M.Sc.(MATHEMATICS) SEMESTER-1

Math-551 REAL ANALYSIS

12th July - 31st August-

- Unit 1:Set Theory, Countable And Uncountable Sets ,Open And Closed Sets, Compact Sets And Their Different Properties, Compact Subsets Of Euclidean Spaces
- Unit 2:Perfect Sets, Compact Sets, Separated Sets, Connected Sets, Components, Functions Of Bounded Variations
- Unit 3:Sequences In Metric Spaces, Baire' Theorem, Banach Contraction Principle, Cantor's Intersection

1st September – 15th September-

- Unit 4:Limits Of Functions, Continuity Of Functions , Continuity And Compactness, Connectedness And Continuity, Discontinuities, Monotonic Functions

16th September – 30th September -

College House Exams

10th October – 5th November-

- Unit 5:Reimann Stieltje's Integrals, Theorems Related to Integration

5th November – 20th November-

Revision + Class Tests

Math-552 Complex Analysis

12th July - 31st August-

- Unit 1:Functions of Complex Variables ,Continuity And Differentiability, Analytic Functions, Cauchy's Riemann Equations, Construction Of Analytic Functions
- Unit 2:Complex Line Integral, Cauchy's Theorem, Cauchy's Inequalities, Poisson's Integral Formula, Morera & Liouville's Theorem
- Unit 3:Conformal And Bilinear Transformations, Fixed Points, Analytical Continuation, Natural Boundary, Schwartz Reflection Principle

1st September – 15th September-

- Unit 4: Power Series, Taylor's Theorem, Laurent's Theorem, Max. Modulus Principle, Schwarz's Lemma, Poles And Zeros, Argument Principle, Fundamental Theorem Of Algebra And Rouche's Theorem

16th September – 30th September –

College House Exams

10th October – 5th November-

- Unit 5: Zeros And Singularities Of Functions, Evaluation Of Integrals, Integration Involving Many Valued Functions

5th November – 20th November-

Revision + Class Tests

MATH – 553 ALGEBRA-1

12th July - 31st August-

- Unit 1: Groups, Subgroups, Normal Subgroups, Quotient Groups, Lagrange's Theorem
- Unit 2: Generating Sets, Cyclic Groups, Commutator Subgroups, Homomorphism, Isomorphism Theorems, Automorphisms
- Unit 3: Permutation Groups, The Alternating Groups, Cayley's Theorems, Fundamental Theorems For Finitely Generated Abelian Groups And Applications, Structure Of Such Groups

1st September – 15th September-

- Unit 4: Conjugate Elements, Class Equation With Applications, Cauchy's Theorem, Sylow's Theorems And Applications, Jordan Holder Theorem, Solvable Groups, Composite Series

16th September – 30th September–

College House Exams

10th October – 5th November-

- Unit 5: Rings, Subrings , Ideals, Factor Rings, Homomorphism, Integral Domain, Maximal And Prime Ideals, The Field Of Quotients Of Integral Domain

5th November – 20th November-

Revision + Class Tests

MATH 555 DIFFERENTIAL EQUATIONS

12th July - 31st August-

- Unit 1: Existence And Uniqueness Theorems For Solution Of Differential Equations, Methods For Successive Approximation, General Properties Of Solution Of Linear Differential Equation Of Order n, Adjoint And Self Adjoint Equations
- Unit 2: Laplace Transforms, Inverse Laplace Convolution Theorem, Complex Inversion Formula
- Unit 3: Infinite Fourier Transforms, Problems Based on Infinite Fourier Transforms, Problems Based On Finite Fourier Transforms

1st September – 15th September-

- Unit 4: Generating Functions, Recurrence Relation And Orthogonality Of Legendre Polynomials, Bessel Functions, Hermit And Laguerre Polynomials

16th September – 30th September–

College House Exams

10th October – 5th November-

- Unit 5: Total Differential Equations, Orthogonal Trajectory, Sturm Liouville's Boundary Value Problem, Sturm Comparison And Separation Theorems, Orthogonality Solution

