Name : Ms. GAGANDEEP
Designation : Assistant Professor
Department : MATHEMATICS

LESSON PLAN (Even Sem.)
[redacted]

B.A (MATHEMATICS- ORDINARY DIFFERENTIAL EQUATIONS)

Semester-2 [redacted]

Weeks	Topics
1	Geometrical meaning of a differential equation. Exact differential equations
2	Integrating factors. First order higher degree equations solvable for x, y, p Lagrange's equations
3	Clairaut's equations, Equation reducible to Clairaut's form. Singular solutions.
4	Orthogonal trajectories: in Cartesian coordinates and polar coordinates. Self orthogonalfamily of curves.
5	Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.
6	Equations reducible to homogeneous.
7	Linear differential equations of second order: Reduction to normal form. Transformation of the equation by changing the dependent variable/the independent variable.
8	Solution by operators of non-homogeneous linear differential equations.
9	Reduction of order of a differential equation. Method of variations of parameters. Method of undetermined coefficients
10	Ordinary simultaneous differential equations. Solution of simultaneous differential Equations involving operators x(d/dx) or t(d/dt)etc.
11	Simultaneous equation of the form dx/P=dy/Q=dz/R. Total differential equations. Condition for Pdx +Qdy +Rdz = 0 to be exact.
12	General method of solving Pdx+Qdy+Rdz = 0 by taking one variable constant. Method of auxiliaryequations.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- VECTOR CALCULUS)

Semester-2 [redacted]

Weeks	Topics
1	Scalar and vector product of three vectors, product off our vectors.
2	Reciprocal vectors. Vector differentiation.
3	Scalar Valued point functions, vector valued point functions, derivative along a curve, directional derivatives.
4	Gradient of a scalar point function, geometrical interpretation of grad? character Of gradient as a point function
5	Divergence and curl of vector point function, characters of Div$f$ and Curl$f$ As point function, examples
6	Gradient, divergence and curl of sums and product and their related vector identities. Laplacian operator.
7	Orthogonal curvilinear coordinates Conditions for orthogonality fundamental triad of mutually orthogonal unit vectors.
8	Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvi linear coordinates.
9	Cylindrical co- ordinates and Spherical co-ordinates.
10	Vector integration; Line integral, Surface integral
11	Volume integral. Theorems of Gauss,
12	Green & Stokes and problems based on these theorems.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- NUMBER THEORY AND TRIGONOMETRY)

Semester-2 [redacted]

Weeks	Topics
1	Divisibility, G.C.D (Greatest common Divisors), LCM
2	Primes, Fundamental theorem of Arithmetic, Linear Congruence
3	Fermat's theorem, Wilson's theorem and its converse LinearDiophantine equation in two variables
4	Complete Residue System and Reduced Residue System modulo *m*. Euler ϕ Function, Euler's Generalization of Fermat's theorem.
5	Chinese Remainder Theorem, Quadratic Residues, Legendre Symbols, Lemma of Gauss; Gauss Reciprocity Law
6	Greatest integer function[□], The number of divisors and the sum of divisors of a Natural number □. Moebius Function and Moebius Inversion Formula
7	De- Moivre's theorem and its applications
8	Expansion of trigonometrical functions
9	Direct circular and Hyperbolic functions and their properties
10	Inverse circular and hyperbolic functions and their properties
11	Logarithm of a complex quantity
12	Gregory's series, Summation of Trigonometric series
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- PROGRAMMING IN C AND NUMERICAL METHODS)

Semester-4 [redacted]

Weeks	Topics
1	Programmer's model of a computer, Algorithms.
2	Flow charts, Data types,
3	Operators and expressions, Input/outputs functions.
4	Decisions control structure :Decision statements, Logical and conditional statements
5	Implementation of Loops, Switch Statement & Case control structures.
6	Functions, Pre processors and Arrays.
7	Strings: Character Data Type, Standard String handling Functions, Arithmetic Operations on Characters. Structures: Definition, using Structures, use of Structures in Arrays and Arrays in Structures.
8	Pointers: Pointers Data type, Pointers and Arrays, Pointers and Functions. Solution of Algebraic and Transcendental equations, Bisection method
9	Regula- Falsi method, Secant method, Newton- Raphson's method. Newton's iterative method for finding p^{th}root of a number, Order of Convergence of above methods.
10	Simultaneous linear algebraic equations: Gauss-elimination method, Gauss-Jordan method, Triangularization method (LU Decomposition method).
11	Crout's method, Cholesky Decomposition method. Iterative method
12	Jacobi's method, Gauss-Seidal's method, Relaxation method
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- SEQUENCES AND SERIES)

Semester-4 [redacted]

