



**MAHARAJA SURAJMAL BRIJ UNIVERSITY
BHARATPUR (RAJASTHAN)
SYLLABUS**

(Three/Four Year Under Graduate Programme)

Faculty of Science

(Maths Group)

I & II Semester

Examination 2023-24

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डॉ. अरुण कुमार पाण्डेय
उपकुलसचिव
प्रभासी अकादमिक प्रथम

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Name of University	MAHARAJA SURAJMAL BRIJ UNIVERSITY BHARATPUR (RAJASTHAN)
Name of Faculty	Science
Name of Programme	Three/Four Year Under Graduate Programme in Science (Maths Group)
Name of Discipline	Mathematics

PROGRAMME PREREQUISITES

Mathematics course of XIIth std. of Central Board of Secondary Education, Rajasthan board of secondary education or equivalent.

PROGRAMME OUTCOME

The program would enable student to take on advanced course in Mathematics with global needs and to serve as a formidable skill-force in research, academia, industry, government, and other sectors where mathematics is reckoned as a strong devising and design tool with diverse interdisciplinary applications.

Scheme of Examination-

1 credit = 25 marks for examinations/evaluation.

Each course in Semester Grade Point Average (SGPA) has two components-

(1) Practical (20% weightage)

(2) End of the Semester Examination (EoSE) (80% weightage)

1. Practical – Each candidate is required to appear in the practical examination to be conducted by internal and external examiners. External examiner will be appointed by university and internal examiner will be appointed by the principal consultation with Head, department of Mathematics in the college. An internal/External examiner can conduct practical examination of not more than 100 candidate (20 candidate in each batch).
2. Each Paper of EoSE shall carry 80% of the total marks of the course/subject. The EoSE will be of 3 hours duration. Each question will carry equal marks and have two parts as –
 - Part-A of the question paper shall consist first question with 08 short answer type questions of 3 marks each, two from each of the units. The first question shall be based on knowledge, understanding and applications of the topics/texts covered in the syllabus.
 - The Part-B of the question paper shall consist four questions of 24 marks each, one from each unit. Each Question will have four parts. A Candidate is required to attempt all four units by taking any two parts from each question.
3. 75% Attendance is mandatory for appearing in EOSE.
4. To appear in the EoSE examination of a course/subject student must appear in the Practical examination and obtain at least a "C" grade in the course/subject.
5. Credit points in a course/Subject will be assign only if, the student obtains at least a C grade in Practical and EoSE examination of the course/subject.

Exit and Entrance Policy: -

1. Students who opt to exit after completion of the first year and have secured 48 credits will be awarded a UG Certificate if, in addition, they complete one internship of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.
2. Students who opt to exit after completion of the second year and have secured 96 credits will be awarded the UG diploma if, in addition, they complete one internship of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.

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3. Students who wish to undergo a 3-year UG programme will be awarded UG Degree in the Major discipline after successful completion of three years, securing 150 credits and satisfying the minimum credit requirement.
4. A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree programme with 200 credits and have satisfied the minimum credit requirements.
5. Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a faculty member of the University/College. The research project/dissertation will be in the major discipline. The students who secure 200 credits, including 12 credits from a research project/dissertation, are awarded UG Degree (Honours with Research).


Letter Grades and Grade Points-

Letter Grade	Grade Point	Marks Range (%)
O(Outstanding)	10	91-100
A+ (Excellent)	9	81-90
A (Very Good)	8	71-80
B+ (Good)	7	61-70
B (Above Average)	6	51-60
C (Average)	5	40-50
P (Pass)	4	
F (Fail)	0	
Ab (Absent)	0	

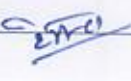
Syllabus - Three/Four Year Under Graduate Programme in Science (Maths Group) I-Semester (Mathematics) (2023-2024 & onwards)

