Govt. College for Girls Bastli, Karnal (Haryana) Lesson-Plan (2023-24)

**Name of the Teacher:-** Subhash Chand (Asst. Prof. Maths)

**Class:-** BA/B.Sc (3rd year 5th sem) **Subject:-** Real Analysis **Paper:-** BM-351

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| Week | Topic Covered |
| 1.  (1-3 Sep) | **UNIT-1**   1. Definition of a Riemann Integral 2. Important examples of R-Integral 3. Simple Properties 4. Related theorems |
| 2.  (5-10 Sep) | 1. Integrability of continuous functions 2. Integrability of monotonic functions 3. Related theorems and applications. 4. Discussions |
| 3.  (12-17 Sep) | 1. Fundamental theorem on integral calculus 2. MVT of integral calculus 3. Applications based excecises 4. Problem Solving 5. Assignment |
| 4.  (19-24 Sep) | **UNIT-2**   1. Improper integrals 2. Convergence of Improper Integrals 3. Introduction to comparison tests 4. Discussion |
| 5.  (26-30 Sep) | 1. Abel Test (Statement and Proof) 2. Applications of Abel test to problems 3. Dirichlet’s Test (Statement and Proof) 4. Applications to problems 5. Frullani’s Integral |
| 6.  (1-8 Oct) | 1. Integral as a function of parameter 2. Continuity of an integral of a function of a parameter 3. Its continuity aspect 4. Differentiability aspect 5. Problem solving and discussion 6. Assignment |
| 7.  (10-15 Oct) | Revision and Sessional Exam-1 |
| 8.  (17-21 Oct) | **UNIT-3**   1. Definitions of metric spaces 2. Examples of metric spaces 3. Neighbourhood 4. Limit points 5. Interior Points 6. Discussions |
| 9.  (27-29 Oct) | 1. Open and Closed sets 2. Closure and interior |

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|  | 1. Boundary Points 2. Subspace of a metric spaces 3. Equivalent metrices |
| 10.  (02-05 Nov) | 1. Cauchy sequences 2. completeness 3. Cantor’s intersection theorem   4 Baire’s category theorem   1. Contraction Principle 2. Problems discussion and assignment |
| 11.  (07-12 Nov) | **UNIT-4**   1. Continuous Functions 2. Uniform Continuity 3. Examples and understanding 4. Compactness for metric spaces 5. Sequential Compactness 6. Exercise problem Solvinf |
| 12.  (14-19 Nov) | 1. Bolzano-Weierstrass property 2. Total boundedness 3. Finite Intersection Property 4. Related theorems 5. Discussion |
| 13.  (21-26 Nov) | 1. Continuity in relation with compactness 2. Connectedness and its understanding 3. Components 4. Continuity in relation with connectedness 5. Applications 6. Assignment |
| 14.  (28-30 Nov) | Revision and Sessional Exam-2 |
| 15.  ( 01-03 Dec) | Discussion and Revision |
| 16.  (05-10 Dec) | DO |
| 17.  (12-17 Dec) | DO |
| 18.  (19-24 Dec) | DO |

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**Name of the Teacher:-** Subhash Chand (Asst. Prof. Maths)

**Class:-** BA/B.Sc (3rd year 5th sem) **Subject:-** Groups and Rings **Paper:-** BM-352

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| Week | Topic Covered |
| 1.  (1-3 Sep) | **UNIT-1**   1. Definition of a Group 2. Important examples of groups 3. Simple Properties of groups 4. Abelian groups and their examples 5. Finite/Infinite groups and the order of a group 6. Addition/Multiplication modulo-m groups |
| 2.  (5-10 Sep) | 1. Definition of Subgroup and Examples 2. Subgroup criterion (one-step subgroup test) 3. Product, intersection and union of two subgroups 4. Cyclic groups (definition and examples) 5. Generator and order of cyclic groups. 6. Discussion and Assignments |
| 3.  (12-17 Sep) | 1. Cosets (left and right) 2. Some theorems on cosets 3. Index of a subgroup in a group 4. Coset decomposition 5. Relation of Congruence modulo of a subgroup 6. Discussion |
| 4.  (19-24 Sep) | 1. Lagrange’s theorem 2. Converse and Application of Lagrange’s theorem 3. Normal subgroups 4. Simple groups 5. Quotient (factor) groups 6. Exercises / problem solving techniques |
| 5.  (26-30 Sep) | **UNIT-2**   1. Homomorphism of groups 2. Isomorphism and automorphism of groups 3. Inner automorphism of groups 4. Some theorems on homomorphism 5. Kernel of a homomorphism 6. Understanding of group of automorphisms 6.. Discussion and assignment |
| 6.  (1-8 Oct) | 1. First Fundamental theorem on homomorphism of groups 2. Second and third theorem on homomorphism 3. Their applications to group theory and algebra 4. Centre of a group 5. Characteristic subgroup 6.Normalizer & commutator |
| 7. | 1. Permutation groups |

