SESSION-2022-23

B. A./B. Sc. Part I Examination - 2019

SESSION-2022-23

5. MATHEMATICS

Teaching : 3 hours per week per theory paper

2 hours per week per batch for practical

(20 candidates in each batch)

Examination Scheme :

	Min. Pass Marks	Max. Pass Marks
Science	54	150
Arts	72	200

		Duration	Max Marks
Paper – I	Discrete Mathematics	3 hrs	40 (Science) 53 (Arts)
Paper – II	Advanced Calculus	3 hrs	40 (Science) 53 (Arts)
Paper – III	Coordinate Geometry and Vector Calculus	3 hrs	40 (Science) 54(Arts)
Practical		2 hrs	30 (Science) 40 (Arts)

Note :-

1. Syllabus of each of three papers is divided into FIVE units.
2. Each paper is divided into THREE sections A, B & C.
3. **Section-A :** TEN short answer type questions will be set taking two questions from each unit. Each question will carry 1 mark for Science and 1.5 mark for Arts. All questions will be compulsory .
4. **Section-B :** TEN questions will be set taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt ONE question from each unit
5. **Section-C :** FIVE questions will be set taking one questions from each unit. Each question will carry 5 marks for Science in all three papers and 6 marks for Arts in paper I & II and 6.33marks in paper III. Student has to attempt ANY THREE Questions.
6. Common paper will set for Faculty of Science and Faculty of Social Science .

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7. Each candidate is required to appear in the practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the principal in consultation with the head, department of Mathematics in the college.
8. An internal/external examiner can conduct practical examination of not more than 100 (one hundred) candidates (20 candidates in each batch).
9. Each candidate has to pass in theory and practical examinations separately.

Paper – I Discrete Mathematics

Teaching : 3 hrs per week

Duration of Examination : 3 hrs **Max. Marks 40 (Science)**

53 (Arts)

Note: *This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. **Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt any THREE questions.*

Unit-I : Sets, Cardinality, Principal of inclusion and Exclusion, Mathematical induction, Relation and Functions, Binary relations, Equivalence relations and Partitions, Partial ordered relations and Lattices, Chains and Anti- chains, Pigeon hole principal.

Unit-II : Graph theory — Introduction , definition of graph, degree of vertex, Directed graphs, finite and infinite graphs, hand shaking property, Regular graphs, Bipartite graphs, Operations on graphs, Isomorphism, sub graphs, Connected and Disconnected graphs, Euler circuit and Euler graphs, Hamiltonian cycles and Hamiltonian graphs, Weighted graphs, Shortest path problem, Dikstra algorithm.

Unit-III : Planner and non planner graphs, Euler's formula, Detection of planarity, Dual of planner graphs, Graph colouring, Chromatic number, Map colouring, Five colour theorem, Matrix representation of graphs. Trees, properties of trees, rooted tree, binary tree, Spanning tree, Spanning tree in weighted graphs.

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Unit-IV : Boolean Algebra —Definition, Duality, properties of Boolean algebra, Ordered relation in Boolean algebra, Lattices, Homomorphism, Boolean functions and expressions, Conjunctive and Disjunctive normal forms, Fundamental theorem of arithmetic, divisibility in Z, Congruences, Chinese Remainder Theorem.

Unit-V : Generating functions—Discrete numeric function, Ordinary generating function, Convolution of sequences, Summation using convolution, Counting techniques, Partition of inters, Exponnential generating function. Recurrence Relation —First order relation, Second order linear homogeneous relation, Third and higher order linear homogeneous relations, Linear non homogeneous relations Linear non homogeneous relations of second and higher order, Solution of recurrence relations using generating functions.

Paper – II Advanced Calculus

Teaching : 3 hrs per week

Duration of Examination : 3 hrs **Max. Marks 40 (Science)**

53 (Arts)

Note: *This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. **Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions.*

Unit – I : Convergence and Divergence of Infinite Series- Introduction, Tests for convergence, Comparison test, D' Alembert ratio test, Cauchy's n^{th} root test, Raabe's test, De Morgan and Bertrand test, Cauchy's condensation test.
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, Pedal equation of Cartesian and polar curves. Derivatives of arcs- – Cartesian and polar forms. Curvature – Definition, radius of curvature for Cartesian, polar and parametric curves, curvature at the origin, centre of curvature, circle of curvature, chord of curvature. . Partial differentiation, Euler's theorem on homogeneous functions, Total differentiation.

