Lesson Plan
Kallol Bhandhu Bagchi
Department of Mathematics
Session: 2021-22

Weekly Lesson Plan For 1st Sem (2021-2022)
Paper : HCC(I-II)

Month/week	Topic to be covered
November , Week 3 (Offline)	Calculas, Geometry and ODE Unit-I
November, Week 4(Offline)	Calculas, Geometry and ODE Unit-I
December, Week 1 (Offline)	Calculas, Geometry and ODE Unit-III
December, Week 2 (Offline)	Calculas, Geometry and ODE Unit-IV
December, Week 3 (Offline)	Calculas, Geometry and ODE Unit-IV
January , Week 1 (Online)	Algebra Unit-I
January , Week 2 (Online)	Algebra Unit-II
January , Week 3 (Online)	Algebra Unit-III
January , Week 4 (Online)	Algebra Unit-IV
February, Week 1 (Online)	Rivision

Mode of Internal Assessment: Online Class Test Using Google Classroom Platform/Class test in Offline Mode depending on COVID Situation.

Weekly Lesson Plan For 2nd Sem (2022)
Paper : HCC-III, HCC-IV, GE-II

Month/Week	Topic to be covered
March, Week 3	Review of Algebric and order properties of R, Vector valued functions
March, Week 4	Classification of sets through cardinality, Limit-continuity-differentiation-integration of vector functions
April, Week 1	Countable and uncountable sets, 2nd and higher order ODE with constant coefficeints
April, Week 2	Important results related to countable and uncountable sets, Wronskian and method of variation of parameter
April, Week 3	Bounded sets and related topics, method of undetermined coefficeints
April, Week 4	Introduction to ponit set topology of R, 2nd order homogeneous ODE
May Week 1	Results related to open and closed sets, System of linear differential equations
May, Week 2	Results related to limit points, derived sets and closure of a sets, System of linear differential equations
May, Week 3	Sequence of real numbers, System of linear differential equations
May, Week 4	Sequence of real numbers
June, Week 1,2	Infinite series

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Weekly Lesson Plan For 3rd Sem (2021-2022)

Paper : HCC(V-VII), SE-I

Month/week	Topic to be covered
September, Week 1 (Online)	Theory of real functions and introduction to metric spaces Unit-I
September, Week 2 (Online)	Theory of real functions and introduction to metric spaces Unit-II
September, Week 3 (Online)	Theory of real functions and introduction to metric spaces Unit-III
September, Week 4 (Online)	Theory of real functions and introduction to metric spaces Unit-IV
October, Week 1 (Online)	Group Theory1 Unit-I Logic and sets Unit-I
October, Week 2 (Online)	Group Theory1 Unit-II Logic and sets Unit-II
November, Week 3 (Offline)	Group Theory1 Unit-III Logic and sets Unit-III
November, Week 4 (Offline)	Group Theory1 Unit-IV
December, Week 1 (Offline)	Group Theory1 Unit-V
December, Week 2,3 (Offline)	Riemann Integration and Series of functions Unit-(I, II)
January, Week 1,2,3,4 (Online)	Riemann Integration and Series of functions Unit-(III, IV, V)

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Weekly Lesson Plan For 4th Sem (2022)

Paper : HCC(VIII-X), GE-IV, SE-II

Month/Week	Topic to be covered
March, Week 3	Functions of several variables, limit and continuity of functions of two or more variables
March, Week 4	Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability.
April, Week 1	Chain rule for one and two independent parameters, directional derivatives, the gradient
April, Week 2	maximal and normal property of the gradient, tangent planes, extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems.
April, Week 3	Double integration over rectangular region, double integration over non-rectangular region, double integrals in polar co-ordinates
April, Week 4	triple integrals, triple integral over a parallelepiped and solid regions. Volume by

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	triple integrals, cylindrical and spherical co-ordinates.
May, Week 1	Change of variables in double integrals and triple integrals. Continuous mapping, sequential criterion and other characterizations of continuity. Uniform continuity. Connectedness, connected subsets of $\mathbb{R}$. Compactness: Sequential compactness, Heine-Borel property, totally bounded spaces, finite intersection property and continuous functions on compact sets.
May, Week 2	Definition of vector field, divergence and curl.
May, Week 3	Line integrals, applications of line integrals: mass and work. Fundamental theorem for line integrals, conservative vector fields, independence of path. Homeomorphism. Contraction mappings. Banach fixed point theorem and its application to ordinary differential equation.
May, Week 4	Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, the Divergence theorem.
June, Week 1	Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.
June, Week 2	Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms. Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix. Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bipartite graphs, isomorphism of graphs. Trees and forests, paths and cycles. Eulerian circuits, Eulerian graph, semi-Eulerian graph, theorems, Hamiltonian cycles,theorems Representation of a graph by matrix, the adjacency matrix, incidence matrix, weighted graph.

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Weekly Lesson Plan 5th Sem (2021-2022)
Paper : HCC(XI, XII), DSE(I, II)

Month/Week	Topic to be covered
September, Week 1 (Online)	Group Theory II Unit-I
September, Week 2,3 (Online)	Group Theory II Unit-II
September, Week 4 (Online)	Group Theory II Unit-III
October, Week 1 (Online)	Group Theory II Unit-IV
October, Week 2 (Online)	Numerical Methods Unit-I, II
November, Week 3,4 (Offline)	Numerical Methods Unit-III-VI
December, Week 1,2 (Offline)	Linear Programming Unit-I,II
December, Week 3,4 (Offline)	Linear Programming Unit-III Linear Programming Unit-I,II
January, Week 1,2 (Online)	Linear Programming Unit-III Numerical Methods Lab
January, Week 3,4 (Online)	Numerical Methods Lab

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Weekly Lesson Plan For 6th Sem (2022)
Paper : HCC(XIII-XIV), DSE(III-IV)

Month/Week	Topic to be covered
March, Week 3,4	Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, and unique factorization in Z [x]. Divisibility in integral domains, irreducible, primes, unique factorization domains, Euclidean domains. Theory of equations unit-i
April, Week1,2	Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators. Eigen spaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator, canonical forms. Theory of equations unit-ii
April, Week 3,4	Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements, Bessel's inequality, the adjoint of a linear operator. Least squares approximation, minimal solutions to systems of linear equations. Normal and self-adjoint operators. Orthogonal projections and Spectral theorem. Theory of equations unit-iii
May, Week 1,2	Partial differential equations – Basic concepts and definitions. Mathematical problems. First-

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	order equations: classification, construction and geometrical interpretation. Method of characteristics for obtaining general solution of quasi linear equations. Canonical forms of firstorder linear equations. Method of separation of variables for solving first order partial differential equations. Theory of equations unit-iv
May, Week 3,4	Derivation of heat equation, wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order linear equations to canonical forms.
June, Week 1	Countable and Uncountable Sets, Schroeder-Bernstein Theorem, Cantor's Theorem. Cardinal numbers and cardinal arithmetic. Continuum Hypothesis, Zorns Lemma, Axiom of Choice. Wellordered sets, Hausdorff's maximalprinciple. Ordinal numbers.
June, Week 2	Topological spaces, basis and Sub basis for a topology, subspace topology, interior points, limit points, derived set, boundary of a set, closed sets, closure and interior of a set. Continuous functions, open maps, closed maps and homeomorphisms. Product topology, quotient topology, metric topology, Baire category theorem.

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