Real analysis-I (MM-402)

Class-M.Sc.-I (1st Semester)

Teacher's Name-Ms. Aaina

Planner

Session -2020-21

December: Week 1- Definition and existence of Riemann Stieltjes integral, properties of the integrintegration and differentiation.

December: Week 2- the fundamental theorem of integral calculus, integration by parts, integration of vector-valued functions, Rectifiable curves.

December: Week 3- Pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weirstrass M-test, Abel's test

December:Week 4- Dirichlet's test for uniform convergence, uniform convergence and continuity, uniform convergence and Riemann Stieltjes integration

January: Week 1- uniform convergence and differentiation, existence of a real continuous nowhere differentiable function, equicontinous families of functions, Weierstrass approximation theorem

January: Week 2- Functions of several variables : linear transformations, Derivative in an open subset of $_R{}^n$, Chain rule, Partial derivatives, directional derivatives

January: Week 3- the contraction principle, inverse function theorem, Implicit function theorem, Jacobians, extremum problems with constraints, Lagrange's multiplier method,

January: Week 4- Derivatives of higher order, mean value theorem for real functions of two variables, interchange of the order of differentiation, Differentiation of integrals.

February: Week 1- Power Series : Uniqueness theorem for power series, Abel's and Tauber's theorem, Taylor's theorem, Exponential & Logarithm functions

February: Week 2 - Trigonometric functions, Fourier series, Gamma function .Integration of differential forms: Partitions of unity, differential forms, stokes theorem .Revision.

Sunita

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Practical-I (MM-406)

Class-M.Sc.-I (1st Semester)

Teacher's Name-Ms. Aaina

Planner

Session -2020-21

December: Week 1- Use of nested **if.. .else** in finding the smallest of four numbers.

December: Week 2-Use series sum to compute **sin(x)** and **cos(x)** for given angle **x** in degrees. Then, check error in verifying **$\sin^2 x+\cos^2(x)=1$.**

December: Week 3-Verify $\sum n^3=\{\sum n\}^2$, (where n=1,2,..,m) & check that prefix and postfix increment operator gives the same result.

December: Week 4-. Compute simple interest of a given amount for the annual rate = .12 if amount >=10,000/- or time >=5 years; =.15 if amount >=10,000/- and time >=5 years; and = .10 otherwise.

January: Week 1- Use array of pointers for alphabetic sorting of given list of English words. 6. Program for interchange of two rows or two columns of a matrix. Read/write input/output matrix from/to a file.

January: Week 2- Calculate the eigenvalues and eigenvectors of a given symmetric matrix of order 3.

Calculate standard deviation for a set of values {x(j)j=l,2,...,n} having the corresponding frequencies {f(j)j=l,2,...,n}.

January: Week 3-. Find GCD of two positive integer values using pointer to a pointer.

January: Week 4- Compute GCD of 2 positive integer values using recursion. 11. Check a given square matrix for its positive definite form.

February:Week 1- To find the inverse of a given non-singular square matrix.

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Fluid Dynamics-I (MM_504)
Class- M.Sc. II (SEM-III)
Teacher's Name- Ms. Aaina
Lesson Plan
Session 2020-21

December: Week 1 Kinematics of fluid in motion: Velocity at a point of a fluid. Lagrangian and Eulerian methods. Stream lines, path lines and streak liens, vorticity and circulation. Vortex lines, Acceleration and Material derivative, Equation of continuity (vector or Cartesian form). Reynolds transport Theorem.

December: Week 2 General analysis of fluid motion. Properties of fluids- static and dynamic pressure. Boundary surfaces and boundary surface conditions. Irrotational and rotational motions. Velocity potential. Revision.

December: Week 3 Equation of Motion : Lagrange's and Euler's equations of Motion (vector or in Cartesian form). Bernculli's theorem. Applications of the Bernoulli Equation in one – dimensional flow problems. Kelvins circulation theorem, vorticity equation. Energy equation for incompressible flow.

December: Week 4 Kinetic energy of irrotational flow. Kelvins minimum energy theorem, mean potential over a spherical surface. Kinetic energy of infinite liquid. Uniqueness theorems. Revision.

January: Week 1 Stress components in a real fluid. Relations between rectangular components of stress.

January: Week 2 Connection between stresses and gradients of velocity.Navier- Stoke's equations of motion.

January: Week 3 Steady flows between two parallel plates, Plane Poiseuille and Couette flows.

January: Week 4 Reduction of Navier-Stock equations in flows having axis of symmetry.

February: Week 1 steady flow in circular pipe: the Hagen-Poiseuille flow, steady flow between two coaxial cylinders.

February: Week 2 flow between two concentric rotating cylinders. Steady flows through tubes of uniform crosssection in the form (i) Ellipse,

February: Week 3 (ii) equilateral triangle, (iii) rectangle, under constant pressure gradient, uniqueness theorem.