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Unit – III : Envelopes – Family of curves, Definition of envelope, Envelopes of Cartesian, polar and parametric curves. Asymptotes – Definition, methods to find asymptotes of Cartesian and polar curves, Intersection of curve and its asymptotes. Maxima and Minima of functions of two or three variables – Lagrange's condition for two independent variables, Lagrange's method of undetermined multipliers. Singular points, double point, Tracing of Cartesian and polar curves.

Unit – IV : Gamma and Beta functions – Definition, Transformations of Gamma functions, Relation between Beta and Gamma functions, Euler's functional equation, Double multiple formula. Double Integral- Evaluation of double integrals, Change of order of integration, Triple integrals – Evaluation of triple integrals, Dirichlet's formula for triple integrals.

Unit – V : Rectification- Meaning, lengths of Cartesian and polar plane curves. Quadrature – Areas bounded by plane curves (Cartesian and polar), Use of double integrals to find areas. Volume and Surfaces of solids of revolution, Puppus theorem, Use of triple integrals to find volumes.

Paper —III Coordinate Geometry and Vector Calculus

Teaching : 3 hrs per week

Duration of Examination : 3 hrs **Max Marks 40 (Science)**

54 (Arts)

Note : This paper is divided into THREE Sections A B,& C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory. **Section –B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section- C** consists FIVE questions taking one question from each unit. Each question will carry 5 marks for Science and 6.33 marks for Arts. Student has to attempt ANY THREE questions.

Unit-I : Sphere, Plane sections of sphere, intersection of sphere with a line, Tangent plane, Plane of contact, Pole and Polar planes, Orthogonality of two spheres, Radical plane, Radical line and Radical centre of sphere.

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Unit –II : Cone—Definition and equation, Enveloping cone, Representation of cone by a general equation second degree, Tangent plane, Reciprocal cone, Rightcircular cone. Cylinder— Definition and equation of cylinder, Enveloping cylinder, Right circular cylinder.

Unit –III : Central Conicoid—Definition and standard equation, Tangent lines and tangent planes, Director sphere, Pole and Polar planes, Enveloping cone and enveloping cylinder, Normals to conicoids, Diameter and diametral planes.

Unit –IV: Generating lines of conicoids—condition for a straight line to be a generator, generating lines, Properties of generating lines of hyperboloid. Reduction of general equation of second degree—Principal plane and principal directions,Centre of a conicoid, canonical forms, transfer of origin and rotation of coordinate axes for canonical form.

Unit –V : Vector Calculus—Differentiation and integration of vector point function, Gradient of scalar point function, Divergence and Curl of vector point function, Idetities on Gradient, Curl and divergence. Gauss and Stock's theorems (no proofs are required) and their applications.

Practical

Teaching : 2 hours per week

Examination Scheme: **Duration - 2 hours**

	Science	Arts
Maximum Marks	30	40
Minimum Pass Marks	11	14

Distribution of Marks:

Two Exercises one from each group

10 marks each	=	20 marks	13 marks each	=	26 marks
Practical record	=	05 marks			07 marks
Viva-voce	=	05 marks			07 marks
Total Marks	=	**30 marks**			**40 marks**

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Group – A : Graphs of some standard functions- x^n (for different value of n), e^x, $\log_e x$, $\log_a x$ ($a<1$ and $a>1$), sin x, cos x, tan x, cot x, cosec x, secx.

Tracing of Cartesian and polar two dimensional curves.

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

Classification of conicoid representing by general equation of second degree $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy + 2ux + 2vy + 2wz + d = 0$

Note :- Each candidate (Regular/Non-collegiate) has to prepare his/her record.

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B. A./B. Sc. Part II Examination-~~2019~~ 2023

5. MATHEMATICS

Teaching : 3 hours per week per theory paper

2 hours per week per batch for practical

(20 candidates in each batch)

Examination Scheme :

	Min. Pass Marks	Max. Pass Marks
Science	54	150
Arts	72	200

		Duration	Max Marks
Paper – I	Real Analysis	3 hrs	40 (Science)
			53 (Arts)
Paper – II	Differential Equations	3 hrs	40 (Science)
			53 (Arts)
Paper – III	Numerical Analysis and Optimization Techniques	3 hrs	40 (Science)
			54(Arts)
Practicals		2 hrs	30 (Science)
			40 (Arts)

Note :-

01. Syllabus of each of the three papers is divided into FIVE units .

02. Each paper is divided into THREE sections A, B, & C.

03. **Section-A :** TEN short answer type questions will be set taking two questions from each unit. Each question will carry 1 mark for Science and 1.5 mark for Arts. All questions will be compulsory .

