

**GOVT. D.B. GIRLS' P.G. (AUTONOMOUS) COLLEGE
RAIPUR CHHATTISGARH**

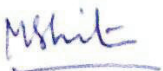
FACULTY OF MATHEMATICS

SYLLABUS

OF

B.Sc. MATHEMATICS PART-III

2020-21

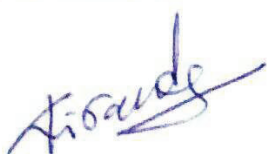


Signature of Chairman


Principal
Govt. D.B. Girls' P.G. College,
Raipur (C.G.)



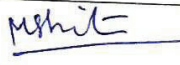
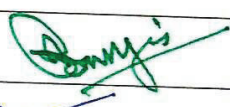

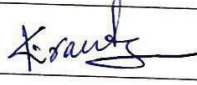
Page 1 of 5






Theory				
Part A				
No.	Title	Marks		Total
		Max.	Min.	
Paper-I	Analysis	50	17	50
Paper-II	Abstract Algebra	50	17	50
Paper-III	Discrete Mathematics	50	17	50

APPROVED BY THE BOARD OF STUDIES ON

NAME	IN THE CAPACITY OF	SIGNATURE
Dr. MADHU SHRIVASTAVA	CHAIRMAN	
Dr. B.S. THAKUR	SUBJECT EXPERT (University Nominee)	
Dr. AMITABH BANERJEE	SUBJECT EXPERT (Principal Nominee)	
Mrs. RASHMI SENGUPTA	MEMBER OF THE DEPARTMENT	
Mrs. KIRAN DEWANGAN	MEMBER OF THE DEPARTMENT	
Ku. SANDHYA SAHU	EX-STUDENT	


Signature of Chairman


Signature of Member (Subject)
Principal
Conv. D.B. Girls' P.G. College,
Bhopal
Page 2 of 5

DEPARTMENT OF MATHEMATICS
B.SC. PART – III
MATHEMATICS
SESSION :2020-21
PAPER - I
ANALYSIS

Maximum Marks: 50
Minimum Marks: 17
REAL ANALYSIS

Number of Units : V

UNIT - I

Series of arbitrary terms, Convergence, Divergence and Oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivation and differentiability of real valued functions of two variables. Schwarz's and Young's theorem. Implicit function theorem. Fourier series. Fourier expansion of piecewise monotonic functions.

UNIT -II

Riemann integral. Integrability of continuous and monotonic functions. The fundamental theorem of Integral Calculus. Mean value theorems of integral calculus. Improper integrals and their convergence, comparison tests. Abel's and Dirichlet's tests. Frullani's integral, Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter.

COMPLEX ANALYSIS

UNIT -III

Complex numbers as ordered pairs. Geometric representation of complex numbers. Stereographic projection. Continuity and differentiability of complex functions. Analytic functions, Cauchy Riemann equations, Harmonic functions. Elementary functions, mapping by elementary functions. Mobious transformations, Fixed points, Cross ratio, Inverse points and critical mappings, Conformal mappings.

METRIC SPACES

UNIT -IV

Definition and examples of metric spaces. Neighbourhoods, Limit points, Interior points, Open and Closed sets, Closure and interior. Boundary points, Sub-space of a metric space. Cauchy sequences, Completeness, Cantor's intersection theorem, Contraction principle, Construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field.

UNIT -V

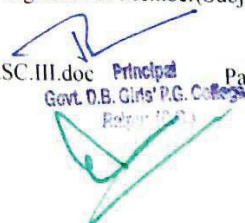
Dense subsets. Baire Category theorem, Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity. Isometry and homeomorphism. Equivalent metrics. Compactness, Sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets. Connectedness, Components, Continuous functions and connected sets.


Signature of Chairperson

Signature of Member (Subject)






Principal
Govt. D.B. Girls' P.G. College
Bijapur, Karnataka

DEPARTMENT OF MATHEMATICS
B.SC. PART – III
MATHEMATICS
SESSION : 2020-21
PAPER - II

ABSTRACT ALGEBRA

Maximum Marks: 50
Minimum Marks: 17

Number of Units : V

UNIT - I

Group-Automorphism, inner automorphisms. Automorphism groups and their computations. Conjugacy relation, Normaliser, Counting principle and the class equation of a finite group. Center for group of prime-order, Abelianizing of a group and its universal property. Sylow's theorems, Sylow's subgroup, structure theorem for finite Abelian groups.

UNIT-II

Ring theory- Ring homomorphism, Ideals and Quotient Rings. Field of Quotients of an Integral Domain, Euclidean Rings, Polynomial rings, Polynomials over the Rational Field. The Eisenstein Criterion, Polynomial Rings over Commutative rings, Unique factorization domain. R unique factorisation domain implies so is $R[x_1, x_2, \dots, x_n]$ Modules, submodules, Quotient modules, Homomorphism and isomorphism theorems.

UNIT-III


Definition and examples of vector spaces. Subspace, Sum and direct sum of subspaces, Linear span. Linear dependence, independence and their basic properties. Basis Finite dimensional vector spaces, existence theorem for bases, invariance of the number elements of a basis set. Dimension, Existence of complementary subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.

UNIT-IV

Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space, Bidual space and natural isomorphism, Adjoint of a linear transformation, Eigenvalues and Eigen vectors of a linear transformation. Diagonalisation. Annihilator of a subspace, Bilinear, Quadratic and Hermitian forms.

UNIT-V


Inner product spaces-Cauchy-Schwarz inequality, Orthogonal vectors, Orthogonal complements, Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process.


Signature of Chairman


Signature of Member (Subject)






Principal
Govt. D.B. Girls' P.G. College,
Raipur (C.G.)

DEPARTMENT OF MATHEMATICS
B.Sc. PART - III
MATHEMATICS
SESSION : 2020-21
PAPER - III (OPTIONAL)
(II) DISCRETE MATHEMATICS

Maximum Marks: 50
Minimum Marks: 17

Number of Units : V

UNIT - I

Sets and Propositions - Cardinality, Mathematical induction, Principle of inclusion and exclusion.

Computability and Formal Languages - Ordered sets, languages, Phrase structure Grammars, Types of Grammars and languages. Permutations, Combinations and Discrete probability.

UNIT-II

Relations and Functions - Binary relations, Equivalence relations and Partitions. Partial Order Relations and Lattices, Chains and Antichains. Pigeon Hole Principle. Graphs and Planar Graphs - Basic Terminology, Multigraphs, Weighted graphs, Paths and circuits, Shortest paths, Eulerian Paths and circuits, Travelling Salesman Problem, Planner graphs, Trees.

UNIT-III

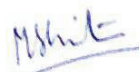
Finite State machines - Equivalent machines, Finite state machines as language recognizers, Analysis of Algorithms - Time complexity, Complexity of problems, Discrete Numeric functions and Generating functions.

UNIT-IV

Recurrence Relations and Recursive Algorithms - Linear Recurrence Relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, Solution by the method of Generating functions, Brief review of Groups and Rings.

UNIT-V

Boolean Algebra - Lattices and Algebraic structures. Duality, distributive and complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean functions and expressions. Propositional Calculus, Design and implementation of Digital Networks, Switching Circuits.

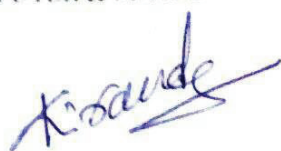


Signature of Chairman

Signature of Member(Subject)



Page 5 of 5






Principal
Govt. D.B. Girls' P.G. College,
Raipur (C.G.)