5th November – 20th November-

Revision + Class Tests

MATH 554 MECHANICS-1

12th July - 31st August-

- Unit 1: Kinematics Of Particles And Rigid Bodies, Moving Axis, Instantaneous Axis Of Rotation And Instantaneous Centre Of Rotation
- Unit 2: Newton's Law Of Motion, Work, Energy And Power, Conservative Forces, Potential Energy, Impulsive Forces, Rectilinear particle Motion
- Unit 3: Projectile Motion Under Gravity, The Cycloid And Its Dynamical Properties

1st September – 15th September-

- Unit 4: Motion Of Particles Under A Central Force, Kepler's Laws Of Planetary Motion And Newton's Law Of Gravitation, Disturbed Orbits, Elliptic Harmonic Motion

16th September – 30th September–

College House Exams

10th October – 5th November-

- Unit 5: Moment Of Inertia, Product Of Inertia ,Theorems Of Parallel And Perpendicular Axis ,Principle Axis ,Coplanar Distribution

5th November – 20th November-

Revision + Class Tests

MATH-563 ALGEBRA

6th January – 5th March -

- Unit 1: Principal Ideal Domains, Euclidean Rings, The Ring Of Guassian Integers , U.F.D ,Polynomials Rings , Chain Conditions.
- Unit 2: Extension Field , Finite Algebraic , Simple , Separable Extensions , Algebraic Closed Fields.
- Unit 3: Splitting Fields: Existence And Uniqueness , Finite Fields , Existence Of Gf(P^N) , Constructive Polygons.
- Unit 4: Galois Theory : Normal Extension Galois Group , Symmetric Rational Functions , Fundamental Theorem , Solvability By Radicals

6th March- 14th March-

College House Exams

15th March – 5th April-

- Unit 5: Modules, Cyclic Modules, Simple Modules, Free Modules, Fundamental Structure Theorem For Finitely Generated Module (Statement Only)

6th April – 20th April-

Revision + Class Tests

M.Sc.(Mathematics) Semester-2

Math-561 Real Analysis

6th January – 5th March -

- Unit 1: Sequence And Series Of Function, Discussion Of Main Problem , Uniform Convergence , Arzelas Theorem, Weierstrass Approximation Theorem.
- Unit 3: Measurable Function, Definition And Properties, Characterstic Function, Step Function And Simple Function , Little Wood's Three Principles.
- Unit 4: Lebesgue Integrals Of Bounded Function , Comparison Of Riemann And Lebesgue Integral. Convergence In Measure
- Unit 2: Outer Measure , Lebesgue Measure, Properties Of Measurable Sets , Non Measurable Sets

6th March- 14th March-

College House Exams

15th March – 5th April-

- Unit 5: Differentiation Of Monotone Functions, Differentiation Of An Integral , Convergence In Measure.

6th April – 20th April-

Revision + Class Tests

Math-563 Tensors And Differential Geometry

6^{th} January – 5^{th} March –

- Unit 1: Notation And Summation Convention , Differentiation Of Cartesian Tensors , Metric Tensors , Contravariant , Covariant And Mixed Tensors.
- Unit 2: Theory Of Space Curve: Tangent , Principal Normal , Bi – Normal , Curvature And Torsion.
- Unit 3: Spherical Indicatrix , Bertands Curve , Surfaces , Envelopes, Edge Of Regression, Developable Surfaces
- Unit 4:Curves On A Surface, Principal Of Curvature, Asymptotic Lines, Mainardi Codazzi Equations

6^{th} March- 14^{th} March-

College House Exams

15^{th} March – 5^{th} April-

- Unit 5: Geodesic, Differential Equation Of Geodesics, Geodesic Curvature, Clairaut's Theorem, Guass Bonnet Theorem, Joachimsthal's Theorem, Geodestic Mapping, Tissot's Theorem

6^{th} April – 20^{th} April-

Revision + Class Tests

Math-564 MECHANICS-2

6^{th} January – 5^{th} March –

- Unit 1: Motion & Linear Momentum Of System Of Particals , Angular Momentum Of System, Use Of Centroid , Moving Origins, Impulsive Forces, Problem In Two Dimensional Rigid Body Motion, Conservation Of Angular Momentum, Impulsive Motion
- Unit 2: Eular's dynamical Equations For Motion Of rigid Body About A Fixed Point, Problem Of General Three Dimensional Body
- Unit 3: Generalised Co-ordinate & Velocities Virtual Work, Generalised Forces, Lagrage's Equation For Holonomic System & For Impulsive Forces, K.E. As Quadratic Function Of Velocities, Small Oscillation Of Conservative Holonomic Dynamical System
- Unit 4: Linear Functioanal, Euler's & Lagrange's Equations For Single Dependent & Independent Variable, Hamilton's Principle And Principle Of Least Action

