

Sardar Patel University

Mandi, 175001 (H. P.)



Syllabus and Scheme of Examination

For

Three Year B. A./ B. Sc. with major in Mathematics
**And B. A./ B. Sc. (Hons. / Hons with research) with major/
minor in Mathematics**

under the

National Education Policy 2020

w.e.f.

Academic Session 2026-27 onwards

Vivek
VIVEK KAPOOR
chairperson.

Rakesh
Rakesh Kapoor
(member)

Semester wise Scheme

Semester-I

Semester-I													
S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BMATH-DSC-101 T		DSC	4	0	0	4	4	30	70	-	-	100
3	BPHYS-DSC-101T		DSC	3	0	0	3	3	25	50	-	-	75
4	BPHYS-DSC-101P		DSC	0	0	1	1	2	-	-	5	20	25
5	BCHEM-DSC-101T		DSC	3	0	0	3	3	25	50	-	-	75
6	BCHEM-DSC-101P		DSC	0	0	1	1	2	-	-	5	20	25
7	BCOMP-DSC-101T		DSC	3	0	0	3	3	25	50	-	-	75
8	BCOMP-DSC-101P		DSC	0	0	1	1	2	-	-	5	20	25
9	BXXXARTS DSC-101		DSC	4	0	0	0	4	30	70	-	-	100
9	BXXXX*- MDC-101*		MDC	3	0	0	3	3	25	50	-	-	75
10	BMATH- SEC-101		SEC	3	0	0	3	3	25	50	-	-	75
11	BXXX- AEC-101		AEC	2	0	0	2	2	15	35	-	-	50
Total							20	23					
Cumulative Credits							20						

Abbreviations: L-Lecture, T-Tutorial, P-Practical, C-Credits, CH-Contact Hours, IA-Internal Assessment, ESE- End Semester Examination

Note:XXXX*- Short form of the department whose MDC is offered in the curriculum

- CANDIDATE HAVE TO SELECT THREE DSC COURSES IN THREE DIFFERENT SUBJECTS IN ALL AND ONE MDC, ONE SEC AND ONE AEC OF CREDITS ($4+4+4+3+3+2=20$)

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Semester-II

S. No.	Course Code	Course Title	Category	L	T	P	C	CH	Theory Assessment		Practical Assessment		Total
									IA	ESE	IA	ESE	
1	BMATH-DSC-201 T		DSC	4	0	0	4	4	30	70	-	-	100
3	BPHYS-DSC-201T		DSC	3	0	0	3	3	25	50	-	-	75
4	BPHYS-DSC-201P		DSC	0	0	1	1	2	-	-	5	20	25
5	BCHEM-DSC-201T		DSC	3	0	0	3	3	25	50	-	-	75
6	BCHEM-DSC-201P		DSC	0	0	1	1	2	-	-	5	20	25
7	BCOMP-DSC-201T		DSC	3	0	0	3	3	25	50	-	-	75
8	BCOMP-DSC-201P		DSC	0	0	1	1	2	-	-	5	20	25
9	BXXXARTS DSC-201		DSC	4	0	0	0	4	30	70	-	-	100
9	BXXXX*-MDC-201*		MDC	3	0	0	3	3	25	50	-	-	75
10	BMATH-SEC-201		SEC	3	0	0	3	3	25	50	-	-	75
10	BMATH-INP-201		INP	4	-	-	4	12	100	-	-	-	100
Total							24	35					
Cumulative Credits							44						

Note:

- Exit option with UG Certificate after securing 44 credits(*with 4 credits of I/A/P/C/ or work-based vocational course offered during winter/summer term), along with entry option to second year or third semester
- Any other

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SARDAR PATEL UNIVERSITY
B.Sc. First Year Syllabus and Examination Scheme
First Semester

Course Code	BMATH-DSC-101
Credits	4
Name of the Course	Differential Calculus
Type of the Course	Discipline Specific Course (DSC A1)
Number of hours required for this course	60 hrs.
Attendance-05 Marks Class Test- 15 Marks Assignments & Presentations-10 Marks	Max. Marks:30
Semester Term End Examination	Max Marks: 70 Maximum Time: 3 hrs.
Lectures to be Delivered (One Hour Each)	60

Instructions

- Instructions for paper setter:** The question paper will consist of five parts A, B, C, D and E of 70 marks and the examiner shall set 9 questions in all. Two questions will be set from each section I, II, III and IV of the syllabus and each question will carry 14 marks. Section E will be compulsory and have 10 short answer type questions from all the sections (I, II, III, IV) of the syllabus.
- Instructions for Candidates:** Candidates are required to attempt five questions in all. Section E is compulsory in which students should attempt 7 questions in total and they are required to attempt one question from each Section A, B, C and D in the question paper.

