MATHEMATICS

I/II/III PAPER

(Title of paper)

Time allowed: 3.00 hours

Max. Marks- 40/53

NOTE: Attempt any FIVE questions in all out of 11 questions without considering sections/units.

All questions carry equal marks...

Section - A

- Q. 1. Attempt eight sub parts:
 - (i)
 - (ii)
 - (iii)
 - (iv)
 - (v)
 - (vi)
 - (vii)
 - (viii)
 - (ix)
 - (x)

 $(1 \times 8 = 8 \text{ marks}))$

Section - B

UNIT-I

Q. 2 (a)

(b)

(4x2=8 marks)

Session 2021-22

अकार मिला प्रभारी आकार मिला बुल विश्वविद्यालय भरतपुर (राजः) Q. 3(a)

(b)

(4x2=8 marks)

UNIT-III

Q. 4 (a)

(b)

(4x2=8 marks)

UNIT-IV

Q.5(a)

(b)

(4x2=8 marks)

UNIT-V

Q. 6 (a)

(b)

(4x2=8 marks)

Section - C

Q. 7

Q. 8

8 mark

0.9

8 marks

Q.10

8 marks

8 marks

Q. 11

8 marks



Maharaja Surajmal Brij University Bharatpur (Raj)

SYLLABUS MATHEMATICS

B. A./B. Sc. Part I

(Annual Scheme)

Session 2021-22

As per decision taken in the Examination Planning and Management Committee of the university the syllabus has been reduced by 30% only for the session 2021-22.

Note: The old students enrolled in the university in B. Sc. Part I before the session 2017-18 will have to appear in Part I, II, III due papers exam 2022 with this new syllabi. There will be no paper of old scheme in B.Sc. Part I, II, III due papers exam 2022

Session 2021-22

(Total number of pages-6)

अकादिमक प्रभारी अकादिमक प्रभारी महाराजा सुरजमन बृज विश्वविद्यालय भन्तपर (राज.)

B. A./B. Sc. Part I Examination - 2022

MATHEMATICS

May Pass Marke

Teaching: 3 hours per week per theory paper

2 hours per week per batch for practical

Min Pass Marks

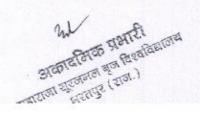
(20 candidates in each batch)

Examination Scheme:

	IVIIII.	1 das ividins	Wax, ras	S IVIAI KS	
	Science	54	15	0	
•	Arts	72	200		
			Duration	Max Marks	
Paper - I	Discrete Mathe	matics	3 hrs	40 (Science)	
				- 53 (Arts)	
Paper - l	II Advanced Calc	ulus	3 hrs	40 (Science)	
197				53 (Arts)	
Paper - 1	III Coordinate Ge	cometry	3 hrs	40 (Science)	
	and Vector Cal	culus		54(Arts)	
Practical			2 hrs	30 (Science)	
				40 (Arts)	

Note :-

- Syllabus of each of three papers is divided into FIVE units.
- Each paper is divided into THREE sections A, B & C.
- 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.
- 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
- 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 .



- 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.
- An internal/external examiner can conduct practical examination of not more than 100 (one hundred) candidates (20 candidates in each batch).
- Each candidate has to pass in theory and practical examinations separately.

Paper - I Discrete Mathematics

Teaching: 3 hrs per week

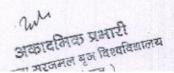
Duration of Examination: 3 hrs

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 TIAREE questions.

