



Maharaja Surajmal Brij University

Bharatpur (Raj.)

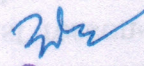
SYLLABUS

MATHEMATICS

B.A. / B.Sc. Part I

(Session 2020-21)

**Only For Session
2020-21**


अकादमिक प्रभारी
महाराजा सुरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

B. A./B. Sc. Part I Examination - 2021

MATHEMATICS

Paper-I Discrete Mathematics (Topics to be deleted)

- Unit-I:** Permutation: product of two permutations, even and odd permutations, inverse of permutations, cyclic permutations, Permutation groups.
- Unit-II:** hand shaking property, Operations on graphs, Isomorphism, Hamiltonian cycles and Hamiltonian graphs, Dikstra algorithm.
- Unit-III:** Graph colouring, Chromatic number, Map colouring, Five colour theorem Spanning tree in weighted graphs, Kruskal's algorithm and Prim's algorithm to find minimal spanning tree in a weighted graph.
- Unit-IV:** Fundamental theorem of arithmetic, divisibility in Z , Congruences, Chinese Remainder Theorem.
- Unit-V:** **Logic and propositional calculus-** propositions, basic logical operations, truth tables, tautologies and contradictions, quantifiers.

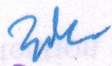
Paper - II Advanced Calculus (Topics to be deleted)

- Unit-I:** **Successive Differentiation-** n^{th} derivative of single variable functions, Leibnitz's theorem, Expansion of functions Using Maiclaurin's theorem.
- Unit-II:** **Polar Coordinates -** Angle between radius vector and tangent, length of perpendicular from pole to the tangent, polar sub tangent and subnormal,
- Unit-III:** **Maxima and Minima of functions of two or three variables-** Lagrange's condition for two independent variables, Lagrange's method of undetermined multipliers.
- Unit-IV:** **Triple integrals -** Evaluation of triple integrals, Dirichlet's formula for triple integrals.
- Unit - V:** **Volume and Surfaces of solids of revolution,** Pappus theorem, Use of triple integrals to find volumes.

Paper-III Coordinate Geometry and Vector Calculus (Topics to be deleted)

- Unit-I:** Ellipse and Hyperbola
- Unit-II:** Representation of cone by a general equation second degree, Tangent plane, Reciprocal cone, Right circular cone.

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Unit-III: Pole and Polar planes, Enveloping cone and enveloping cylinder, Normals to conicoids, Diameter and diametral planes.

Unit-IV: Reduction of general equation of second degree-principal planes and principal directions, centre of a conicoid, canonical forms, transfer of origin and rotation of coordinate axes for canonical form.

Unit-V: Gauss and Stock's theorems(no proofs are required) and their applications.

Practical (Topics to be deleted)

Group - A: Tracing of Cartesian and polar two dimensional curves.

Group - B: Classification and Tracing of conics representing by general equation of second degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

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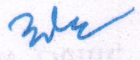
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MATHEMATICS

B.A. / B.Sc. Part II

(Session 2020-21)

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B. A./B. Sc. Part II Examination-2021

MATHEMATICS

Paper - I Real Analysis (Topics to be deleted)

- Unit-I:** Compact sets, Heine Borel Theorem, Connected sets. Equivalent sets, Finite and infinite sets, Denumerable sets, Countable and uncountable sets.
- Unit-II:** Sub sequence, Cauchy sequence, Cauchy's general principal of convergence. Uniform Continuity.
- Unit-III:** Taylor's theorem with various forms of remainders. Limits and Continuity for the functions of two variables.
- Unit-IV:** Reimann Steiltze's integrals. Differentiation and Integration under the sign of Integration.
- Unit-V:** Uniform convergence and continuity, Term by term integration, and term by term differentiation. Half range Fourier series.