DSC A1: Differential Calculus

Course Objectives: After thorough learning of the course, students will be able to

- Understand the basic tools of calculus.
- Attain a basic level of competency in developing their mathematical skill.
- Handle business and economic problems with derivatives.
- Differentiate any function using standard derivatives and rules of differentiation.

Course Learning Outcomes: By the end of the course, students will be able to

- Compute and analyze functions using limits, derivatives, and continuity.
- Understand the method of successive differentiation and Taylor series expansions.
- Develop the concepts of asymptotes, curvature and singular points.
- Apply the concepts of calculus for tracing and rectification of the curves.

Section I (15 hrs.)

Basic properties of Limit and Continuity (epsilon and delta definition), Indeterminate forms (L'Hospital Rule), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem and its applications.

Section II (15 hrs.)

Rolle's theorem, Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series. Maclaurin's series of $\sin x$, $\cos x$, e^x , $\log(1+x)$, $(1+x)^m$

Section III (15 hrs.)

Concavity, Convexity & Points of Inflexion, Singular and Double points of curves, Curvature, Polar Coordinates and its relation with Cartesian coordinates.

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Section IV (15 hrs.)

Functions of two variables, Limit and Continuity of function of two variables, Partial differentiation, Euler's theorem for homogeneous functions.

Recommended Books:

1. H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, *Calculus*, Pearson Education, 2007.

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SARDAR PATEL UNIVERSITY
B.Sc. First Year Syllabus and Examination Scheme
Second Semester

Course Code	BMATH-DSC-201
Credits	4
Name of the Course	Ordinary Differential Equations
Type of the Course	Discipline Specific Course (DSC A2)
Number of hours required for this course	60 hrs.
Attendance-05 Marks Class Test- 15 Marks Assignments & Presentations-10 Marks	Max. Marks:30
Semester Term End Examination	Max Marks: 70 Maximum Time: 3 hrs.
Lectures to be Delivered (One Hour Each)	60

Instructions

- Instructions for paper setter:** The question paper will consist of five parts A, B, C, D and E of 70 marks and the examiner shall set 9 questions in all. Two questions will be set from each section I, II, III and IV of the syllabus and each question will carry 14 marks. Section E will be compulsory and have 10 short answer type questions from all the sections (I, II, III, IV) of the syllabus.
- Instructions for Candidates:** Candidates are required to attempt five questions in all. Section E is Compulsory in which students should attempt 7 questions in total and they are required to attempt one question from each Section A, B, C and D in the question paper.

DSC A2: Ordinary Differential Equations

Course Objectives: The main objectives of the course are

- To understand the basic concepts of differential equations and its solutions.
- To acquire the knowledge of linear differential equations (Leibnitz's and Bernoulli's equations), their solutions, exact differential equations and standard rules for finding their integrating factors.
- To gain knowledge of Clairaut's equation as well as the linear homogenous and non-homogenous differential equations with constant coefficients and their solutions.
- To acquire the knowledge of linear differential equations and their variable coefficients (Cauchy- Euler and Legendre's form).
- To understand simultaneous linear differential equations with constant coefficients and total differential equations with their solutions.

Course Learning Outcomes After the completion of course, the students will be able to

- Describe basic concepts of differential equations and its solutions.
- Solve linear differential equations (Leibnitz's and Bernoulli's equations) as well as exact differential equations and standard rule for finding their integrating factors.
- Understand and solve Clairaut's equation and its solution as well as the linear homogenous and non-homogenous differential equations with constant coefficients.
- Attain and solve various linear differential equations with variable coefficients (Cauchy- Euler and Legendre's form).
- Understand simultaneous linear differential equations with constant coefficients along with total differential equations and their solutions.

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Section-I (15 hrs.)