6^{th} March- 14^{th} March-

College House Exams

15^{th} March – 5^{th} April-

- Unit 5: Euler's & Lagrange's Equation For Several Dependent & Independent Variables, Functions Involving Higher Order Derivatives, Approximate Sol^{n} For Bondary Value Problems

6^{th} April – 20^{th} April-

Revision + Class Tests

Math-565 DIFFERENTIAL AND INTEGRAL EQUATIONS

6^{th} January – 5^{th} March –

- Unit 1: Origin Of 1^{st} Order Partial Differential Equation, Cauchy Problem For 1^{st} Order Equation,Surface Orthogonal To Given Surface, Charpit's & Jacobi's Method
- Unit 2: Origin Of Partial Differential Equation Of 2^{nd} Order, Linear p.d.e. With Constant Coeff. & Complete Sol^{n}, Non Linear Equation Of 2^{nd} degree, Monge's Method
- Unit 3: Solution Of Laplace, Wave & Diffusion Equations By Method Of Separation Of Variables & Fourier Transforms, Greenfunction For These Equations
- Unit 4: Volterra Equations L_2 Kernals & Functions, Volterra Equations Of 1^{st} & 2^{nd} Kind, Volterra Integral Equations

6^{th} March- 14^{th} March-

College House Exams

15^{th} March – 5^{th} April-

- Unit 5: Fredholm's Equations With Pincherte-Goursat Kernel's, The Fredholm Theorem, Neumann's Series ,Methods Of Successive Approximations

6^{th} April – 20^{th} April-

Revision + Class Tests

Math-578 OPERATIONS RESEARCH

12th July - 31st August-

- Unit 1: The Linear Programming Problem, Generating Extreme Point Solution, The Artificial Basis Techniques, A First Feasible Solution Using Slack Variables, Two Phase And Big-M Method With Artificial Variables
- Unit 2: General Primal-Dual Prime , Primal Dual Pair In Matrix Form, Slackness Theorem, Duality And Simplex Method, Dual Simplex Method
- Unit 3: General Transportation Problem, Duality And Loops In Transportation, Test For Optimality, Degeneracy

1st September – 15th September-

- Unit 4: Mathematical Formulation Of Assignment Problem, Game Theory, Dominance Property, General Solution Of $m*n$ Rectangular Games

16th September – 30th September -

College House Exams

10th October – 5th November-

- Unit 5: Gomory's all I.P.P., Branch And Bound Method, Applications Of Integer Programming, Dynamic Programming Algorithm, Application And Solution Of L.P.P. By Dynamic Programming

5th November – 20th November-

Revision + Class Tests

M.Sc.(MATHEMATICS) SEMESTER-3

Math-571 FUNCTIONAL ANALYSIS

12th July - 31st August-

- Unit 1: Normed Linear Spaces, Banach Spaces, Subspaces, Quotient Spaces, L^P –Spaces: Holder's And Minkowski's Inequalities, Convergence And Completeness, Riesz-Fischer Theorem
- Unit 2: Continuous Linear Transformations, Equivalent Norms, Finite Dimensional Normed Linear Spaces And Riesz Theorem
- Unit 3: The Conjugate Space N^*, The Hahn-Banach Theorem And Its Consequences, Natural Imbedding Of N into N^{**}, Reflexivity Of Normed Spaces

1st September – 15th September-

- Unit 4:Open Mapping Theorem, Projections On A Banach Space, Closed Graph Theorem, Uniform Boundedness Principle, Conjugate Operators

16th September – 30th September -

College House Exams

10th October – 5th November-

- Unit 5: Inner Product Spaces, Hilbert Spaces, Orthogonal Complements, Orthogonal Sets, The Conjugate Space H^*