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| (10-15 Oct) | 1. Even and odd permutations 2. Alternating groups 3. Cayley’s theorem 4. Centre of a group 5. Derived group of a group |
| 8.  (17-21 Oct) | Revision and Sessional Exam-1 |
| 9.  (27-29 Oct) | **UNIT-3**   1. Introduction to Rings 2. Subrings and Division rings 3. Some theorems on subrings 4. Characteristic of a ring and theorems on it 5. Integral Domains and fields 6. Centre of ring |
| 10.  (02-05 Nov) | 1. Understanding of Ideal 2. Sum, product, intersection and union of ideals 3. Simple ring, principal ideal 4. Principal ideal ring and principal ideal domain 5. Maximal ideal and prime ideal 6. Quotient ring and some theorems on it |
| 11.  (07-12 Nov) | 1. Homomorphisms o rings 2. Kernel of ring homomorphism 3. Fundamental theorem on homomorphism of rings (First, second and third theorem) 4. Embedding of rings 5. Field of quotients of integral domain 6. Problems discussion and assignment |
| 12.  (14-19 Nov) | **UNIT-4**  1. Euclidean rings and  2 Related important definitions   1. Every field implies an integral domain 2. Principal Ideal Domain 3. Some theorems on Euclidean rings 4. The ring of Gaussian integers Z[i] |
| 13.  (21-26 Nov) | 1. Polynomial rings 2. Polynomials over rational fields 3. Divisibility of polynomials over a field 4. Remainder & factor theorems and their applications 5. Polynomial rings over commutative rings 6. Exercises and problem solving techniques |
| 14.  (28-30 Nov) | 1. Unique factorization Domain 2. Irreducible, primitive polynomials 3.Gauss Lemma and its converse 3. Eisenstein criterion of irreducibility 4. R unique factorization domain implies so is R[x1,x2,…,xn] |
| 15.  ( 01-03 Dec) | Revision and Sessional Exam-2 |
| 16.  (05-10 Dec) | ----------Discussion and Revision------- |
| 17. | DO |

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| (12-17 Dec) |  |
| 18.  (19-24 Dec) | DO |

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**Name of the Teacher:-** Subhash Chand (Asst. Prof. Maths)

**Class:-** BA/B.Sc (3rd year 5th sem) **Subject:-** Numerical Analysis **Paper:-** BM-353

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| Week | Topic Covered |
| 1.  (1-3 Sep) | **UNIT-1**   1. Finite difference operators and 2. Relationships in finite difference operators 3. Finding the missing terms 4. Effect of error in a difference table values 5. Related theorems and applications |
| 2.  (5-10 Sep) | 1. Interpolation with equal intervals 2. Newton’s forward interpolation formula 3. Newton’s backward interpolation formula 4. Applications and examples 5. Discussions |
| 3.  (12-17 Sep) | 1. Interpolation with unequal intervals 2. Newton’s Divided difference 3. Lagrange’s Interpolation formula 4. Hermite formula 5. Problem Solving 6. Assignment |
| 4.  (19-24 Sep) | **UNIT-2**   1. Central Differences 2. Gauss forward interpolation formula 3. Gauss backward interpolation formula 4. Applications to problems |
| 5.  (26-30 Sep) | 1. Sterling formula 2. Bessel formula 3. Probability distribution of random variables 4. Binomial distribution 5. Discussions |
| 6.  (1-8 Oct) | 1. Poisson Distribution 2. Normal Distribution 3. Mean 4. Variance and Fitting |

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|  | 1. Problem solving of Exercises 2. Assignment |
| 7.  (10-15 Oct) | Revision and Sessional Exam-1 |
| 8.  (17-21 Oct) | **UNIT-3**   1. Numerical Differentiation 2. Derivation of a function using formulae in previous units That is unit I and II 3. Examples and Problem solving 4. Doubt session |
| 9.  (27-29 Oct) | 1. Eigen Value problems 2. Power method 3. Jacobi’s Method 4. Given’s method 5. Applications and Discussions |
| 10.  (02-05 Nov) | 1. House Holder’s method 2. QR-method 3. Lanczo’s method 4. Related theorems 5. Problems solving and assignment |
| 11.  (07-12 Nov) | **UNIT-4**   1. Numerical Integration 2. Newton-Cote’s Quadrature formula 3. Trapezoidal rule 4. Simpson’s 1/3rd rule 5. Simpson’s 3/8th rule |
| 12.  (14-19 Nov) | 1. Chebychev’s formula 2. Gauss Quadrature formula 3. Numerical solution to ODE 4. Single step method-Picard’s method 5. Taylor Series method 6. Euler’s method |
| 13.  (21-26 Nov) | 1. Runge-Kutta methods 2. Multiple step method 3. Predictor-corrector method 4. Modified Euler’s method 5. Milne-Simpson’s method 6. Exercise solving and Assignment |
| 14.  (28-30 Nov) | Revision and Sessional Exam-2 |
| 15.  ( 01-03 Dec) | Discussion and Revision |
| 16.  (05-10 Dec) | ------------DO--------- |

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| 17.  (12-17 Dec) | DO |
| 18.  (19-24 Dec) | DO |