2015-16

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: MATHEMATICAL ANALYSIS

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Algebras, σ- algebra, their properties, General measurable spaces, measure spaces, properties of measure, Complete measure, Lebesgue outer measure and its properties, measurable sets and Lebesque measure, A non measurable set. Measurable function w.r.t. general measure. Borel and Lebesgue measurability. Integration of non-negative measurable functions, Fatou's lemma, Monotone convergence theorem
TILLMST-II
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, Absolute Continuity, Convex Fucntions and Jensen's inequality
TILLFINAL EXAM
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.

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.-I(SEMESTER-Ist)
MM 402: TOPOLOGY I

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Cardinals: Equipotent sets, Countable and Uncountable sets, Cardinal Numbers and their Arithmetic, Bernstein's Theorem and the Continumm Hypothesis. Topological Spaces: Definition and examples, Euclidean spaces as topological spaces, Basis for a given topology, Topologizing of Sets; Sub-basis, Equivalent Basis. Relativization, Subspaces. Elementary Concepts: Closure, Interior, Frontier and Dense Sets, Topologizing with pre-assigned elementary operations
TILLMST-II
Maps and Product Spaces: 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. Axioms of CountablityConnectedness and Compactness: 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.Cartesian Product Topology, Elementary Concepts in Product Spaces, Continuity of Maps in Product Spaces and Slices in Cartesian Products.
TILLFINAL EXAM
Compactness and Countability: Compactness and Countable Compactness, Local Compactness, One-point Compactification, T_0, T_1, and T_2 spaces, T_2 spaces and Sequences and Hausdorfness of One-Point Compactification. Axioms of Separability, Equivalence of Second axiom, Separable and Lindelof in Metric Spaces. Equivalence of Compact and Countably Compact Sets in Metric Spaces.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-Ist)

MM 403: ALGEBRA - I

Max Marks: 75 **Maximum Time: 3 Hrs.**

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_w
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.
TILLFINAL EXAM
Review of rings and homorphism of rings, Ideals, Algebra of Ideals, Maximal and prime ideals, ideal in Quotient rings, Field of Quotients of integral Domain.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-Ist)

MM 404: DIFFERENTIAL GEOMETRY

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
A simple arc, Curves and their parametric representation, are length and natural parameter, contact of curves, Tangent to a curve, osculating plane, Frenet trihedron, Curvature and Torsion, Serret Frenet formulae, fundamental theorem for spaces curves, helices, contact between curves and surfaces.Evolute and involute, Bertrand Curves, spherical indicatrix, implicit equation of the surface, Tangent plane.
TILLMST-II
First fundamental form of a surface, length of tangent vector and angle between two tangent vectors, area of a surface.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 Lines.
TILLFINAL EXAM
conjugate directions, envelopes, developable surfaces associated with spaces curves, minimal surfaces, ruled surfaces.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-1st)
MM -405 : FUNDAMENTALS OF COMPUTER SCIENCE AND C-Programming

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Computer's General Concepts: Historical Evolution of Computer, Characterization of Computers, types of Computers, the Computer generations, CPU, Primary memory, Secondary storage devices, Input devices, Output devices, software – System software, Application software, Binary arithmetic for integer and fractional numbers.**Computer Languages**: Machine Language, assembly language, high level language, 4GL, assembler, compiler and interpreter, Linkers, Loaders, Debuggers.
TILLMST-II
Operating System Concepts: Role of an operating System, Function of operating Systems, Types of operating systems, Booting procedure and its types.**Networking:** Basics, types of networks (LAN, WAN, MAN), topologies, Transmission media.**Internet:** Internet and its applications, Working knowledge of Search engines and use of electronic mail, Virus, Threats, Hacking, Prevention Mechanism: Anti Viruses, Firewalls.**E-commerce:** meaning, advantages and application of e-commerce. Programming tool, **C Programming.**
TILLFINAL EXAM
Functions: Declaration, Definition, Call, passing arguments, call by value, call by reference, Recursion, Use of library functions; Storage classes: automatic, external and static variables.**Arrays**: Defining and processing arrays, Passing array to a function, Using multidimensional arrays, Solving matrices problem using arrays; Strings: Declaration, Operations on strings. Introduction to Pointers, Structure and union.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-2nd)
MM 501: DIFFERENTIAL EQUATIONS

Max Marks: 75 **Maximum Time: 3 Hrs.**

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.
TILLMST-II
Linear system of equations (homogeneous & non homogeneous). Superposition principle, 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.
TILLFINAL EXAM
Sturm Liouville boundary value problem, Characteristic values & Characteristic functions, Orthogonality of Characteristic functions, Expansion of a function in a series of orthonormal functions.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-2nd)

MM 502: FUNCTIONAL ANALYSIS

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Metric Spaces : Definition & Examples. Normal 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. Uniform boundedness principle, Open mapping theorem.
TILLMST-II
Projections on Banach spaces, Closed graph theorem. The conjugate of an operator. Dual spaces of lp and C [a,b], Reflexivity of Banach spaces. 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.
TILLFINAL EXAM
Continuity, Compactness, Completeness and Connectedness in metric spaces. Completion of Metric spaces.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-2nd)
MM 503 : TOPOLOGY II