- Unit I: Algebraic Structures Binary operations, Definition and examples of groups, El: mentary properties of groups, Order of an element, Cyclic groups, properties of cyclic groups.
- Unit II: Graph theory Introduction, definition of graph, degree of vertex, Directed graphs, finite and infinite graphs, Regular graphs, Bipartite graphs, Sub graphs, Connected and Disconnected graphs, Euler circuit and Euler graphs, Weighted graphs, Shortest path problem.
- Unit III : Planner and non planner graphs, Euler's formula, Detection of planarity, Dual of planner graphs, Matrix representation of graphs. Trees, properties of trees, rooted tree, binary tree, Spanning tree.
- Unit IV: Boolean Algebra- Definition, duality, properties of Boolean algebra, Ordered relation in Boolean algebra, Lattices, Homomorphism, Boolean functions and expressions, Conjunctive an Disjunctive normal forms.
- Unit V: Generating functions Discrete numeric function, ordinary generating function, Convolution of sequences, Summation using convolution, counting techniques, Partition of integers, Exponential generating function. Recurrence Relation - First order relation, second order linear homogeneous relation, Third and higher order linear homogeneous relations, Linear non homogeneous relations of second and higher order, Solution of recurrence relations using generating functions.



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Paper - II Advanced Calculus

Teaching: 3 hrs per week

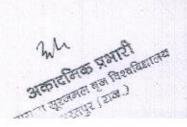
Duration of Examination: 3 hrs

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 nth root test, Raabe's test, De Morgan and Bertrand test, Cauchy's condensation test.
- Unit II: Pedal equation of Cartesian and polar curves. Derivatives of arcsCartesian and polar forms. <u>Curvature</u> Definition, radius of curvature for Cartesian, polar
 and parametric curves, curvature at the origin, centre of curvature, circle of curvature, chord
 of curvature. <u>Partial differentiation</u>, Euler's theorem on homogeneous functions, Total
 differentiation.
- Unit III: Envelopes Family of curves, Definition of envelope, Envelopes of Cartesian, polar and parametric curves. <u>Asymptotes</u> Definition, methods to find asymptotes of Cartesian and polar curves, Intersection of curve and its asymptotes. 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.
- Unit V: <u>Rectification-</u> Meaning, lengths of Cartesian and polar plane curves.
 <u>Quadrature</u> Areas bounded by plane curves (Cartesian and polar), Use of double integrals to find areas:



(page-5)

Paper - III Coordinate Geometry and Vector Calculus

Teaching: 3 hrs per week

Duration of Examination: 3 hrs

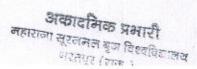
Max. Marks 40 (Science)

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 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: <u>Two Dimensional Coordinate Geometry</u> Conic sections, Parabola, Intersection with straight lines, Condition of tangency, Tangent and Normals, Pair of tangents, Chord of contact, Pole and Polar lines, diameter, Parametric coordinates.
- Unit—II: Three Dimensional Coordinate Geometry—Sphere, Plane sections of sphere, Intersection of a sphere with a line, Tangent plane, Plane of contact, Pole and Polar planes, Ornogonality of two spheres, Radical plane, Radical line and Radical centre of sphere. Cone—Definition and equation, Enveloping cone.
- Unit-III: Cylinder Definition and Equation of cylinder, Enveloping cylinder, Right circular cylinder. Central Conicoid Definition and standard equation, Tangent lines and tangent planes, Director sphere.
- Unit IV: Generating lines of conicoids- condition for a straight line to be a generator, system of generating lines, properties of generating lines of hyperboloid.
- Unit -V: <u>Vector Calculus</u> Differentiation and Integration of vector point function, Gradient of scalar point function, Divergence and Curl of vector point functions, Identities on gradient, curl, divergence.





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Practical.

Teaching: 2 hours per week

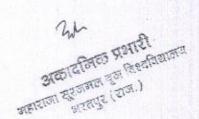
Prominet of				
Examination Scheme:			Du	ration - 2 hours
#I.		Science		Arts
Maximum Marks	72	30	3	40
Minimum Pass Marks		11		14
Distribution of Marks:				
Two Exercises one from each g	roup			
10 marks each	=	20 marks	13 marks each	= 26 marks
Practical record	=	05 marks		07 marks
Viva-voce	=	05 marks		07 marks
. Total Marks	=	30 marks		40 marks

Group – A: 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, seex.

Group - B:

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.