February: Week 4 Revision

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Elasticity-(MM-503 opt.(i))

Class-M.Sc.-II (3rd Semester)

Teacher's Name-Ms. Aaina

Planner

Session -2020-21

November Week 1: Tensor Algebra: Coordinate-transformation, Cartesian Tensor of different order. Properties of tensors

November Week 2.: Isotropic tensors of different orders and relation between them, Symmetric and skew symmetric tensors. Tensor invariants,

November Week 3 : Deviatoric tensors, Eigen values and eigen-vectors of a tensor.

Tensor Analysis: Scalar, vector, tensor functions,

November Week 4: Comma notation, Gradient, divergence and curl of a vector / tensor field

December Week 1: Analysis of Strain : Affine transformation, Infinitesimal affine deformation, Geometrical Interpretation of the components of strain.

December Week 2: Strain quadric of Cauchy. Principal strains and invariance, General infinitesimal deformation.

December Week 3: Saint-Venant's equations of compatibility. Finite deformations

December Week 4: Analysis of Stress:Stress Vecotr, Stress tensor, Equations of equilibrium, Transformation of coordinates.

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MM-401: Advanced Abstract Algebra-I

Class- M.sc.-P(semester-1)
Teacher's Name-Ms. Anmol
Lesson Plan
Session(2020-21)

January week1:

Automorphisms and Inner automorphisms of a group G. The groups Aut(G) and Inn(G). Automorphism group of a cyclic group, Normalizer and Centralizer of a non-emptysubset of a group G. Problems

January week2: Class equation of a finite group G and its applications. Derived group (or a commutator subgroup) of a group G.perfect groups. Zassenhau's Lemma. Normal and Composition series of a group G.

January week3: Conjugate elements and conjugacy classes.Scheier's refinement theorem. Jordan Holder theorem. Composition series of groups of order pn and of Abelian groups.

January week4: Caunchy theorem for finite groups. Π - groups and p-groups. Sylow Π-subgroups and Sylow p-subgroups.Test

February week1: Sylow's Ist, IInd and IIIrd theorems. Application of Sylow theory to groups of smaller orders. Characteristic of a ring with unity. Prime fields Z/pZ and Q. Field extensions. Degree ofan extension. Algebraic and transcendental elements

February week2:. Simple field extensions. Minimal polynomial of an algebraic element, Conjugate elements. Algebraic extensions. Finitely generated algebraic extensions. Algebraic closure and algebraically closed fields.Problems

February week3:. Splitting fields., finite fields,Normal extensions. Separable elements, separable polynomials and separable extensions. Theorem ofprimitive element. Perfect fields. Galois extensions. Galois group of an extension.Test

February week4:, Dedekind lemma Fundamental theorem of Galois theory. Frobenius automorphism of a finite field. Klein's 4-group and Diheadral group. Galois groups of polynomials.

March week1: Fundamental theorem of Algebra, Solvable groups Derived series of a group G. Simplicity of the Alternating group An(n>5). Non-solvability of the symmetric group Sn and the Alternating group An (n>5).Roots of unity Cyclotomic polynomials and their irreducibility over Q Radicals extensions

March week2: Galois radical extensions. Cyclic extensions. Solvability of polynomials by radicals over Q. Symmetric functions and elementary symmetric functions. Construction with ruler and compass only.

BC-105 BUSINESS MATHEMATICS-I

Class-B.com-I(semester-1)
Teacher's Name-Ms. Anmol
Lesson Plan
Session(2020-21)

November week1: Matrices and Determinants: definition of a matrix; types of matrices; algebra of matrices; properties of determinants;;

November week2: calculation of values of determinants upto third order, adjoint of a matrix, elementary row or column operations

November week3: Finding inverse of a matrix through adjoint and elementary row or column operations; Problems

November week4: solution of a system of linear equations having unique solution and involving not more than three variables,Test

December week1:, Compound Interest and Annuities: certain different types of interest rates

December week2: concept of present value and amount of a sum; types of annuities; present value and amount of an annuity, including the case of continuous compounding; Test

. **December week3:** valuation of simple loans and debentures; problems relating to sinking funds

December week4: logarithm and antilogarithms

January week1: Arithmetic series

January week2: Geometric series,Problems

January week3: Differentiation

January week4: Differentiation

February week1: Maxima and Minima; cases of one variable involving second or higher order derivatives; cases of two variables involving not more than one constraint.

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Shahabad Markanda

MM-501 Functional Analysis

Class-Msc.-F(semester-3)
Teacher's Name-Ms. Anmol
Lesson Plan
Session(2020-21)

November week1: Normed linear spaces, Banach spaces and examples, subspace of a Banach space,completion of a normed space, quotient space of a normed linear space and its completeness

November week2: , product of normed spaces, finite dimensional normed spaces and subspaces, equivalent norms, compactness and finite dimension, F.Riesz's lemma.Bounded and continuous linear operators,

November week3: differentiation operator, integral operator,bounded linear extension, linear functionals, bounded linear functionals, continuity and boundedness, definite integral, canonical mapping,

November week4: linear operators and functionals on finite dimensional spaces, normed spaces of operators, dual spaces with examples.Hahn-Banach theorem for real linear spaces, complex linear spaces and normed linear spaces

December week1: , application to bounded linear functionals on C[a,b], Riesz-representation theorem for bounded linear functionals on C[a,b], adjoint operator, norm of the adjoint operator.

