GOVERNMENT COLLEGE ISRANA (PANIPAT)
LESSON PLAN
(January 2024 to April 2024)

Name of the Assistant Professor: Dr Prateek Mor
Class: B.A & B.Sc 3rd Semester - 6th
Subject: Mathematics
Paper: Linear Algebra

January 2024	**Unit 1:**	Vector spaces, subspaces, Sum and Direct sum of subspaces, Linear span, Linearly Independent and dependent subsets of a vector space. Finitely generated vector space, Existence theorem for basis of a finitely generated vactor space, Finite dimensional vector spaces, Invariance of the number of elements of bases sets, Dimensions, Quotient space and its dimension. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
February 2023	**Unit 2:**	Homomorphism and isomorphism of vector spaces, Linear transformations and linear forms on vactor spaces, Vactor space of all the linear transformations Dual Spaces, Bidual spaces, annihilator of subspaces of finite dimensional vactor spaces, Null Space, Range space of a linear transformation, Rank and Nullity Theorem. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
March 2023	**Unit 3:**	Algebra of Liner Transformation, Minimal Polynomial of a linear transformation, Singular and non-singular linear transformations, Matrix of a linear Transformation, Change of basis, Eigen values and Eigen vectors of linear transformations. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
April 2023	**Unit 4:**	Inner product spaces, Cauchy-Schwarz inequality, Orthogonal vectors, Orthogonal complements, Orthogonal sets and Basis, Bessel's inequality for finite dimensional vector spaces, Gram Schmidt, Orthogonalization process, Adjoint of a linear transformation and its properties, Unitary linear transformations. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

Books Recommended:

1. I.N. Herstein Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975

2. P.B. Bhattacharya, S.K. Jain and S.R. Nagpal Basic Abstract Algebra (2nd edition).

3. Vivek Sahai and Vikas Bist Algebra, Narosa Publishing House.

4. I.S. Luther and I.B.S. Passi Algebra, Vol.-II, Narosa Publishing House.

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Name of the Assistant Professor: Dr Prateek Mor
Class: B.A & B.Sc 3rd Semester - 6th
Subject: Mathematics
Paper: Real and Complex Analysis

January 2024	**Unit 1:**	Jacobians, Beta and Gama functions, Double and Triple integrals, Dirichlets integrals, change of order of integration in double integrals. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
February 2023	**Unit 2:**	Fourier's series: Fourier expansion of piecewise monotonic functions, Properties of Fourier Coefficients, Dirichlet's conditions, Parseval's identity for Fourier series, Fourier series for even and odd functions, Half range series, Change of Intervals. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
March 2023	**Unit 3:**	Extended Complex Plane, Stereographic projection of complex numbers, continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations. Harmonic functions. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
April 2023	**Unit 4:**	Mappings by elementary functions: Translation, rotation, Magnification and Inversion. Conformal Mappings, Mobius transformations. Fixed pints, Cross ratio, Inverse Points and critical mappings. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

Books Recommended:

1. T.M. Apostol Mathematical Analysis, Narosa Publishing House, New Delhi, 1985
2. R.R. Goldberg :Real analysis, Oxford & IBH publishing Co., New Delhi, 1970
3. D. Somasundaram and B. Choudhary A First Course in Mathematical, Analysis, Narosa Publishing House, New Delhi, 1997
4. Shanti Narayan A Course of Mathematical Analysis, S. Chand & Co., New Delhi
5. R.V. Churchill & J.W. Brown: Complex Variables and Applications, 5th Edition, McGraw-Hill, New York, 1990
6. Shanti Narayan Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.

GOVERNMENT COLLEGE ISRANA (PANIPAT)
LESSON PLAN
(January 2024 to April 2024)

Name of the Assistant Professor: Dr Prateek Mor
Class: M.Sc 1st Semester – 2nd
Subject: Mathematics
Paper: Abstract Algebra II

January 2024	**Unit 1:**	Commutators and higher commutators. Commutators identities. Commutator subgroups.Derived group. Three subgroups Lemma of P.Hall. Central series of a group G. Nilpotent groups. Centre of a nilpotent group. Subgroups and factor subgroups of nilpotent groups. Finite nilpotent groups. Upper and lower central series of a group G and their properties. Subgroups of finitely generated nilpotent groups. Sylow-subgroups of nilpotent groups. Problems discussion and revision of unit 1, Assignment 1 and Test 1.
February 2023	**Unit 2:**	Similar linear transformations. Invariant subspaces of vector spaces. Reduction of a linear transformation to triangular form. Nilpotent transformations. Index of nilpotency of a nilpotent transformation. Cyclic subspace with respect to a nilpotent transformation. Uniqueness of the invariants of a nilpotent transformation. Primary decomposition theorem. Jordan blocks and Jordan canonical forms. Cyclic module relative to a linear transformation. Companion matrix of a polynomial f(x). Rational Canonicals form of a linear transformation and its elementary divisior. Uniqueness of the elementary divisior. Problems discussion and revision of unit 2, Assignment 2 and Test 2.
March 2023	**Unit 3:**	Modules, submodules and quotient modules. Module generated by a non-empty subset of an R-module. Finitely generated modules and cyclic modules. Idempotents. Homomorphism of R-modules. Fundamental theorem of homomorphism of R-modules. Direct sum of modules. Endomorphism rings EndZ(M) and EndR(M) of a left R-module M. Simple modules and completely reducible modules (semi-simple modules). Finitely generated free modules. Rank of a finitely generated free module. Submodules of free modules of finite rank over a PID. Problems discussion and revision of unit 3, Assignment 3 and Test 3.
April 2023	**Unit 4:**	Endomorphism ring of a finite direct sum of modules. Finitely generated modules. Ascending and descending chains of sub modules of an R-module. Ascending and Descending change conditions (A.C.C. and D.C.C.). Noetherian modules and Noetherian rings. Finitely co-generated modules. Artinian modules and Artinian rings. Nil and nilpotent ideals. Hilbert Basis Theorem. Structure theorem of finite Boolean rings. Wedeerburn-Artin theorem and its consequences. Problems discussion and revision of unit 4, Assignment 4 and Test 4.

Books Recommended:

1. Basic Abstract Algebra P.B. Bhattacharya S.R. Jain and S.R. Nagpal
2. Theory of Groups I.D. Macdonald
3. Topics in Algebra I.N. Herstein
4. Group Theory W.R. Scott