04. **Section-B :** TEN questions will be set taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt ONE question from each unit.

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05. **Section-C :** FIVE questions will be set taking one questions from each unit. Each question will carry 5 marks for Science in all three papers and 6 marks for Arts in paper I & II and 6.33marks in paper III. Student has to attempt ANY THREE Questions.

06. Common paper will set for Faculty of Science and Faculty of Social Science . Each candidate is required to appear in the practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the principal in consultation with the head, department of Mathematics in the college.

08. An internal/external examiner can conduct practical examination of not more than 100 (one hundred) candidates(20 candidates in each batch).

09. Each candidate has to pass in theory and practical examinations separately.

Paper – I Real Analysis

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks 40 (Science)**

53 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory .**Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions .

Unit – I : The set of real numbers as a complete ordered field, Incompleteness of Q, Archimedean and dense properties of R, Absolute value of real numbers, Intervals, Limit point of a set, Bolzano-Weierstrass theorem, open and closed sets, Compact sets, Heine Borel Theorem, Connected sets, Equivalent sets, Finite and infinite sets, Denumerable sets, Countable and uncountable sets.

Unit – II : Real sequences, Bounded and unbounded sequences, Monotonic sequence, Limit point and limit of a sequence, Convergence of sequences, Necessary and sufficient condition for convergence, Sub sequence, Cauchy sequence, Cauchy's general principal of convergence. Continuity of a function, Cauchy's and Heine's definition of continuity, Types of discontinuity, Properties of continuous functions on closed intervals, Uniform Continuity.

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Unit – III: Differentiability- Darboux theorem, Rolle's theorem, Algebraic and geometric interpretation of Rolle's theorem, Lagrange's and Cauchy's mean value theorems, Taylor's theorem with various forms of remainders. Limits and Continuity for the functions of two variables. Improper Integrals and their convergence, Comparison test, μ-test, Abel's test and Dirichlet's test.

Unit – IV: Reimann Integration – partition of an interval, Darboux sums, Lower and Upper Reimann Integrals, Definition of Reimann Integration, Integrability of continuous, discontinuous and monotonic functions, Fundamental theorem of integral calculus, Mean value theorems, Reimann Steiltze's integrals. Differentiation and Integration under the sign of Integration.

Unit – V : Uniform convergence of sequence and series of functions, Cauchy's criterion for uniform convergence, M_n- test, Weierstrass M-test, Abel and Dirichlet's tests, Uniform convergence and continuity, Term by term integration, and term by term differentiation. Fourier Series – Periodic functions, Dirichlet's conditions, Fourie series in the interval $(\alpha, \alpha+2\pi)$ and particular cases in the interval $(0, 2\pi)$, $(-\pi, \pi)$, Half range Fourier series.

Paper – II Differential Equation

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks 40 (Science)**

53 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory .**Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions .

Unit – I : Order and degree of differential equations, Differential equations of first and first degree. Method of separation of variables, Homogeneous differential equation, and equations reducible to homogeneous forms, Linear differential equation and equations reducible to linear forms. Exact differential equation and equations which can be made exact. Differential equations of first order but not of first degree- Differential equations solvable for x, y and p.

Unit – II : Clairaut's form and Singular Solutions with extraneous locii. Linear differential equations with constant coefficients, Complimentary functions and Particular integrals.

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Unit – III : Homogeneous linear differential equations, Differential equations reducible to homogeneous linear differential equations. Simultaneous differential equations, Differential equations of the form dx/P =dy/Q =dz/R: geometric interpretation and method of solution. Exact differential equations of nth order, Existence and uniqueness theorem.

Unit – IV : Linear differential equations of second order- Solution by finding a part of complimentary function, Solution by transformation into Normal form and by changing the independent variable, Factorisation of operators, Method of variation of parameters, Method of undetermined coefficient.

Unit – V : Partial differential equation of first order and first degree, Langrange's linear equations. Non-Linear partial differential equations of order one: Standard form I, II, III, and IV, Charpit's method. Linear partial differential equations with constant coefficient, Homogeneous and Non-homogeneous linear partial differential equations.

Paper – III Numerical Analysis and Optimization Techniques

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks 40 (Science)**

54 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory .**Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6.33 marks for Arts. Student has to attempt ANY THREE questions .

Unit – I : Calculus of Finite Differences- Introduction, Difference Operators, Differences of Polynomials, Factorial notation, Relation between difference and derivative, Separation of symbols. Newton-Gregory's formulae for Forward and Backward interpolation with equal intervals, Newton's divided difference interpolation formula, Lagrange's interpolation formula.