December week2: Reflexive spaces, uniform boundedness theorem and some of its applications to the space of polynomials and fourier series.

December week3: Strong and weak convergence, weak convergence in lp,convergence of sequences of operators, uniform operator convergence, strong operator convergence, weal operator convergence, strong and weak* convergence of a sequence of functional.Test

December week4: . Openmapping theorem, bounded inverse theorem, closed linear operators, closed graph theorem, differential operator, relation between closedness and boundedness of a linear operator.Problems

January week1: Inner product spaces, Hilbert spaces and their examples, pythagorean theorem,Apolloniu's identity, Schwarz inequality, continuity of innerproduct,

January week2: completion of an inner product space, subspace of a Hilbert space, orthogonal complements and direct sums, projection theorem, characterization of sets in Hilbert spaces whose space is dense.

January week3: Orthonormal sets and sequences, Bessel's inequality, series related to orthonormal sequences and sets, total(complete) orthonormal sets and sequences, Problems

January week4: Parseval's identity, separable Hilbert spaces.Representation of functionals on Hilbert spaces, Rieszrepresentation theorem for bounded linear functionals on a Hilbert space, sesquilinearform.Test

February week1: , Riesz representation theorem for bounded sesquilinear forms on a Hilbert space.Hilbert adjoint operator, its existence and uniqueness, properties of Hilbert adjointoperators, self adjoint, unitary, normal, positive and projection operators.

February week2: Revison

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Numerical Analysis(MM-353)
Class-B.sc.-III(semester-5)
Teacher's Name-Ms. Anmol
Lesson Plan
Session(2020-21)

November week1:

Finite Differences operators and their relations. Finding the missing terms and effect of error in a difference tabular values.

November week2: Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formulae

November week3: Interpolation with unequal intervals: Newton's divided difference, Lagrange's Interpolation formulae, Hermite Formula.

November week4: Central Differences: Gauss forward and Gauss's backward interpolation formulae, Sterling, Bessel Formula. Test

December week1: Probability distribution of random variables, Binomial distribution, Poisson's distribution, Normal distribution: Mean, Variance and Fitting.

December week2: Numerical Differentiation: Derivative of a function using interpolation formulae as studied in Sections –I & II.

December week3: Eigen Value Problems: Power method, Jacobi's method ,Given's method, HouseHolder's method,Problems

December week4: Chebychev formula, Gauss Quadrature formula. Numerical solution of ordinary differential equations

January week1: QR method, Lanczos, Numerical Integration: Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's one- third and three-eighth rule,

January week2: Single step methodsPicard's method. Taylor's series method, Euler's method, Runge-Kutta Methods. Multiple step methods;Test

January week3: Predictor-corrector method, Modified Euler's method, Milne-Simpson's method

January week4: Revision

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Calculus (BM-112)
Class- B.Sc.-I(1^{st} Semester)
Teacher's Name- Dr. Hema Sukhija
Lesson Plan
Session-2020-21

November:Week 1 Bridge Course, $\epsilon - \delta$ definition of limit function, basic properties of limit, Continuous functions and classification of discontinuities

November:Week 2 Differentiability, Successive differentiation

November:Week 3 Remaining part of Successive differentiation, Lebnitz theorem

November:Week 4 Maclaurin and Taylor series expansions

December:Week 1 Asymptotes in cartesian coordinates, intersection of curve and its asymptotes

December:Week 2 Asymptotes in polar coordinates, Curvature, radius of curvature for cartesian curves, parametric curves

December:Week 3 Radius of curvature for polar curves, Newton's method, Radius of curvature for pedal curves, Tangential polar equations, Center of curvature, Circle of curvature, Chord of curvature, evolutes

December:Week 4 and end Tests for concavity and convexity, points of inflexion, multiple points, cusps, nodes and conjugate points. Types of cusps

January: Week 1 Tracing of curves in cartesian, parametric coordinates

January: Week 2 Tracing of curves in polar coordinates, Reduction formulae

January: Week 3 Remaining part of Reduction formulae, Rectification

January: Week 4 Rectification and intrinsic equation of curve

January: Week 5 Quadrature(area), sectorial area

February:Week 1 Area bounded by closed curves

February:Week 2 Volumes and surfaces of solids of revolution

February:Week 3 Remaining part of volumes and surfaces of solids of revolution, Theorem of Pappu's and Guilden.

February:Week 4 Revision and discussion of exam pattern.