5th November – 20th November-

Revision + Class Tests

Math-575 DISCRETE MATHEMATICS

12th July - 31st August-

- Unit 1:Binary Relations, Equivalence Relations And Partitions, Inclusion And Exclusion Principle, Hasse Diagram, Pigeon Hole Principle
- Unit 2: Basic Logical operations, Conditional And Biconditional Statements, Tautologies, Contradiction, Quantifiers, Prepositional Calculus
- Unit 3: Definition And Examples Of Semigroups And Monoids, Homomorphism Of Semigroups And Monoids, Congruence Relations And Quotient Subgroups

1st September – 15th September-

- Unit 4: Phrase Structure Grammars, Rewriting Rules, Derivation Sentential Forms, Languauge Generated By Grammar, Regular, Context Free And Context Sensitive Grammar And Languages

16th September – 30th September -

College House Exams

10th October – 5th November-

- Unit 5: Polynomial Expressions, Telescopic Form, Recursion Theorem, Closed Form Expression, Generating Function, Solution Of Recurrence Relation Using Generating Function

5th November – 20th November-

Revision + Class Tests

Math-577 STATISTICS

12th July - 31st August-

- Unit 1:Measures Of Central Tendency And Dispersion, Moments, Measure Of Skewness And Kurtosis, Classical And Axiomatic Approach To The Theory Of Probability
- Unit 2: Random Variable, Probability Mass Function, Probability Density Function, Cumulative Distribution Function, Two And Higher Dimensional Random Variables, Stochastic Independence
- Unit 3: Mathematical Expectations And Moments, Moment Generating Function And Its Properties, Chebyshev's Inequality And Its Application, Stochastic Convergence, Central Limit

1st September – 15th September-

- Unit 4: Uniform Hyper Geometric, Binomial, Poisson, Geometric, Hyper Geometric, Multinomial, Uniform, Exponential, Gamma, Beta, Normal Distribution

16th September – 30th September -

College House Exams

10th October – 5th November-

- Unit 5: Least Square Principle, Correlation And Linear Regression Analysis For Bi-variate Data, Partial And Multiple Correlation Coefficients, Correlation Ratio, Association Of Attributes

5th November – 20th November-

Revision + Class Tests

MATH- 585 DISCRETE MATHS

6th January – 5th March-

- Unit 1: Lattices,Lattices As Partially Ordered Sets, Properties, Lattices As Algebraic Systems, Sublattices, Direct Products, Homomorphism
- Unit 2: Boolean Algebra, Boolean Algebra As Lattices, Boolean Identities, Sub-Algebra, Direct Product, Homomorphism, Join-Irreducible Elements, Atoms And Minterms, Boolean Forms And Their Equivalence
- Unit 3: Graph Theory: Definition, Undirected Graphs, Paths, Circuits, Cycles, Subgraphs, Induced Subgraphs, Degree Of Vertex, Connectivity, Planner Graph, Complete
- Unit 4: Euler's Theorem On The Existence Of Eulerian Paths And Circuits, Directed Graphs, In-Degree And Out-Degree Of A Weighted Graphs, Cut Set, Fundamental Cut Sets And Cycles

6th March – 14th March-

Revision And Class Tests

15thmarch- 5th April-

- Unit 5: Trees: Rooted Tree, Directed Trees, Search Tree, Tree Traversals, Spanning Trees, Minimal Spanning Trees

6th April -20th April-

Revision And Class Tests

M.Sc (MATHEMATICS) SEMESTER 4

MATH-581 FUNCTIONAL ANALYSIS

6th January – 5th March

- Unit 1: Strong And Weak Convergence In Finite And Infinite Dimensional Normed Linear Spaces, Weak Convergences In Hilbert Spaces
- Unit 2: The Adjoint Of An Operator, Self Adjoint Operators, Normal Operators, Unitary Operators
- Unit 3: Finite Dimensional Spectral Theory, Eigen-Values And Eigen Vectors, Spectrum Of A Bounded Linear Operator
- Unit 4: Compact Linear Operator On Normed Spaces, Properties Of Compact Linear Operators, Spectral Properties Of Compact Linear Operators

6th March – 14th March-

Revision And Class Tests

15thmarch- 5th April -

- Unit-V : Banach Algebras, Definitions And Simple Examples, Regular And Singular Elements, Topological Divisors Of Zero