Differential equations (Definition, formulation and solutions), Differential equations of first order and first degree, Homogeneous differential equations and equations reducible to homogeneous form and their solutions, Linear differential equation (Leibnitz's) and their solutions.

Section-II (15 hrs.)

Exact differential equations and standard rule for finding their integrating factors, Differential equations of first order and higher degree solvable for x , y , p , Clairaut's equation and its solution, Linear homogenous and non-homogenous differential equations with constant coefficients and their solutions.

Section-III (15 hrs.)

The linear differential equations and its variable coefficients (Cauchy- Euler and Legendre's form) and their solutions, Linear differential equations of second order and its solution by the method of variation of parameters.

Section-IV (15 hrs.)

Simultaneous linear differential equations with constant coefficients and their solutions, Total differential equations and its solutions.

Recommended Books:

1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Ed., John Wiley and sons. New York, 2015.

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SARDAR PATEL UNIVERSITY
B.Sc. First Year Syllabus and Examination Scheme
First Semester

Course Code	BMATH-MDC-101
Credit	3
Name of the Course	Mathematics for Competitive Examinations
Type of the Course	Multidisciplinary Course (MDC 1)
Number of hours required for this course	45 hrs.
Attendance-05 Marks Class Test-10 Marks Assignments & Presentations-10 Marks	Max. Marks:25
Semester Term End Examination	Max Marks: 50 Maximum Time: 2 hrs.
Lectures to be Delivered (One Hour Each)	45

Instructions

- 1. Instructions for paper setter:** The question paper will consist of four parts A, B, C and D of 50 marks and the examiner shall set 7 questions in all. Two questions will be set from each section I, II, and III of the syllabus and each question will carry 12 marks. Section D will be compulsory and will have 10 short answer type questions from all the sections (I, II, III) of the syllabus each of two marks.
- 2. Instructions for Candidates:** Candidates are required to attempt four questions in all. Section D is Compulsory in which students should attempt 7 questions in total whereas they are required to attempt one question from each Section A, B and C in the question paper.

MDC 1: Mathematics for Competitive Examinations

Course Objectives: After thorough learning of the course, students will be able to

- Have an idea of concepts of mathematics with emphasis on analytical ability and computational skill required in competitive examinations.
- Understand various language structures.
- Develop the understanding of various principles involved in solving mathematical problems thereby reducing the time taken for performing job functions.

Course Learning Outcomes: By the end of the course, students will be able to

- Learn the basic concepts of Mathematics needed for most competitive exams and can solve the mathematics part of competitive examinations easily.
- Communicate quantitative and logical reasoning in multiple forms.
- Learning the problem-solving skills.
- Develop a problem-solving attitude.

Section I (15 hrs)

Numbers, averages, square root, cube root, LCM and HCF, Ratio and proportions.

Section II (15 hrs)

Percentages - Profit and loss. Problems of ages.

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Section III (15 hrs)

Time and work – Time and distance, Simple interest - Compound interest.

Recommended Books:

1. R.S. Agarwal, Content and treatment as in the book Quantitative Aptitude, S. Chand & Co, New Delhi, 2015, (Chapter 1: §§ 3 to 29, Chapter 2: §§ 30 to 45, Chapter 5: §§ 117 to 138, Chapter 6: §§ 139 to 160, Chapter 8: §§ 182 to 194, Chapter 12: §§ 294 to 310, Chapter 10: §§ 208 to 250, Chapter 11: §§ 251 to 293, Chapter 15: §§ 341 to 370, Chapter 17: §§ 384 to 404, Chapter 21: §§ 445 to 465, Chapter 22: §§ 466 to 486).
2. Rajesh Verma, Fast track objective Arithmetic, Arihant publications (India) ltd. (Chapter 1,3,5,10,11,12,14,15,17,21,22,25).