Maharaja Surajmal Brij University Bharatpur (Raj)

SYLLABUS MATHEMATICS

B. A./B. Sc. Part II

(Annual Scheme)

Session 2021-22

As per decision taken in the Examination Planning and Management Committee of the university the syllabus has been reduced by 30% only for the session 2021-22.

Note: The old students enrolled in the university in B. Sc. Part I before the session 2017-18 will have to appear in Part I, II, III due papers exam 2022 with this new syllabi. There will be no paper of old scheme in B.Sc. Part I, II, III due papers exam 2022

Session 2021-22

(Total number of pages - 06)

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अकादमिक प्रभारी महाराजा सुरजमल वृज विश्वविद्यालय भरताच (क्रांच)

B. A./B. Sc. Part II Examination-2022

MATHEMATICS

Teaching: 3 hours per week per theory paper

2 hours per week per batch for practical

(20 candidates in each batch)

Examination Scheme:

0 10 =	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)
$Paper-\Pi$	Differential Equations	3 hrs	40 (Science)
			53 (Arts)
${\tt Paper}-\Pi{\tt I}$	Numerical Analysis and	3 hrs	40 (Science)
4	Optimization Techniques		54(Arts)
Practicals		2 hrs	30 (Science)
*.			40 (Arts)

Note:-

- 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.



(page-03)

- 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)

(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
- 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. Continuity of a function, Cauchy's and Heine's definition of continuity, Types of discontinuity, Properties of continuous functions on closed. intervals.

- Unit III: <u>Differentiability</u>- Darboux theorem, Rolle's theorem, Algebraic and geometric interpretation of Rolle's theorem, Lagrange's and Cauchy's mean value theorems. 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.
- 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. Fourier Series Periodic functions, Dirichlet's conditions, Fourie series in the interval $(\alpha, \alpha+2\pi)$ and particular cases in the interval $(0, 2\pi)$, $(-\pi, \pi)$.

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, <u>Differential equations of first and first degree</u>, 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. <u>Differential equations of first order but not of first degree</u>- Differential equations solvable for x, y and p.
- Unit II: Linear differential equations with constant coefficients, Complimentary functions and Particular integrals.
- 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:.

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(W) अकादिनक प्रभारी महाराजा स्ट्रजमान यून विश्वविद्यालय भरतपुर (राज,)

- 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.
- Unit V: Partial differential equation of first order and first degree, Langrange's linear equations. Non-Linear partial differential equations of order one: Charpit's method. Linear partial differential equations with constant coefficient.

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. Students can use Non-programmable Scientific Calculator.

- Unit I: <u>Calculus of Finite Differences</u>- 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.
- Unit II: <u>Central differences</u>- Gauss's central difference interpolation formulae, Stirling and Bessel's interpolation formulae. <u>Numerical integration</u> General quadrature formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eight rule.
- 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.

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Unit - IV: <u>Linear programming problem</u> - feasible solution, optimal solution, Basic solution, Degenerate and non-degenerate basic solution, Convex sets and their properties. Optimality criterion, Simplex algorithm.

Unit - V: <u>Duality in linear programming problem</u> - Dual of l. p. p., use of duality to solve l. p. p. . <u>Transportation problem</u> - Basic feasible solution and methods to find it, Northwest corner rule, least-cost method, Vogel's approximation method, Optimality criterion,.

Practicals

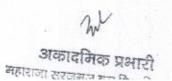
Teaching: 2 Hours per Week

Exam	ination Scheme:			Dur	ation - 2 Hours
			Science		Arts
Maxi	imum Marks		30		40
Minin	num Pass Marks		11		14
Distril	bution of Marks:				
Two E	xercises 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: 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.

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





Maharaja Surajmal Brij University Bharatpur (Raj)

SYLLABUS MATHEMATICS

B. A./B. Sc. Part III

(Annual Scheme)

Session 2021-22

As per decision taken in the Examination Planning and Management Committee of the university the syllabus has been reduced by 30% only for the session 2021-22.