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Ordinal Numbers : 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.Higher Separation Axioms : Regular, Completely Regular, Normal and Completely Normal Spaces. Metric Spaces as Completely Normal T_2 Spaces. Urysohns Lemma and The Tietze Extension Theorem. Point finite and Locally Finite families,Covering Characterization of Normality.
TILLMST-II
Products : Products of first countable,Regular, T_2 and Completely Regular Spaces. Non invariance of normality under products. Embedding of Tichonov spaces into parallelotopand the Stone Cech Compactification.Nets and Filters : 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.
TILLFINAL EXAM
Identification Topology: Identification Topology,Identification Map,Subspaces,General Theorem,Transgression,Transitivity Spaces with Equivalance Relation,Quotient Spaces.Cones and Suspensions,Attaching of Spaces, Adjunction Space,The relation K(f) for continous maps and Weak Topologies

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-2nd)
MM 504: COMPLEX ANALYSIS

Max Marks: 75 **Maximum Time: 3 Hrs.**

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, logz 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).

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-I(SEMESTER-2nd)
MM 505: ALGEBRA-II (RINGS AND MODULES)

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
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
TILLMST-II
Modules with chain conditions: Artinian Modules, Noetherian Modules, composition series of a module, Length of a module, Hilbert Basis Theorem (RR2: Chapter 6). Cohen Theorem, Radical Ideal, Nil Radical, Jacobson Radical, Radical of an Artinian ring.
TILLFINAL EXAM
Unique Factorization Domains, Principal Ideal Domains, Euclidean Domains, Polynomial Rings over UFD, Rings of Fractions.

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MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-II(SEMESTER-3rd)

MM 601 : DIFFERENTIABLE MANIFOLDS

Max Marks: 75 Maximum Time: 3 Hrs.

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. Curves and integral curves, Immersions and embeddings. existence of parallelism and geodesics, covariant derivative, exterior derivative contraction, Lie-derivative.
TILLMST-II
Exterior product and Grassman algebra, connections. Tensors and forms. Difference tensor, Torsion tensor and curvature tensor of a connection, properties of torsion and curvature tensor, Bianchi's identities, Cartan's approach and structure equations of cartan. Riemannian manifolds, Fundamental theorem of Riemannian geometry, Riemannian connection.
TILLFINAL EXAM
Riemannian curvature tensor and its properties. Bianchi's identities, Sectional curvature, Theorem of Schur, Sub-manifolds and hyper-surfaces, Normals, induced connection, Gauss and Weingartan formulae.

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MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-II (SEMESTER-3rd)

MM 603-Differential Equations –II

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Partial Differential Equations: Occurrence and elementary solution of Laplace equation. Family of equipotential surface. Interior and exterior Dirichlet boundary value problem for Laplace equation. Separation of Variables. Axial symmetry, Kelvin's inversion theorem. Green's function for Laplace equation. Dirichlet's problem for semi infinite space and for a sphere. Copson'sTheorem (Statement only)
TILLMST-II
Existence and uniqueness of solutions of first order differential equations for complex systems. Maximum and minimum solution. Caratheodory theorem. Continuation of solution.
TILLFINAL EXAM
Uniqueness of solutions and Successive approximations. Variation of Solutions.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-II(SEMESTER-3rd)

MM 604 : CATEGORY THEORY - I

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Categories: Introduction with Functions of Sets, Definition and examples of Categories: Sets, Pos, Rel, Mon, Groups, Top, Dis (X),. Finite Category, Abstract Mappings, Additive Categories, The category of modules, The concept of functor and the category Cat, Functors of several variables. Isomorhism. Constructions: Product of two categories, The Dual Category, The Arrow Category, The Slice and Co- Slice Category. **Free Categories**:Free Monoids and their Universal Mapping Property, The category Graphs, the category C (G) generated by a graph, Homomorphism of Graphs and the Universal Mapping Property of C (g).
TILLMST-II
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: Product of Sets, Product in Cat, Poset, Product in Top. Categories with Products, Hom-Sets, Covariant representable functors, Functors preserving binary product. **Duality**: The duality principle, Formal duality, Conceptual duality, 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.
TILLFINAL EXAM
Groups and Categories: Groups in categories, topological group as a group in Top. The category of groups, Groups as categories, Congruence on a category, quotient category and its univalent mapping property, finitely presented categories. Limits and Co-limits: Subojects, 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.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-II(SEMESTER-3rd)
MM 609-ANALYTIC NUMBER THEORY

Max Marks: 75 **Maximum Time: 3 Hrs.**

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.
TILLMST-II
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. 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 $\Sigma_{p\leq x}(1/p)$.
TILLFINAL EXAM
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, Dirichlet's theorem in primes on Arithmetical progression, Distribution of primes in Arithmetical progression.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-II (SEMESTER-3rd)