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SARDAR PATEL UNIVERSITY
B.Sc. First Year Syllabus and Examination Scheme
Second Semester

Course Code	BMATH-MDC-201
Credits	3
Name of the Course	Probability and Statistics
Type of the Course	Multidisciplinary Course (MDC 2)
Number of hours required for this course	45 hrs.
Attendance-05 Marks Class Test-10 Marks Assignments & Presentations-10 Marks	Max. Marks:25
Semester Term End Examination	Max Marks: 50 Maximum Time: 2 hrs.
Lectures to be Delivered (One Hour Each)	45

Instructions

- Instructions for paper setter:** The question paper will consist of four Sections A, B, C and D of 50 marks and examiner shall set 7 questions in all. Two questions will be set from each section I, II, and III of the syllabus and each question will carry 12 marks. Section D will be compulsory and will have 10 short answer type questions from all the sections (I, II, III) of the syllabus each of two marks.
- Instructions for Candidates:** Candidates are required to attempt four questions in all. Section D is Compulsory in which students should attempt 7 questions in total whereas they are required to attempt one question from each Section A, B and C in the question paper.

MDC 2: Probability and Statistics

Course Objectives: The main objectives of the course are

- To understand the basic concepts of Statistics, its scope and importance in various fields.
- To master basic techniques for data summary and data presentation.
- To describe data with measures of central tendency and measures of dispersion.
- To distinguish between random and non-random experiments.
- To conceptualize the probabilities of events including frequentist and axiomatic approach.
- To learn the notion of conditional probability including the concept of Independent events.

Learning Outcomes: After the completion of course, the students will have

- The knowledge of the basic concepts of Statistics, its scope and importance in various fields.
- The ability to master basic techniques for data summary and data presentation.
- The knowledge to describe data with measures of central tendency and measures of dispersion.
- The knowledge of basic concepts of probability and the ability to understand conditional probability and independent events.

Section-I (15 hrs.)

Frequency distribution, Frequency polygon, Histogram, Measures of Central tendency, Arithmetic Mean, Median, Mode, Relationship among measures of central tendency and their limitations.

Section-II (15 hrs.)

Dispersion, Range, Quartile deviation, Mean deviation, Standard deviation and mean square deviation, Coefficients of dispersion, Moments, Skewness, Kurtosis.

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Section -III (15 hrs.)

Introduction to probability, Basic terminology, Classical probability, Theorems on probability, Conditional probability, Dependent and Independent Events, Multiplication theorem, Law of total probability and Baye's theorem.

Recommended Books:

1. Gupta S. C. and Kapoor V. K., Fundamentals of Mathematical Statistics, 11th Edition, Sultan Chand & Sons, 2002. (Chapter 2, Chapter 3 and 4.1 of Chapter 4)
2. Rohtagi V. K. and Ehsanes A. K. Md., *An Introduction to Mathematical Statistics*, John Wiley & Sons, 2015.
3. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to Mathematical Statistics*, Pearson Education, Asia, 2007.
4. Irwin Miller and Marylees Miller, John E. Freund, *Mathematical Statistics with Application*, 7th Ed., Pearson Education, Asia, 2006.

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SARDAR PATEL UNIVERSITY
B.Sc. First Year Syllabus and Examination Scheme
First Semester

Course Code	BMATH-SEC-101
Credits	3
Name of the Course	Elementary Algebra
Type of the Course	Skill Enhancement Course (SEC I)
Number of hours required for this course	45 hrs.
Attendance-05 Marks Class Test-10 Marks Assignments & Presentations-10 Marks	Max. Marks: 25
Semester Term End Examination	Max Marks: 50 Maximum Time: 2 hrs.
Lectures to be Delivered (One Hour Each)	45

Instructions

- Instructions for paper setter:** The question paper will consist of four parts A, B, C and D of 50 marks and the examiner shall set 7 questions in all. Two questions will be set from each section I, II, and III of the syllabus and each question will carry 12 marks. Section D will be compulsory and will have 10 short answer type questions from all the sections (I, II, III) of the syllabus each of two marks.
- Instructions for Candidates:** Candidates are required to attempt four questions in all. Section D is Compulsory in which students should attempt 7 questions in total whereas they are required to attempt one question from each Section A, B and C in the question paper.

SEC-1: Elementary Algebra

Course Objectives: The main objectives of the course are

- To understand the basic concepts of polynomials, types of polynomials, Algebraic operations on polynomials and Euclidean algorithm for polynomials.
- To acquire the knowledge of Horner's method of synthetic division, polynomial equations and their roots, fundamental theorems of Algebra and its applications.
- To gain the knowledge of the relation between the roots and the coefficients of general polynomial equation of one variable and its applications, Transformation of equations.
- To acquire the knowledge of reduction of general form of cubic equation to standard form of cubic and its solution by Cardon's Method, reduction of general form to standard form of biquadratic and its solution by Descartes's and Ferrari's Methods, Descartes's rule of signs.