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Solid Geometry (BM-113)
Class- B.Sc.-I(1^{st} Semester)
Teacher's Name- Dr. Hema Sukhija
Lesson Plan
Session-2020-21

November:Week 1 Bridge Course: Basics of Solid geometry.
November:Week 2 General equation of second degree.
November:Week 3 Tracing of conics.
November:Week 4 Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic.
December:Week 1 System of conics. Confocal conics.
December:Week 2 Polar equation of a conic, tangent and normal to the conic.
December:Week 3 Sphere: Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, radical plane of two spheres. Co-oxal system of spheres.
December:Week 4 and end Cones. Right circular cone, enveloping cone and reciprocal cone.
January:Week 1 Cylinder: Right circular cylinder and enveloping cylinder.
January:Week 2 Central Conicoids: Equation of tangent plane. Director sphere.
January:Week 3 Normal to the conicoids. Polar plane of a point.
January:Week 4 and end Enveloping cone of a coincoid. Enveloping cylinder of a coincoid.
February:Week 1 Paraboloids: Circular section, Plane sections of conicoids.
February:Week 2 Diwali break and Generating lines.
February:Week 3 Confocal conicoid. Reduction of second degree equations.
February:Week 4 Revision of Unit 1 and 2, discussion of exam pattern.

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Partial differential equations (BM-232)
Class- B.Sc.-II(3^{rd} Semester)
Teacher's Name- Dr. Hema Sukhija
Lesson Plan
Session-2020-21

October:Week 1 Basic of Partial differential equations.
October:Week 2 Partial differential equations: Formation, order and degree.
October:Week 3 Linear and non-linear partial differential equations of the first order: Complete solution, general solution.
October:Week 4 and end Admission days.
November:Week 1 Singular solution, Particular Solution and Solution of partial differential equations.
November:Week 2 Solution of Lagrange's linear equations, Charpit's general method of solution.
November:Week 3 Compatible system of first order equations, Jacobi's method.
November:Week 4 Linear partial differential equations of second and higher orders.
December:Week 1 Linear and non-linear homogeneous and non-homogeneous equations with constant coefficients.
December:Week 2 Partial differential equation with variable coefficients reducible to equations with constant coefficients, their complementary functions and particular integrals.
December:Week 3 Some questions related to complementary functions and particular integrals, equations reducible to linear equations with constant coefficients
December:Week 4 and end Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to canonical (normal) forms and their solutions.
January:Week 1 Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order
January:Week 2 Monge's method, Cauchy's problem for second order partial differential equations
January:Week 3 Characteristics equations and characteristics curves of

second order partial differential equation

January:Week 4 and end Method of separation of variables: Solution of Laplace's equation, Wave equation (One and two dimensions).

February: Week 1 Solution of Diffusion (Heat) equation (One and two dimension) in Cartesian coordinate system.

February: Week 2 Revision of first and second unit.

February: Week 3 Revision of third and fourth unit.

February: Week 4 Discussion of question papers and exam pattern.

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Real Analysis (BM-351)
Class- B.Sc.-III(5^{th} Semester)
Teacher's Name- Dr. Hema Sukhija
Lesson Plan
Session-2020-21

October:Week 1 Definition of Set, bounds, partition.
October:Week 2 Riemann integration.
October:Week 3 Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus.
October:Week 4 and end Mean value theorem of integral calculus, Improper integral and their convergence.
November: Week 1 Comparison tests of improper integrals.
November: Week 2 Abel's and Drichlet's tests, Frullani's integral, Integral as a function of a parameter.
November: Week 3 Continuity, Differentiability and integrability of an integral as a function of a parameter
November: Week 4 Complete of Unit 2.
December: Week 1 Definition and examples of metric spaces.
December: Week 2 Neighbourhoods, limit points, interior points, open and closed sets, closure and interior, boundary points, subspace of a metric space, equivalent metrics.
December: Week 3 Cauchy sequences, completeness, Cantor's intersection theorem.
December: Week 4 and end Baire's category theorem, Contraction principle.
January: Week 1 Continuous functions, uniform continuity, compactness for metric spaces
January: Week 2 Sequential compactness, Bolzano-Weierstrass property, total boundedness
January: Week 3 Finite intersection property, continuity in relation with compactness.
January: Week 4 and end components (Diwali break)
February: Week 1 Connectedness, Continuity in relation with connectedness.
February: Week 2 Revision of Unit 1 and 2.
February: Week 3 Revision of Unit 3 and 4.

February: Week 3 Discussion of exam pattern and numerical problems given by students.

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Advance Calculus(BM-231)
Class- B.Sc.-11 (semester-111)
Teacher's Name-Ms. Neelam Rani
Lesson Plan
Session 2020-21

November week 1: Continuity, Sequential Continuity, properties of continuous functions, Uniform continuity, chain rule of differentiability.

November week 2: Mean value theorems; Rolle's Theorem and Lagrange's mean value theorem and their geometrical interpretations.

November week 3: Taylor's Theorem with various forms of remainders, Darboux intermediate value theorem for derivatives, Indeterminate forms.

November week 4: Limit and continuity of real valued functions of two variables. Partial differentiation.

December Week 1: Total Differentials; Composite functions & implicit functions. Change of variables.

December Week 2: Homogenous functions & Euler's theorem on homogeneous functions.

December Week 3: Taylor's theorem for functions of two variables.

December Week 4: Differentiability of real valued functions of two variables. Schwarz and Young's theorem.

January Week 1: Implicit function theorem. Maxima, Minima and saddle points of two variables. Lagrange's method of multipliers.

January Week 2 : Curves: Tangents, Principal normals, Binormals, Serret-Frenet formulae.