Note:- The old students enrolled in the university in B. Sc. Part I before the session 2017-18 will have to appear in Part I, II, III due papers exam 2022 with this new syllabi. There will be no paper of old scheme in B.Sc. Part I, II, III due papers exam 2022

(Total number of pages-6)

अकादिभक प्रभारी

B. A./B. Sc. Part III Examination-2022 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 Ma	arks	Max. Pass Marks
	Science	54		150
	Arts	72		200
			Duration	Max Marks
Paper – I	Modern Alg	ebra	3 hrs	40 (Science)
t.				53 (Arts)
	Complex Ar	nalysis	3 hrs	40 (Science)
				53 (Arts)
Paper – III	Mechanics		3 hrs	40 (Science)
				54(Arts)
Practicals		3	2 hrs	30 (Science)
				40 (Arts)

Note :-

- 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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- 06. 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 Ouestions.
- 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 Modern Algebra

Teaching: 3 Hours per Week

Duration of Examination: 3 Hours

Max. Marks 40 (Science)

(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: Subgroups Complex of a group, subgroup, criterion for a complex to be a subgroup, algebra of complexes, union and intersection of subgroups, cosets of a group, algebra of cosets.
- Unit II: Group homomorphism, Isomorphism and Isomorphic groups, properties of homomorphism, Cayley's theorem. Normal subgroups, Simple groups, Properties of normal subgroups.
- Unit III: Ring, Integral domain and Fields- Definition and their properties, Characteristics of Ring, Integral domain and Field. Subring, Subfield, Prime field and their properties.

Session 2021-22

महाराजा सुरजनल बुज विश्टविद्यालय

- Unit IV: Vector Space Definition and examples of vector/linear space, Elementary properties of vector space, Linear combination of vectors, Linear span, Linear dependence and independence of vectors, Basis dimensions.
- Unit-V: Linear transformation or homomorphism, Linear operator, Isomorphism, theorems on isomorphism, Quotient space and its dimensions, Rank and Nullity of linear transformation, Sylvester's law, Characteristic polynomials, Eigen values and Eigen vectors, Cayley-Hamilton's theorem.

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. 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.
- Unit-II: Conformal Mapping- necessary and sufficient conditions for w = f(z) to represent a conformal mapping, Bilinear transformation, 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.
- Unit-IV: 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
- Unit-V: Residue at singularity, Calculation of residues, Cauchy Residue theorem, Evaluation of real definite integrals by contour integration.

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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,
- Unit-II: Motion in Resisting Medium- Resistance varies as velocity and square of velocity. Constrained Motion: Motion on a smooth curve in a vertical plane, motion on inside and outside of a smooth circle.
- Unit-III: 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: Equilibrium of body Under Three Forces. Friction: Force of Friction, Angle of Friction, Coefficient of Friction, Cone of Friction, Limiting Equilibrium on an Inclined Plane.
- Unit-V: <u>Catenary</u>: Equation of Common Catenary, Properties of Catenary <u>Virtual Work</u>:: Principle of Virtual Work, Tension in a Strng, Thrust in a Rod, Problems involving Elastic String and Curves.

Session 2021-22

अकादनिक प्रभारी अकादनिक प्रभारी महाराजा सूरणमल बृल विश्वविद्यालय भरतपुर (राज.) (Page - 6)

Practicals

Teaching: 2 Hours per Week

Examina	ation Scheme:	100		Du	ration - 2 Hours
	ats		Science		Arts
Maxim	um Marks		30		40
Miaimu	m Pass Marks		11		14
Distribu	tion of Marks:				
Two Exe	rcises 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.

Group - B: Solution of some Numerical Analysis problems- Numerical Integration, Gauss elimination method to solve system of linear equations, Bisection method, Newton-Raphson method.

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

2. Students have to practice in a computer lab.

Session 2021-22

अकादिनक प्रभारी अकादिनक प्रभारी भाराताना स्टलगल वृज विश्वविद्यालय भाराताना स्टलगल वृज विश्वविद्यालय