Type	Paper Code and Nomenclature	Duration of examination	Maximum Marks (Practical+ EoSE)	Minimum Passing Marks (Practical+ EoSE)
Practical & Theory	Discrete mathematics and Differential calculus	2 Hrs- Practical 3Hrs- EoSE	30 Marks- Practical 120 Marks- EoSE	12 Marks- Practical 48 Marks- EoSE

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credit
I	MAT-101	Discrete mathematics and Differential calculus	5	6
Level of Course	Type of the Course	Delivery Type of the Course		
Introductory	UG	Lecture and laboratory, ninety lecture		
Prerequisites	Mathematics course of XIIth std. of Central Board of Secondary Education, Rajasthan board of secondary education or equivalent.			
Objectives of the courses	The objective of the course is to expose discrete structures and involved topology, learn the basic problems of calculus			


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next



Syllabus

Paper Code - MAT101

Paper - Discrete mathematics and Differential calculus

Teaching: 6 hrs per week

Duration of Examination: 3 hrs

Maximum Marks (Practical + EoSE) : 30 Marks- Practical and 120 Marks – EoSE

Minimum Marks (Practical + EoSE) : 12 Marks- Practical and 48 Marks – EoSE

The Question paper will be divided into two parts, Part-A and Part-B

Part-A: Part-A contains one compulsory question consisting of 8 short answer type questions, each carrying 3 Marks. These 8 short questions are selected from all the units, with two questions from each unit. The Part-A of the question paper evaluate the candidate's knowledge, understanding, and application of the topics/texts covered in the syllabus.

Part-B: Part-B comprise four questions with one question from each unit, each carrying 24 marks. Each question in Part-B has four subparts. The candidate must attempt all four units by selecting any two subparts from each question. Each subpart within a question carries equal marks.

Note- The question Paper will be set in both Hindi and English.

Unit-I: Boolean Algebra- Definition, duality, properties of Boolean algebra, ordered relation in Boolean algebra, Lattices, Boolean functions and expressions, Conjunctive and Disjunctive normal forms. Generating functions- Discrete numeric function, ordinary generating function, Convolution of sequences, Summation using convolution, counting techniques, Recurrence Relation - First order relation, second order linear homogeneous relation, Third and higher order linear homogeneous relations, Linear non homogenous relations of second and higher order, Solution of recurrence relations using generating functions. Logic and propositional calculus - propositions, basic logical operations, truth tables, tautologies, and contradictions.

Unit-II: Graph Theory- Introduction, definition of graph, degree of vertex, directed graphs, regular graphs, Bipartite Graph, Operations on graphs, Isomorphism, Connected and Disconnected graphs, Euler circuit and Euler graphs. Hamiltonian cycles and Hamiltonian graphs, Weighted graphs, shortest path problems, Dijkstra algorithm. 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, spanning tree in weighted graphs.

Unit-III: 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. Polar Coordinates - Angles between radius-vector and tangent, length of perpendicular from pole to the tangent, Pedal equation of Cartesian and polar curves. Derivatives of arcs cartesian and polar forms, Curvature - Definition, radius of curvature for cartesian, polar and parametric, centre of curvature, circles of curvature, chord of curvature. Partial differentiation - Euler's theorem on Homogeneous functions. Total differentiation. Jacobian - definition and it's properties. Jacobian of implicit functions.

Unit-IV: Envelope Family of curves. Definition of envelope. Envelope in cartesian, polar. and parametric curves. Asymptotes - Definition, method to find asymptotes of Cartesian and polar curves, Intersection of curves and its asymptotes. Maxima and minima of functions of two variables - Lagrange's condition for two independent variables. Curve Tracing - Singular points, double points, Tracing of Cartesian and polar curves.

Practical

Teaching: 2 hrs per week

Examination Scheme --

Duration- 2 hours

Science


Arts

Maximum Marks	30	40
Minimum Pass Marks	12	16
Distribution of Marks:		
Two Exercise 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: Exercises on Basic concepts of graph. Shortest path in Weighted Graph. Generating tree in Weighted Tree.