Course Learning Outcomes: After the completion of course, the students will be able to

- Describe the basic concepts of polynomials, types of polynomials, Algebraic operations on polynomials and Euclidean algorithm for polynomials.
- Explain the concept of Horner's method of synthetic division, polynomial equations and their roots, fundamental theorems of Algebra and its applications.
- Understand and find the relation between the roots and the coefficients of general polynomial equation of one variable and Transformation of equations.
- Reduce the general form of cubic equation to standard form of cubic by Cardon's Method, standard form of biquadratic by Descartes's and Ferrari's Methods.

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Section-I (15 hrs.)

Polynomials in one variable: Polynomials, Multiplication and Division of Polynomials, The Remainder Theorem, Synthetic Division, Horner's process & Highest common divisor of two Polynomials.

Section-II (15 hrs.)

Algebraic equations, Identity theorem, The Fundamental Theorem of Algebra, Imaginary roots of equations with real coefficients, Relation between roots and coefficients & Discovery of multiple roots.

Section-III (15 hrs.)

Cardan's formulas, Discussion of solution, Irreducible case, Trigonometric solution, Criterion of the Nature of Roots of Cubic, Solution of Biquadratic equations (Descartes' and Ferrari method), Descartes' rule of sign.

Recommended Book:

1. J.V. Uspensky, Theory of equations, McGraw Hill (1948). Chapter- II: §§ 1 to 6, §§ 8, Chapter-III: §§1 to 6, Chapter-V: §§ 2 to 6 & Chapter-VI: §§10.
2. H. W. Turnbull, Theory of equations, OLIVER AND BOYD, Fourth Edition, 1947.

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SARDAR PATEL UNIVERSITY
B.Sc. (Non-Medical) Syllabus and Examination Scheme
Second Semester

Course Code	BMATH-SEC-201
Credits	3
Name of the Course	Logic and Sets
Type of the Course	Skill Enhancement Course (SEC 2)
Number of hours required for this course	45 hrs.
Attendance-05 Marks Class Test-10 Marks Assignments & Presentations-10 Marks	Max. Marks:25
Semester Term End Examination	Max Marks: 50 Maximum Time: 2 hrs.
Lectures to be Delivered	45 hrs

Instructions

- 1. Instructions for paper setter:** The question paper will consist of four parts A, B, C and D of 50 marks and the examiner shall set 7 questions in all. Two questions will be set from each section I, II, and III of the syllabus and each question will carry 12 marks. Section D will be compulsory and will have 10 short answer type questions from all the sections (I, II, III) of the syllabus each of two marks.
- 2. Instructions for Candidates:** Candidates are required to attempt four questions in all. Section D is Compulsory in which students should attempt 7 questions in total whereas they are required to attempt one question from each Section A, B and C in the question paper.

SEC 2.1: Logic and Sets

Course Objectives: After thorough learning of the course, students will be able to

- Get a comprehensive understanding of the logic and sets.
- Recognize some basic notions that will be needed as background for most of the mathematics and computer science courses.
- Familiar with abstract mathematical thinking & reasoning, which helps to understand and apply mathematical concepts to analyze and interpret various types of data.

Course Learning Outcomes: By the end of the course, students will be able to

- Describe memberships of sets, including the empty set, using proper notation, and decide whether given items are members and determine the cardinality of a given set.
- Perform the operations of union, intersection, complement, and difference on sets using proper notation.
- Draw and interpret Venn diagrams of set relations and operations and use Venn diagrams to solve problems.
- Recognize when set theory is applicable to real-life situations, solve real-life problems, and communicate real-life problems and solutions to others.

Section I (15 hrs.)

Definition of logic, propositions, truth table, negation, conjunction and disjunction, conditional, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.

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Section II (15 hrs.)

Propositional equivalence: Logical equivalences, Predicates and quantifiers. Sets, subsets, Power set of a set, Set operations, Venn diagrams, Finite and infinite sets.

Section III (15 hrs.)

Counting principle, Classes of sets, Set identities, De- Morgan's Law, Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation.

Recommended Books:

1. R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
2. P. R. Halmos, Naive Set Theory, Springer, 1974.

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