January Week 3: Locus of the centre of curvature, Spherical curvature, Locus of centre of Spherical curvature, Involutes, evolutes, Bertrand Curves.

January Week 4: Surfaces: Tangent planes, one parameter family of surfaces, Envelopes.

February Week 1: Revision

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Differential Equations-I (MM-405)

Class-M.Sc.-I (1st Semester)

Teacher's Name-Ms. Neelam Rani

Planner

Session -2020-21

November: Week 1- Preliminaries: Initial value problem and equivalent integral equation, ε-approximate solution, equicontinuous set of functions. Basic theorems: Ascoli- Arzela theorem, Cauchy –Peano existence theorem and its corollary.

November: Week 2- Lipschitz condition. Differential inequalities and uniqueness, Gronwall's inequality. Successive approximations. Picard-Lindelöf theorem. Continuation of solution, Maximal interval of existence

November: Week 3-Extension theorem. Kneser's theorem (statement only). Linear differential systems: Definitions and notations. Linear homogeneous systems; Fundamental matrix

November:Week 4- Adjoint systems, reduction to smaller homogeneous systems. Non homogeneous linear systems; variation of constants.

December : Week 1- Linear systems with constant coefficients. Linear systems with periodic coefficients; Floquet theory.

December: Week 2- Higher order equations: Linear differential equation (LDE) of order n; Linear combinations, Linear dependence and linear independence of solutions

December: Week 3- Wronskian theory: Definition, necessary and sufficient condition for linear dependence and linear independence of solutions of homogeneous LDE. Abel's Identity, . Fundamental set, More Wronskian theory. Reduction of order.

December: Week 4- Non-homogeneous LDE. Variation of parameters. Adjoint equations, Lagrange's Identity, Green's formula. Linear equation of order n with constant coefficients.

January: Week 1-System of differential equations, the n-th order equation. Dependence of solutions on initial conditions and parameters: Preliminaries, continuity and differentiability.

January: Week 2- Maximal and Minimal solutions. Differential inequalities. A theorem of Wintner.

January: Week 3- Uniqueness theorems: Kamke's theorem, Nagumo's theorem and Osgood theorem.

January: Week 4-revision work

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Integral Equations (MM-505)
Class- M.Sc. II (SEM-III)
Teacher's Name- Mrs. Neelam Rani
Lesson Plan
Session 2020-21

November: Week 1 Definition of Integral Equations and their classifications. Eigen values and Eigen functions. Special kinds of Kernel Convolution Integral.

November: Week 2 The inner or scalar product of two functions. Reduction to a system of algebraic equations.

November: Week 3 Fredholm alternative, Fredholm theorem, Fredholm alternative theorem.

November: Week 4 An approximate method. Revision.

December: Week 1 Method of successive approximations, Iterative scheme for Fredholm and Volterra Integral equations of the second kind.

December: Week 2 Conditions of uniform convergence and uniqueness of series solution. Some results about the resolvent Kernel.

December: Week 3 Application of iterative scheme to Volterra integral equations of the second kind.

December: Week 4 Classical Fredholm's theory, the method of solution of Fredholm equation, Fredholm's First theorem, Fredholm's second theorem, Fredhom's third theorem.

January: Week 1 Symmetric Kernels, Introduction, Complex Hilbert space. An orthonormal system of functions, Riesz-Fisher theorem, A complete two-Dimensional orthonormal set over the rectangle $a \leq s \leq b, c \leq t \leq d$.

January: Week 2 Fundamental properties of Eigenvalues and Eigenfunctions for symmetric Kernels. Expansion in eigen functions and Bilinear form. Hilbert-Schmidt theorem and some immediate consequences.

January: Week 3 Definite Kernels and Mercer's theorem. Solution of a symmetric Integral Equation. Approximation of a general L 2 -Kernel(Not necessarily symmetric) by a separable Kernel.

January: Week 4 The operator method in the theory of integral equations. Rayleigh-Ritz method for finding the first eigenvalue.

February: Week 1 The Abel Intergral Equation. Inversion formula for singular integral equation with Kernel of the type h(s)-h(t), 0<a<1.

February: Week 2 Cauchy's principal value for integrals solution of the Cauchy-type singular integral equation, closed contour, unclosed contours and the Riemann-Hilbert problem.

February: Week 3 The Hilbert-Kernel, solution of the Hilbert-Type singular Intergal equation.

February: Week 4 Revision.

Dr. (Mrs.) Sunita Pahwa
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Practical-III: FORTRAN (MM-506)
Class- M.Sc. II (SEM-III)
Teacher's Name- Mrs. Neelam Rani
Lesson Plan
Session 2020-21

November: Week 1 Problem solving techniques based on papers MM-501 to MM-505 will be taught.

November: Week 2 Use a function program for simple interest to display year-wise compound interest and amount, for given deposit, rate and time.

November: Week 3 Use logical operators in computing the compound interest on a given amount for rate of interest varying with amount as well as time of deposit.

November: Week 4 Write a subroutine program to check (logical output) whether the three given points in a plane are collinear.