Weeks	Topics
1	Boundedness of the set of real numbers; least upper bound, greatest lower bound of a set, neighborhoods, interior points, isolated points, limit points.
2	Open sets, closed set, interior of a set, closure of a set in real numbers and their properties. Bolzano-Weiestrass theorem.
3	Open covers, Compact sets and Heine-Borel Theorem.
4	Sequence: Real Sequences and their convergence, Theorem on limits of sequence, Bounded and monotonic sequences, Cauchy's sequence, Cauchy general principle of convergence
5	Sub sequences, Sub sequential limits. Infinite series: Convergence and divergence of Infinite Series. Comparison Tests of positive terms Infinite series,
6	Cauchy's general principle of Convergence of series, Convergence and divergence of geometric series, Hyper Harmonic series or p- series.
7	Infinite series: D-Alembert's ratio test, Raabe's test, Logarithmic test.
8	De Morgan and Bertrand's test, Cauchy's N^{th}root test, Gauss Test
9	Cauchy's integral test, Cauchy's condensation test.
10	Alternating series, Leibnitz's test, absolute and conditional convergence, Arbitrary series: abel's lemma, Abel's test, Dirichlet's test.
11	Insertion and removal of parenthesis, re-arrangement of terms in a series, Dirichlet's theorem, Riemann's Re-arrangement theorem.
12	Pringsheim's theorem (statement only), Multiplication of series, Cauchy product of series, (definitions and examples only) Convergence and absolute convergence of infinite products.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- SPECIAL FUNCTION AND INTEGRAL TRANSFORM)

Semester-4 [redacted]

Weeks	Topics
1	Series Solution of differential equations Power series method, Definition of Beta and Gamma functions
2	Bessel equation and its solution, Bessel functions and their properties Convergence.
3	Recurrence relations and Generating functions, Orthogonality of Bessel functions
4	Legendre and Hermite differential equations and their solutions. Legendre andHermite's function and their properties.
5	Recurrence relations and gene rating functions. Orthogonality of Legendre andHermite's polynomials.
6	Rodrigues' Formula for Legendre and Hermite polynomials, Laplace Integral Representation of Legendre polynomial.
7	Laplace Transforms: Existence theorem for Laplace Transform, Linearity of the Laplace transforms.
8	Laplace transforms of derivatives and integrals, Differentiation and Integration of Laplace transforms,Convolution theorem.
9	Inverse Laplace transforms, Convolution theorem, Inverse Laplace transforms of derivatives and integrals, Solution of ordinary derivatives and integrals using Laplace transforms.
10	Fourier transforms: Linearity property, Shifting, Modulation, Convolution theorem.
11	Fourier transforms of derivatives, Relation between Fourier transforms and Laplace transforms.
12	Praseval's identity for Fourier transforms, Solution of differential Equations using Fourier transforms.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- DYNAMICS)

Semester-6 [redacted]

Weeks	Topics
1	Velocity and accelerational on gradial, transverse.
2	Tangential and normal directions. Relative velocity and acceleration.
3	Simple harmonic motion. Elastic strings.
4	Mass, Momentum and Force.
5	Newton's laws of motion
6	Work, Power and Energy. Definitions of Conservative forces and Impulsive forces
7	Motion on smooth and rough plane curves.
8	Projectile motion of a particle in a plane.
9	Vector angular velocity.
10	General motion of a rigid body. Central Orbits.
11	Kepler laws of motion. Motion of a particle in three dimensions.
12	Acceleration in terms of different co-ordinate systems.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- LINEAR ALGEBRA)

Semester-6 [redacted]

Weeks	Topics
1	Vector spaces, sub spaces, Sum and Direct sum of sub spaces, Linear span.
2	Linearly Independent and dependent subsets of a vector space. Finitely generated vector space, Existence theorem for basis of a finitely generated vector space.
3	Finite dimensional vector spaces, Invariance of the number of elements of bases sets, Dimensions, Quotient space and its dimension.
4	Homomorphism and is omorphism of vector spaces, Linear transformations and Linear forms on vector spaces, Vector space of all the linear transformations Dual Spaces,
5	Linear forms on vector spaces, Vector space fall the linear Transformations Dual Spaces,
6	Bidual spaces, an nihilator of sub spaces of finite dimensional Vector spaces, Null Space, Range space of a linear transformation, Rank and Nullity Theorem
7	Algebra of Linear Transformation, Minimal Polynomial of a linear transformation,
8	Singular and non-singular linear transformations, Matrix of a linear Transformation.
9	Change of basis, Eigen values and Eigen vectors of linear transformations.
10	Inner product spaces, Cauchy-Schwarz inequality, Orthogonal vectors, Orthogonal complements,
11	Orthogonal sets and Basis, Bessel's inequality for finite dimensional vector spaces, Gram Schmidt
12	Orthogonalization process, Adjoint of a linear transformation and its properties, Unitary linear transformations.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- REAL AND COMPLEX ANALYSIS)

Semester-6 [redacted]

Weeks	Topics
1	Jacobians, Beta and Gama functions
2	Double and Triple integrals.
3	Dirichlets integrals, change of order of integration in double integrals
4	Fourier's series: Fourier expansion of piece wise monotonic functions, Properties of Fourier Co-efficient,
5	Dirichlet's conditions, Parseval's identity for Fourier series.
6	Fourier series for even and odd functions, Halfrange series, Change of Intervals.
7	Extended Complex Plane, Stereographic projection of complex numbers, continuity and differentiability of complex functions.
8	Analytic functions. Problems biased on it
9	Cauchy- Riemann equations. Harmonic functions.
10	Mappings by elementary functions: Translation, rotation, Magnification and Inversion.
11	Conformal Mappings, Mobius transformations
12	Fixed points, Cross ratio, Inverse Points and critical mappings.
13	Revision
14	Revision
15	Revision