Paper - II Differential Equation

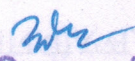
- Unit - I:** Differential equations which can be made exact.
- Unit - II:** Claraut's forms, Singular Solutions with extraneous locii.
- Unit-III:** Geometric interpretation, Exact differential equations of nth order, Existence and uniqueness theorem.
- Unit-IV:** Method of variation of parameters, Method of undetermined coefficient.
- Unit-V:** Non-Linear partial differential equations of order one: Standard form I, II, III, and IV, Homogeneous and Non-homogeneous linear partial differential equations.

Paper - III Numerical Analysis and Optimization Techniques

(Topics to be deleted)

- Unit-I:** Newton's divided difference interpolation formula, Lagrange's interpolation formula.
- Unit-II:** Numerical differentiation. Weddle rule, Newton-Cote's quadrature formula, Gauss's quadrature formula.
- Unit-III:** Relaxation method. **Numerical solution of ordinary differential equations-** Picard's successive approximation method, Euler's method and Euler's modified method.

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Unit-IV : Extreme point of a set, Theory of Simplex method.

Unit-V: Properties of the dual, Fundamental theorem of I. p. p., Travelling Salesman problem.

Practicals (Topics to be deleted)

Group-A: Numerical solution of differential equations using Runge-Kutta methods.

Group-B: Modelling of industrial and engineering problems into Assignment problem and their solutions.

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SYLLABUS

MATHEMATICS

B.A. / B.Sc. Part III

(Session 2020-21)

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2020-21**

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B. A./B. Sc. Part III Examination – 2021

Paper - I Modern Algebra (Topics to be deleted)

- Unit - I:** Index of a subgroup, Lagrange's theorem, Fermet's theorem, subgroups of cyclic group.
- Unit-II:** Quotient group or Factor group, Fundamental theorem on homomorphism.
- Unit-III:** Ring homomorphism, Embedding of ring and integral domain, Embedding of integral domain in a field, Field of quotients.
- Unit-IV:** Vector subspaces, Direct sum of subspaces, properties of finite dimensional vector spaces.
- Unit-V:** Matrices of linear maps, Matrices of composition maps, Invertible matrices, Similar matrices, Determinant of matrices and its computations.

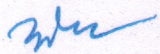
Paper-II Complex Analysis (Topics to be deleted)

- Unit-I:** Steriographic Projection. Convergence of power series- absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, circle and radius of convergence of power series.
- Unit-II:** Elementary mapping: $w=1/2(z + 1/z)$, $w=z^2$, $w=e^z$, $w=\sin z$, $w=\cos z$.
- Unit-III:** Morera's theorem, Poisson integral formula, Liouville's theorem, Maximum Modulus Principal.
- Unit-IV:** Taylor's theorem, Laurent's theorem, Argument principle, Rouché's theorem, Fundamental theorem of algebra.
- Unit-V:** Residue at infinity.

Paper -III Mechanics (Topics to be deleted)

- Unit-I:** Hooke's law, Horizontal Elastic String, Vertical Elastic String, Repulsion from a fixed point, Motion under Inverse Square Law.
- Unit-II:** **Uniplanar Motion:** Projectile on an Horizontal Plane, Projection to pass through a given point, Projectile on an Inclined Plane.
- Unit-III:** **Central Orbits:** p-r equation, Apses, time in a orbit, Kepler's law of planetary motion.
- Unit-IV:** Reduction of System of Coplanar Forces into a Force and a Couple Equilibrium of body Under more than Three Forces. Least Force Required to pull a Body up and down on an inclined rough plane.

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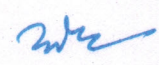
Unit-V: Sag of Tightly Stretched Wire., Problems Related to a body or a Frame work resting on a Pags or on Inclined Plane.

Practicals (Topics to be deleted)

Group -A: Elementary programs on Matrix multiplication and to find inverse.

Group-B: Solution of some Numerical Analysis problems- Euler's method, Runge-Kutta's method using C-programming.

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