December: Week 1 Use subroutine program to multiply two given matrices and use resource files in main program to read input and write output.

December: Week 2 Use ALLOCATABLE size declaration for given set of points in a plane and fit a straight line through these points.

December: Week 3 Write a program to display the use of whole-array operations on non-conformable arrays.

December: Week 4 Write a program to display the procedure of format-rescan-rule and the action of tab-edit descriptors.

January: Week 1 Use string operations to find if a given string is a palindrome or not.

January: Week 2 Compute a given definite integral (as summation) in a subroutine using integrand as a dummy argument.

January: Week 3 Explain the use of MODULE in defining an abstract (derived) data type for complex arithmetic.

January: Week 4 Use of pointers in manipulating a linked-list.

February: Week 1 To solve a quadratic equation with given (complex-valued) coefficients, using COMPLEX data type.

February: Week 2 Revision.

February: Week 3 Revision.

February: Week 4 Revision.

Dr. (Mrs.) Sunita Pahwa
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Principal (Offg.)
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Shahabad Markanda

Mathematical Foundations-1 (B.C.A-113)

Teacher's Name- Ms. Nikita

Class- B.C..A-1 Sem-1

Planner

Session 2020-21

November; Week 1 Sets, Representation of sets,subsets

November; Week 2 Venn Diagrams, Operations On sets, Theorem on set, Practical Application of sets

November; Week 3 Relations, Boolean Algebra, Definition of continuity of a single Variable.

November; Week 4 Derivatives of a function, logarithmic.

December: Week 1 continuous functions, classifications of discontinuities

December: Week 2 exponential, trigonometric.

December: Week 3 Derivatives of Inverse Trigonometrical and hyperbolic functions.

December: Week 4 Higher order Derivatives.

January: Week 1 Differential Equations of first order and first degree

January: week 2 Exact differential equations

January: Week 3 linear Differential Equations with constant coefficients

January: week 4 linear Differential Equations with constant coefficients

February: week 1 Homogeneous linear equations

February: week 2 Revision

Principal (Offg.)
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Shahabad Markanda

Statics (BM-233)

Class- B.Sc.(11) (Sem-111)

Planner

Session 2020-21

November : Week 1 Forces acting at a point , components of a given force,Lami's theorem

November : Week 2 Theorem of resolved parts, Equilibrium of bodies placed on a smooth plane

November : Week 3 Parallel forces, Moments of a force about a point, centre of a number of parallel forces.

November : Week 4 Moment about a line, couples

December: Week 1 Analytical Conditions of Equilibrium of Co-planar forces

December: Week 2 Friction, Problems on Equilibrium of Rods and ladders

December: Week 3 centre of gravity, Centre of gravity of a thin rod, triangular lamina, parallelogram lemma

December: Week 4 Virtual work, Examples based on simple Framework.

January:Week 1 Forces in three dimensions

January: Week 2 wrenches

January: Week 3 Null lines and Null planes

January: Week 4 Stable, Unstable and Neutral Equilibrium

February: Week 1 Revision

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Complex Analysis-1 (MM-404)

Class- M.Sc.(P) (Sem-1)

Planner

Session 2020-21

January: Week 1 Power series, its convergence, radius of convergence, examples, sum and product, differentiability of sum function of power series,

January: week 2 property of a differentiable function with derivative zero. expz and its properties, logz, power of a complex number (z), their branches with analyticity.

January:Week 3 Path in a region, smooth path, p.w. smooth path, contour, simply connected region, multiply connected region, bounded variation, total variation, complex integration, Cauchy-Goursat theorem, Cauchy theorem for simply and multiply connected domains.

January:Week 4 Index or winding number of a closed curve with simple properties. Cauchy integral formula. Extension of Cauchy integral formula for multiple connected domain.

February:Week 1 Higher order derivative of Cauchy integral formula. Gauss mean value theorem Morera's theorem. Cauchy's inequality. Zeros of an analytic function, entire function, radius of convergence of an entire function

February: week 2 Liouville's theorem, Fundamental theorem of algebra,Taylor's theorem. Maximum modulus principle, Minimum modulus principle. Schwarz Lemma.

February: Week 3 Singularity, their classification, pole of a function and its order. Laurent series, Cassorati– Weiertrass theorem Meromorphic functions, Poles and zeros of Meromorphic functions. The argument principle, Rouche's theorem, inverse function theorem.

February: Week 4 Residue : Residue at a singularity, residue at a simple pole, residue at infinity.

March: Week 1 Cauchy residue theorem and its use to calculate certain integrals, definite integral.

March: week 2 Revision

Elasticity-(MM-503 opt.(i))

Class-M.Sc.-II (3rd Semester)

Teacher's Name-Ms. Aaina

Planner

Session -2020-21

November Week 1: Tensor Algebra: Coordinate-transformation, Cartesian Tensor of different order. Properties of tensors

November Week 2.: Isotropic tensors of different orders and relation between them. Symmetric and skew symmetric tensors. Tensor invariants,

November Week 3 : Deviatoric tensors, Eigen values and eigen-vectors of a tensor.