MM 610-OPTIMIZATION TECHNIQUES

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Introduction, definition of operation research, models in operation research, general methods for solving O.R. models Elementary theory of convex sets, Linear programming problems, 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.Duality in linear programming: Concept of duality, fundamental properties of duality, duality theorems, complementary slackness theorem, duality and simplex method, dual simplex method.
TILLMST-II
Transportation Problem: Introduction, mathematical formulation of the problem, initial basic feasible solution, optimum solution, degeneracy in transportation problems, transportation algorithm, unbalanced transportation problems. Assignment Problems: Introduction, mathematical formulation of an assignment problem, assignment algorithm, unbalanced assignment problems. Games and Strategies : Introduction, Two person zero sum games, Maximum, Minimum, Principle; Games without saddle points, Mixed Strategies, Graphical solution, Dominance property, Reducing the game problem to a LPP.
TILLFINAL EXAM
Integer Programming: Introduction, Gomory's all-IPP method, Gomory's mixed-integer method, Branch and Bound method. Sensitivity Analysis: Discrete changes in the cost vector, in the requirement vector and in the co-efficient matrix.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-II (SEMESTER-4th)

MM 702 -THEORY OF LINEAR OPERATORS

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Spectral theory in normed linear spaces, resolvant set and spectrum. Spectral properties of bounded linear operator. Properties of resolvant and spectrum. Spectral mapping theorem for polynomials, spectral radius of bounded linear operator on a complex Banach space. Elementary theory of Banach algebras. Resolvant set and spectrum. Invertible elements, Resolvant equation.
TILLMST-II
General properties of compact linear operators.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.
TILLFINAL EXAM
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. Square roots of positive operators. Spectral family of a bounded self-adjoint linear operator and its properties, Spectral theorem.

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3	Attendance	20%

MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-II (SEMESTER-4th)
MM 704 :CATEGORY THEORY -II

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Naturality : Exponential in a category, Cartesian Closed categories, Category of Categories, Representable Structure, Stone Duality; ultrafillers in Booteam Algebra, Naturality, Examples of natural transformations, the functor category Fun (C D) and natural isomorphism. **Equivalence :** Exponentials of Categories, The Bifunctor Lemma, Cat is cartesian closed, Functor Categories, Equivalence of Categories, Examples of Equivalence : $Sets_{fin}$ and $Ord_{fin.}$, Pointed Set and partial maps, slice categories and indexed families, stone duality.
TILLMST-II
Categories of Diagrams : Set-valued functor categories, The Yoneda embedding, The Yoneda Lemma, Applications of the Yoneda lemma, Limits, Colimits and Exponentials in Categories of diagrams. Hom (X, G^P) and Hom (X x P , Q) .
TILLFINAL EXAM
Adjoints: Adjunction between categories, left and right adjoints, Hom-Set definition of adjoints. Examples of Adjoints, Uniqueness up to isomorphism. Order Adjoints and interior operation in Topology as an order adjoint. Preservation of Limits (Co limits) by Right (Left) Adjoints. UMP of the Yoneda Embedding and Kan Extensions. Statement only of the Adjoint Functor Theorem.

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MULTANI MAL MODI COLLEGE, PATIALA
UNIT PLAN
Class – M.Sc.-II (SEMESTER-4th)

MM 706-MATHEMATICAL METHODS

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
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.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.
TILLMST-II
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 n-unknown functions, Variational problem in parametric form, Functionals depending on higher order derivatives.
TILLFINAL EXAM
Euler Lagrange equation, First integral of Euler-Lagrange equation, Geodesics, The brachistochrone, Minimum surface of revolution, Brachistochrone from a given curve to a fixed point, Snell's law, Fermat's principle and calculus of variations.

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MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-II (SEMESTER-4th)

MM 708- ALGEBRAIC CODING THEORY

Max Marks: 75 **Maximum Time: 3 Hrs.**

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.

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MULTANI MAL MODI COLLEGE, PATIALA

UNIT PLAN

Class – M.Sc.-II (SEMESTER-4th)

MM 710-OPERATIONS RESEARCH

Max Marks: 75 **Maximum Time: 3 Hrs.**

TILLMST-I
Queueing problems: Characteristics of queueing system. Distributions in queueing systems, poisson arrivals and exponential service times, the M/M/I, M/M/S queueing systems, steady state solutions and their measures of effectiveness.Replacement and maintenance problems: replacement of capital equipment, discounting cost, replacement in anticipation of failure, preventive maintenance, the general renewal process.
TILLMST-II
Inventory problems, definition, the nature and structure of inventory system, deterministic models and their solution, multi item inventory problems, stochastic *inventory models*
TILLFINAL EXAM
Network Analysis: Introduction to Networks, Minimal Spanning Tree Problem, Shortest Path problem: Dijkstra's Algorithm, Floyd's Algorithm, Maximum Flow Problem, Project Management: Critical Path method, Critical Path Computations, Optimal Scheduling by CPM, Project Evaluation and Review Techniques (PERT).

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