6th April -20th April-

Revision And Class Tests

MATH-588 OPERATIONS RESEARCH

6th January – 5th March

- Unit 1 : Queueing Theory, Introduction, Queueing System, Elements Of Queueing System, Distributions Of Arrivals, Inter Arrivals
- Unit 2: Queueing Models, (M/M/1): (N/FIFO), Generalized Model: Birth-Death Process, (M/M/C): (/FIFO), (M/M/C) (N/FIFO), (M/M/R) (KIGD), Power Supply Model.
- Unit 3: Inventory Controlthe Inventory Decisions, Costs Associated With Inventories, Factors Affecting Inventory Control, Economic Order Quantity (EOQ)
- Unit 4: Replacement Problems,Replacement Of Equipment/Asset That Deteriorates Gradually

6th March – 14th March-

Revision And Class Tests

15thmarch- 5TH APRIL-

- Unit 5: Need Of Simulation, Methodology Of Simulation. Simulation Models, Event- Type Simulation, Generation Of Random Numbers

6th April -20th April

Revision And Class Tests

MATH- 587 STATISTICS

6th January – 5th March-

- Unit1: Sampling Distributions: Chi-square, t And F-Distributions With Their Properties, Distribution Of Sample Mean And Variance, Distribution Of Order Statistics
- Unit-2: Point Estimation: Estimators, Properties Of Unbiased Ness, Consistency, Sufficiency, Efficiency, Completeness, Uniqueness, Methods Of Estimation
- Unit 3: Testing Of Hypothesis: Null Hypothesis And Its Test Of Significance, Simple And Composite Hypothesis, M.P. Test, UMP Test, Likelihood Tests
- Unit 4: Applications Of Sampling Distributions: Test Of Mean And Variance In The Normal Distribution

6th March – 14th March-

Revision And Class Tests

15th March- 5TH April-

- Unit 5 :Linear Estimation: Gauss Markoff Linear Models, Gauss Markoff Theorem

6th April -20th April-

Revision And Class Test

MATH- 581 TOPOLOGY

6th January – 5th March

- Unit 1: Higher Separation Axioms, Completely Regular Spaces. Tychonoff Spaces, Completely Normal Space
- Unit2: Compact Spaces, Compact Sets, Subsets Of Compact Space, Finite Intersection Property, Compactness Of Subsets Of Real Line.
- Unit3: Sequentially Compact Spaces, Bolzano Weierstrass Property, Countably Compact Spaces, Locally Compact Spaces. Tychonoff theorem,One Point Compactification.
- Unit4: The Stone-Čech Compactification , Evaluation Mappings, Separate Point Family, Separate Point And Closed Set Family.

6th March – 15th March-

Revision And Class Tests

15thmarch- 5th April-

- Unit5: Directed Sets And Nets. Convergence Of A Net In A Space, Clustering Of A Net, Nets And Continuity, Nets In Product Spaces, Ultra Nets.

6th April -20th April-

Revision And Class Tests

MATH 572 TOPOLOGY

12TH JULY- 31ST AUGUST-

- UNIT- I Topological Spaces, Basic concepts, closure, interior, exterior and boundary of a set. Dense sets, Closure operator [Kuratowski function] and Interior operator. Neighbourhoods and neighbourhood system, Coarser and finer topologies.
- Unit – II Sub-spaces, Hereditary properties, Separated sets, Connected sets, Connected and disconnected spaces, Connectedness on real line
- Unit – III Continuous functions, Restriction and extension of a mapping. Sequential continuity at point. Invariants under a continuous mapping. Open and closed mappings.

1ST SEPTEMBER-16TH SEPTEMBER

- Unit – IV Product of two spaces, The product of n spaces. Base for a finite product topology. General product spaces.

17th SEPTEMBER-30th SEPTEMBER

College house exam

9TH OCTOBER-5TH NOVEMBER

- Unit – V Separation Axioms: T0, T1, T2 – spaces. Regular spaces, T3 – spaces, Normal spaces, T4 – space. Tychonoff lemma, Urysohn lemMA

6TH NOVEMBER-15TH NOVEMBER-

Revision and class test