Tensor Analysis: Scalar, vector, tensor functions,

November Week 4: Comma notation, Gradient, divergence and curl of a vector / tensor field

December Week 1: Analysis of Strain : Affine transformation, Infinitesimal affine deformation, Geometrical Interpretation of the components of strain.

December Week 2: Strain quadric of Cauchy. Principal strains and invariance, General infinitesimal deformation.

December Week 3: Saint-Venant's equations of compatibility. Finite deformations

December Week 4: Analysis of Stress:Stress Vecotr, Stress tensor, Equations of equilibrium, Transformation of coordinates.

January:Week 1 Analysis of Strain : Affine transformation, Infinitesimal affine deformation, Geometrical Interpretation of the components of strain.

January: week 2 Strain quadric of Cauchy. Principal strains and invariance, General infinitesimal deformation.

January: week 3 Saint-Venant's equations of compatibility.Finite deformations Analysis of Stress : Stress Vecotr, Stress tensor, Equations of equilibrium, Transformation of coordinates.

January: week 4 Stress quadric of Cauchy, Principal stress and invariants. Maximum normal and shear stresses. Mohr's circles

February : week 1 examples of stress. Equations of Elasticity : Generalised HooksLaw, Anisotropic symmetries, Homogeneous isotropic medium.

February: week 2 Revision

Principal (Offg.)
Arya Kanya Mahavidyalaya
Shahabad Markanda

Topology (MM-403)

Class-M.Sc.-I (1st Semester)

Teacher's Name-Ms. Nitika Garg

Planner

Session -2020-21

October:Week 3-Definition and examples of topological spaces, Neighbourhoods, Neighbourhood system of a point and its properties, Interior point and interior of a set, interior as an operator and its properties,

October :Week 4- definition of a closed set as complement of an open set, limit point (accumulation point) of a set, derived set of a set, definition of closure of a set as union of the set and its derived set,

November: Week 1- Adherent point (Closure point) of a set , closure of a set as set of adherent (closure) points, properties of closure, closure as an operator and its properties, boundary of a set, Dense sets. A characterization of dense sets.

November: Week 2- Base for a topology and its characterization, Base for Neighbourhood system, Sub-base for a topology.

Relative (induced) Topology and subspace of a topological space. Alternate methods of defining a topology using 'properties' of 'Neighbourhood system', 'Interior Operator', 'Closed sets', Kuratowski closure operator and 'base'.

November: Week 3- First countable, Second countable and separable spaces, their relationships and hereditary property. About countability of a collection of disjoint open sets in a separable and a second countable space, Lindelof theorem.

November: Week 4- Comparison of Topologies on a set, about intersection and union of topologies, infimum and supremum of a collection of topologies on a set, the collection of all topologies on a set as a complete lattice

December:Week 1- Definition, examples and characterisations of continuous functions, composition of continuous functions, Open and closed functions, Homeomorphism, embedding. Tychonoff product topology in terms of standard (defining) subbase, projection maps, their continuity and openness,

December: Week 2- Characterisation of product topology as the smallest topology with projections continuous, continuity of a function from a space into a product of spaces.

December: Week 3- T_0, T_1, T_2, Regular and T_3 separation axioms, their characterization and basic properties i.e. hereditary property of T_0, T_1, T_2, Regular and T_3 spaces, and productive property of T_1 and T_2 spaces.

Quotient topology w.r.t. a map, Continuity of function with domain a space having quotient topology, About Hausdorffness of quotient space

December: Week 4- Completely regular and Tychonoff ($T_{3\frac{1}{2}}$), spaces, their hereditary and productive properties. Embedding lemma, Embedding theorem.

Normal and T_4 spaces : Definition and simple examples, Urysohn's Lemma, complete regularity of a regular normal space, T_4 implies Tychonoff, Tietze's extension theorem (Statement only), Convergence of filters: Limit point (Cluster point) and limit of a filter and relationship between them, Continuity in terms of convergence of filters. Hausdorffness and filter convergence.

January: Week 1- Definition and examples of filters on a set, Collection of all filters on a set as a p.o. set, finer filter, methods of generating filters/finer filters, Ultra filter (u.f.) and its characterizations, Ultra Filter Principle (UFP) i.e. Every filter is contained in an ultra filter. Image of filter under a function.

January:Week 2- Compactness: Definition and examples of compact spaces, definition of a compact subset as a compact subspace, relation of open cover of a subset of a topological space in the sub-space with that in the main space, compactness in terms of finite intersection property (f.i.p.), continuity and compact sets, compactness and separation properties,

January:Week 3- Closedness of compact subset, closeness of continuous map from a compact space into a Hausdorff space and its consequence, Regularity and normality of a compact Hausdorff space.