Group-B: Tracing of cartesian and polar two-dimensional curves.

Each candidate (regular/non-collegiate) must prepare his/her record


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**Syllabus - Three/Four Year Under Graduate Programme in Science
(Maths Group)
II-Semester (Mathematics)
(2023-2024 & onwards)**

Type	Paper Code and Nomenclature	Duration of examination	Maximum Marks (Practical+ EoSE)	Minimum Passing Marks (Practical+ EoSE)
Practical & Theory	Integral Calculus, Geometry and Vector Calculus	2 Hrs- Practical 3Hrs-EoSE	30 Marks- Practical 120 Marks- EoSE	12 Marks- Practical 48 Marks- EoSE

Semester	Code of the course	Title of the course/paper	NHEQF Level	Credit
II	MAT-102	Integral Calculus, Geometry and Vector Calculus	5	6
Level of Course	Type of the Course	Delivery Type of the Course		
Introductory	UG	Lecture and laboratory, ninety lecture		
Prerequisites	Mathematics course of XIIth std. of Central Board of Secondary Education, Rajasthan board of secondary education or equivalent.			
Objectives of the courses	The objective of the course is to provide comprehensive understanding of fundamental concept and practical approach of Integra calculus, geometry, and vector calculus.			


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Syllabus

Paper Code – MAT 102

Paper- Integral Calculus, Geometry and Vector calculus

Teaching: 6 hrs per week

Duration of Examination: 3 hrs

Maximum Marks (Practical + EoSE) : 30 Marks- Practical and 120 Marks – EoSE

Minimum Marks (Practical + EoSE) : 12 Marks- Practical and 48 Marks – EoSE

The Question paper will be divided into two parts, Part-A and Part-B

Part-A: Part-A contains one compulsory question consisting of 8 short answer type questions, each carrying 3 Marks. These 8 short questions are selected from all the units, with two questions from each unit. The Part-A of the question paper evaluate the candidate's knowledge, understanding, and application of the topics/texts covered in the syllabus.

Part-B: Part-B comprise four questions with one question from each unit, each carrying 24 marks. Each question in Part-B has four subparts. The candidate must attempt all four units by selecting any two subparts from each question. Each subpart within a question carries equal marks.


Note- The question Paper will be set in both Hindi and English.

Unit-I: Gamma and Beta functions - Definitions, Transformations of gamma functions. Relation between Beta and Gamma function, Euler's functional equation, Double multiple formula. Double integral- Evaluation of double integrals, change of order of integration. Triple integral - Evaluation of triple integrals, Dirichlet's formula for triple integrals.

Unit-II: Rectification - Meaning, lengths of Cartesian and Polar curves. Quadrature - Areas bounded by plane curves (Cartesian and polar), Use of double integrals to find areas. Volume and Surface of Solid of revolution - Pappus theorem, Use of triple integral to find volumes.

Unit-III: Sphere - Sphere, Plane section 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, Representation of cone by second degree, Tangent plane, Reciprocal cone. Right circular cone. 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: Vector Calculus - Differentiation and Integration of vector point function, Gradient of scalar point function, Directional derivatives, vector equation of Tangent plane and Normal, vector equation of Tangent line and Normal Plane, Divergence and Curl of vector point function, Identities on gradient, curl, divergence. Gauss's theorem, Stoke's theorem and Green's Theorem (proof is not required) and their applications.


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EX-11

Practical

Teaching: 2 hrs per week

Examination Scheme --

Duration- 2 hours

Science

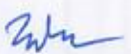
Arts

Maximum Marks	30	40
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Distribution of Marks:		
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	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: Exercises on Rectification, Quadrature and Volume and Surface of revolution.

Group-B: Exercises on Gauss's theorem, Stoke's theorem and Green's Theorem.

Each candidate (regular/non-collegiate) must prepare his/her record


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 7/5/21
 2021