEMESTER-4th)

MM 709- ALGEBRAIC CODING THEORY

TILLMST-I
Introduction to error-correcting codes, The main coding theory problem, An introduction to finite fields, Introduction-to Linear codes, Encoding & Decoding with a linear code. The dual code, the parity-check matrix and syndrome decoding, incomplete decoding.
TILLMST-II
Hamming codes, extended binary Hamming codes, Q-ary Hamming codes, Perfect codes, Golay codes, sphere packing bound.
TILLFINAL EXAM
Cyclic codes, Hamming codes as cyclic codes, BCH codes, Quadratic residue codes.

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLANNING (SESSION 2017-18)
MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-II (SEMESTER-4th)

MM 710- Commutative Algebra

TILLMST-I
Nil radical and Jacobson radical of Ring, Operation on ideals, Extension and Contraction of Ideals, The Prime Spectrum of Ring, Zairiski Topology Exact sequence of Modules, Tensor product of modules, Restriction and Extension of Scalars, Exactness property of Tensor product, Flat Modules, Tensor product of Algebras.
TILLMST-II
Rings and Modules of Fractions, Local properties, Extended and Contracted ideals in rigs of Fractions. Primary decomposition : Primary ideals, Decomposable Ideals, First Uniqueness Theorem, Isolated prime ideals,
TILLFINAL EXAM
Second Uniqueness Theorem, behavior of primary ideals under localization.

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%

UNIT PLAN

Class – M.Sc.-II (SEMESTER-4th)

MM 716-MATHEMATICAL METHODS

TILLMST-I
<p>Linear integral equations of first and second kind, Abel's problem, Relation between linear differential equation and Volterra's equation, Non linear and Singular equations, Solution by successive substitutions, Volterra's equation, iterated and reciprocal functions, Volterra's solution of Fredholm's equation.</p> <p>Fredholm's equation as limit of finite system of linear equations, Hadamard's theorem, convergence proof, Fredholm's two fundamental relations, Fredholm's solution of integral equation when $D(\lambda) \neq 0$, Fredholm's solution of Dirichlet's problem and Neumann's problem, Lemmas on iterations of symmetric kernel, Schwarz's inequality and its applications</p>
TILLMST-II
<p>Simple variational problems, Necessary condition for an extremum, Euler's equation, End point problem, Variational derivative, Invariance of Euler's equation, Fixed end point problem for unknown functions, Variational problem in parametric form, Functionals depending on higher order derivatives.</p>
TILLFINAL EXAM
<p>Euler Lagrange equation, First integral of Euler-Lagrange equation, Geodesics, The brachistochrone, Minimum surface of revolution, Brachistochrone from a given curve to a fixedpoint, Snell's law, Fermat's principle and calculus of variations.</p>

Mode of Assessment

Mode of Assessment		
Sr. No.	Component	Weightage
1	Mid Semester Test (MST)	40% (Average of 2 MST)
2	Written Assignments	40%
3	Attendance	20%