January:Week 4- Compactness and filter convergence, Convergence of filters in a product space, compactness and product space. Tychonoff product theorem using filters, Tychonoff space as a subspace of a compact Hausdorff space and its converse, compactification and Hausdorff compactification, Stone-Cech compactificatio

Dr. (Mrs) Sunita Pahwa

Offg. Principal

Principal (Offg.)
Arya Kanya Mahavidyalya
Shahabad Markanda

Algebra(BM-111)
Class- B.Sc.-1 (semester-1)
Teacher's Name-Ms. Nitika Garg
Lesson Plan
Session 2020-21

November week 1: Symmetric, Skew symmetr ic, Hermitian and skew Hermitian matrices. Elementar y Operations on matrices.
November Week 2: Rank of a matrices. Inverse of a matrix. Linear dependence and independence of rows and columns of matrices.
November Week 3: Row rank and column rank of a matrix. Eigenvalues, eigenvectors and the characteristic equation of a matrix.
November Week 4: Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix.
December Week 1: : Applications of matrices to a system of linear (both homogeneous and non– homogeneous) equations.
December Week 2: Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.

December Week 3: Relations between the roots and coefficients of general polynomial equation in one variable.

December Week 4: Solutions of polynomial equations having conditions on roots. Common roots and multiple roots.

January Week 1 :Transformation of equations.
January Week 2: Nature of the roots of an equation Descarte's rule of signs.
January Week 3 : Solutions of cubic equations (Cardon's method).
January Week 4: Biquadratic equations and their solutions.
February Week 1: Revision

Dr. (Mrs) Sunita Pahwa

Offg. Principal

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Arya Kanya Mahavidyalya

Analytical Mechanics and Calculus of Variation (MM-502)
Class- M.Sc. II (SEM-III)
Teacher's Name- Mrs. Nitika Garg
Lesson Plan
Session 2020-21

October: Week 1 Basics of Calculus.
October: Week 2 Motivating problems of calculus of variations: shortest distance
October: Week 3 Minimum surface of revolution
October: Week 4 Brachistochrone problem. Revision.
November: Week 1 Isoperimetric problem, Geodesics.
November: Week 2 Fundamental Lemma of calculus of variation. Euler's equation for one dependent function of one and several independent variables.
November: Week 3 Generalization to (i) Functional depending on 'n' dependent functions, (ii) Functional depending on higher order derivatives. Variational derivative, invariance of Euler's equations.
November: Week 4 Natural boundary conditions and transition conditions. Revision.
December: Week 1 Conditional extremum under geometric constraints and under integral constraints , Variable end points.
December: Week 2 Free and constrained systems, constraints and their classification, Generalized coordinates, Holonomic and Non-Holonomic systems.
December: Week 3 Scleronomic and Rheonomic systems. Generalized Potential, Possible and virtual displacements, ideal constraints.
December: Week 4 Lagrange's equations of first kind, Principle of virtual displacements D'Alembert's principle, Holonomic Systems independent coordinates, generalized forces
January: Week 1 Lagrange's equations of second kind. Uniqueness of solution. Theorem on variation of total Energy.
January: Week 2 Potential, Gyroscopic and dissipative forces, Lagrange's equations for potential forces equation for conservative fields.
January: Week 3 Hamilton's variables. Don kin's theorem. Hamilton canonical equations. Revision.
January: Week 4 Routh's equations. Cyclic coordinates Poisson's Bracket. Poisson's Identity. Jacobi-Poisson theorem. Hamilton's Principle, second form of Hamilton's principle
February: Week 1 Poincare-Carton integral invariant. Whittaker's equations. Jacobi's equations. Principle of least action.
February: Week 2 Canonical transformations, free canonical transformations, Hamilton-Jacobi equation. Jacobi theorem. Method of separation of variables for solving Hamilton-Jacobi equation.
February: Week 3 Testing the Canonical character of a transformation. Lagrange brackets. Condition of canonical character of a transformation in terms of Lagrange brackets and Poisson brackets.

February: Week 4 Simplicial nature of theJacobian matrix of a canonical transformations. Invariance of Lagrange brackets and Poisson brackets under canonical transformations.

Dr. (Mrs.) Sunita Pahwa
Offg. Principal
Principal (Offg.)
Arya Kanya Mahavidyalaya

Groups and Rings(BM-352)
Class- B.Sc.-111 (semester-V)
Lesson Plan
Session 2020-21

November week 1: Definition of a group with example and simple properties of groups, Subgroups and Subgroup criteria

November week 2: Generation of groups, cyclic groups, Cosets, Left and right cosets, Index of a sub-group Coset decomposition, Largrage's theorem and its consequences

November week 3: Normal subgroups, Quotient groups,

November week 4: Homoomorphisms, isomophisms, automorphisms and inner automorphisms of a group.

December Week 1: Automorphisms of cyclic groups, Permutations groups. : Even and odd per mutations. Alternating groups

December Week 2: Cayley's theorem, Center of a group and derived group of a group.

December Week 3: Introduction to rings, subrings, integral domains and fields, Characteristics of a ring.

December Week 4: Ring homomorphisms, ideals (principle, prime and Maximal) and Quotient rings, Field of quotients of an integral domain.

January Week 1: Euclidean rings, Polynomial rings

January Week 2: Polynomials over the rational field, The Eisenstein's criterion,

January Week 3: Polynomial rings over commutative rings, Unique factorization domain

January Week 4: R unique factorization domain implies so is R[X1 , X2……Xn]

February Week 1: Revision

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