Unit – II : Central differences- Gauss's central difference interpolation formulae, Stirling and Bessel's interpolation formulae. Numerical differentiation. Numerical integration – General quadrature formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eight rule, Weddle rule, Newton-Cote's quadrature formula, Gauss's quadrature formula.

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Unit – III : Numerical solution of algebraic and transcendental equations - Graphical method, Iterative method, Regula-Falsi method, Newton-Raphson method and their convergences. Solution of system of linear equations – Guass's elimination method, Gauss-Jordan's elimination method, method of triangularisation of matrices, Relaxation method. Numerical solution of ordinary differential equations – Picard's successive approximation method, Euler's method and Euler's modified method.

Unit – IV : Linear programming problem - feasible solution, optimal solution, Basic solution, Degenerate and non-degenerate basic solution, Convex sets and their properties, Extreme point of a set, Theory of Simplex method, Optimality criterion, Simplex algorithm.

Unit – V : Duality in linear programming problem – Dual of l. p. p., properties of the dual, Fundamental theorem of l. p. p. , use of duality to solve l. p. p. . Transportation problem – Basic feasible solution and methods to find it, North-west corner rule, least-cost method, Vogel's approximation method, Optimality criterion, Travelling Salesman problem.

Practicals

Teaching : 2 Hours per Week

Examination Scheme: **Duration - 2 Hours**

	Science	Arts
Maximum Marks	**30**	**40**
Minimum Pass Marks	**11**	**14**

Distribution of Marks:

Two Exercises one from each group

10 marks each	=	20 marks	13 marks each	=	26 marks
Practical record	=	05 marks			07 marks
Viva-voce	=	05 marks			07 marks
Total Marks	=	**30 marks**			**40 marks**

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Group – A : Numerical solution of algebraic and transcendental equations using Bisection method, Secant method, Newton-Raphson method.

Jacobi's method and Gauss-Seidal method to solve system of linear equations.

Numerical solution of differential equations using Runge-Kutta methods .

Group – B : Modelling of industrial and engineering problem into linear programming problem , its dual and their solution by simplex method, Modelling of industrial and engineering problems into Assignment problem and their solutions.

Note :-1. Each candidate (Regular/Non-collegiate) has to prepare his/her record.

2. Students can use Non-programmable scientific calculators.

3. Student must know about all functions and operations of scientific calculator.

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SESSION-2022-23

Maharaja Surajmal Brij University

Bharatpur (Raj)

SYLLABUS

MATHEMATICS

B. A./B. Sc. Part III

(Annual Scheme)

(New)

Session 2019-20 SESSION-2022-23

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(Total number of pages-5)

SESSION-2022-23

B. A./B. Sc. Part III Examination – 2020 & onwards

Paper – I Modern Algebra

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks 40 (Science)**

53 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory .**Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions .

Unit 1: Definition and simple properties of Groups and Subgroups. Permutation group, Cyclic group. Cosets, Lagrange's theorem on the order of subgroups of a finite order group.

Unit 2: Morphism of groups, Cayley's theorem. Normal subgroups and Quotient groups. Fundamental theorems of Isomorphism.

Unit 3: Definition and simple properties of Rings and Subrings. Morphism of rings. Embedding of a ring, Integral domain and field. Characteristics of a Ring and Field.

Unit 4: Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields. Definition, Examples and Simple properties of Vector spaces and Subspaces.

Unit 5: Linear combination, Linear dependence and Linear independence of vectors. Basis and Dimension. Generation of subspaces. Sum of subspaces. Direct sum and Complement of subspaces. Quotient space and its dimension.

Only For Session 2020-21

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SESSION-2022-23

Paper – II Complex Analysis

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours **Max. Marks 40 (Science)**

53 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory .**Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6 marks for Arts. Student has to attempt ANY THREE questions .

Unit-I : Complex plane, curves and regions in complex plane, Jordan curve theorem, Extended complex plane, Steriographic Projection. Complex valued function- limit, continuity, differentiability, Analytic function, necessary and sufficient conditions for a function to be analytic, Harmonic functions, Construction of an analytic function, Milne-Thomson's method. Convergence of power series- absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, circle and radius of convergence of power series.

Unit-II : Conformal Mapping- necessary and sufficient conditions for $w = f(z)$ to represent a conformal mapping,. Bilinear transformation, Elementary mapping: $w = \frac{1}{2}(z + 1/z)$, $w = z^2$, $w = e^z$, $w = \sin z$, $w = \cos z$. Analytic continuation, Power series method of analytic continuation.

