MAHARAJA SURAJMAL BRIJ UNIVERSITY

BHARATPUR (RAJ)

SYLLABUS

MATHEMATICS

B.A/B.Sc. Part I II&III

(Annual System)

(New)

Session 2020-21& Onwards

Only For Session
2020-21

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

Helpstudentpoint.com

B. A./B. Sc. Part I Examination - 2020-21 onwards

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 ar d 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 q estion 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 .

Only For Session 2020-21

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

Helpstudentpoint.com

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 : Algebraic Structures – Binary operations, Definition and examples of groups, Elementary 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,

Helpstudentpoint.com

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 : Algebraic Structures – Binary operations, Definition and examples of groups, Elementary 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, 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

Matrix representation of graphs: Trees, properties of trees, rooted tree, binary tree,

Only For Session 2020-21

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

Helpstudentpoint.com

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.

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 Scien. e 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.

Unit – II : 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.

Only For Session
2020-21

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

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.

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 : 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.

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 : Two Dimensional Coordinate Geometry – 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.

Only For Session
2020-21

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

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, Orthogonality 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: Vector Calculus – Differentiation and Integration of vector point function, Gradient of scalar point function, Divergence and Curl of vector point functions, Identities on gradient, curl, divergence.

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**

Only For Session 2020-21

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

Helpstudentpoint.com

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 $a>1$), $\sin x$, $\cos x$, $\tan x$, $\cot x$, $\operatorname{cosec} x$, $\sec x$.

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

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

Only For Session
2020-21

अकादमिक प्रभारी
महाराजा सूरजमल बृज विश्वविद्यालय
भरतपुर (राज.)

Helpstudentpoint.com