Unit-III : Complex Integration- complex line integral, Cauchy integral theorem, Indefinite integral, Fundamental theorem integral calculus for complex functions, Cauchy integral formula, Analyticity of derivative of an analytic function, Morera's theorem, Poisson integral formula, Lioville's theorem, Maximum Modulus Principal.

Unit-IV : Taylor's theorem, Laurent's theorem,. Singularity of an analytic fuction, Branch point, Reimann Theorem, Cassorati Weierstrass theorem, Entire and meromorphic functions, methods of detecting singularities, Zeros and poles of meromorphic functions, Argument principle, Rouche's theorem, Fundamental theorem of algebra.

Unit-V : Residue at singularity, Residue at infinity, Calculation of residues, Cauchy Residue theorem, Evaluation of real definite integrals by contour integration.

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भरतपुर (राज.)

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

SESSION-2022-23

Paper – III Mechanics

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours

Max. Marks 40 (Science)

54 (Arts)

Note: This paper is divided into THREE Sections A, B, & C. **Section-A** consists TEN short answer type questions. Each question is of 1 mark for Science and 1.5 mark for Arts. All questions are compulsory .**Section-B** consists TEN questions taking two questions from each unit. Each question will carry 3 marks for Science and 4 marks for Arts. Student has to attempt FIVE questions selecting ONE question from each unit. **Section-C** consists FIVE questions taking one questions from each unit. Each question will carry 5 marks for Science and 6.33 marks for Arts. Student has to attempt ANY THREE questions .

Unit-I : Kinematics and Kinetics: Radial and Transverse Components of Velocity and Acceleration, Angular velocity and acceleration, Tangential and Normal Components of Acceleration, Kinetics: Force and Motion. Rectilinear Motion: Simple Harmonic Motion, Hooke's law, Horizontal Elastic String,Vertical Elastic String, Repulsion from a fixed point, Motion under Inverse Square Law.

Unit-II : Motion in Resisting Medium- Resistance varies as velocity and square of velocity. Uniplanar Motion:. Projectile on an Horijontal Plane, Projection to pass through a given point, Projectile on an Inclined Plane. Constrained Motion: Motion on a smooth curve in a vertical plane, motion on inside and outside of a smooth circle.

Unit-III : Central Orbits: p-r equation, Apses, time in a orbit, Keplar's law of planetary motion. Moment of Inertia- M. I of rod, circular ring, circular disk, rectangular, elliptical and triangular lamina, solid and hollow spheres, solid ellipsoid, Product of Inertia, Theorem of Parallel Axis, Principal Axis, Equimomental Bodies.

Unit–IV : Equilibrium of a body under Coplanar Forces: Reduction of System of Coplanar Forces into a Force and a Couple, Equilibrium of body Under Three Forces and more than Three Forces. Friction: Force of Friction, Angle of Friction, Coefficient of Friction, Cone of Friction, Limiting Equilibrium on an Inclined Plane, Least Force Required to pull a Body up and down on an inclined rough plane.

Unit-V : Catenary: Equation of Common Catenary, Properties of Catenary, Sag of Tightly Stretched Wire. Virtual Work:: Principle of Virtual Work, Tension in a String, Thrust in a Rod, Problems involving Elastic String and Curves, Problems Related to a body or a Frame work resting on a Pags or on Inclined Plane.

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SESSION-2022-23

Practicals

Teaching : 2 Hours per Week

Examination Scheme: **Duration - 2 Hours**

	Science	Arts
Maximum Marks	**30**	**40**
Minimum Pass Marks	**11**	**14**

Distribution of Marks:

Two Exercises one from each group

10 marks each	=	20 marks	13 marks each	=	26 marks
Practical record	=	05 marks			07 marks
Viva-voce	=	05 marks			07 marks
Total Marks	=	**30 marks**			**40 marks**

Group – A : C-Language Preliminaries, Operators, Input-Output statements, Conditional statements, Implementing loops in C-programs, Array variables, some elementary programs, Matrix addition, subtraction, multiplication and to find inverse.

Group – B : Solution of some Numerical Analysis problems- Numerical Integration, Gauss elimination method to solve system of linear equations, Bisection method, Newton-Raphson method, Euler's method, Runge-Kutta's method using C-programming.

Note :-1. Each candidate (Regular/Non-collegiate) has to prepare his/her record.

2. Students have to practice in a computer lab.

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