

FOURTH YEAR UNDER GRADUATE PROGRAM (NEP-2020)

Program: Bachelor of Science (2024-28)

DISCIPLINE- MATHEMATICS

Session-2024- 25

DSC -01 to08		DSE-01to12		DGE-01&02	
Code	Title	Code	Title	Code	Title
MASC-01	Elementary Calculus	MASE-01	Advanced Calculus	MAGE-01	Elementary Calculus
MASC-02	Algebra	MASE-02	Mechanics	MAGE-02	Algebra
MASC-03	Differential Equations	MASE-03	Numerical Methods		
MASC-04	Abstract Algebra	MASE-04	Number Theory	SEC	
MASC-05	Real Analysis	MASE-05	Integral Transforms	MASEC-01	Introduction to Latex
MASC-06	Metric Spaces	MASE-06	Topology	MASEC-02	Python
MASC-07	Advanced Real Analysis	MASE-07	Complex Analysis - I		
MASC-08	Advanced Abstract Algebra	MASE-08	Discrete Mathematics	VAC	
		MASE-09	Measure Theory	MAVAC-01	Basic Mathematics and Logic
		MASE-10	General and Algebraic Topology		
		MASE-11	Complex Analysis - II		
		MASE-12	Graph Theory		

Program Outcomes(PO):

PO1: Ability to develop scientific temper and acquire in-depth knowledge of algebra, calculus, real analysis, complex analysis, topology and several other branches of mathematics. This program helps learners in building a solid foundation for higher studies in mathematics.

PO2: Utilize mathematics to solve theoretical and applied problems by critical thinking, understanding, analysis and synthesis.

PO3. The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilized in modeling and solving real life problems.

PO4. Ability to apply mathematical tools in Physics, Economics, Optimization and other subjects it will also develop understanding the architecture of curves and surfaces in plane and spaces etc.

(Dr. S. Dashpreet)

Dr. Anil Kumar
10/6/2024
(Dr. P. K. Sahu)

(F. R. Sahu)

Dr. Anandhara
Dr. Madhu Shrivastava

PO5. This program will also enable the learners to join teaching profession in schools and this will help the students to enhance their employability for government jobs, jobs in banking insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

Dr. Omkar Shivastava
Dr. Omkar Shivastava

Dr. ...

Dr. ...

Myhit
Dr. Madhu Shrivastava

Dr. S. Dashputra
(Dr. S. Dashputra)

Dr. P. K. Sahu
(Dr. P. K. Sahu)

Dr. C. S. Patil
Dr. C. S. Patil

Dr. S. Khan
Dr. S. Khan

Dr. ...

Dr. Anil Kumar Sharma
Dr. Anil Kumar Sharma

FOUR YEAR UNDER GRADUATE PROGRAM (2024-28)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction

Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Semester - I	Session:2024-2025
1	Course Code	MASC-01	
2	Course Title	Elementary Calculus	
3	Course Type	DSC	
4	Pre-requisite(if any)	Knowledge of basic Differential and Integral calculus	
5	Course Learning Outcome (CLO)	<p>This Course will enable the students to:</p> <ul style="list-style-type: none"> ➤ Know about ancient Indian Mathematicians and their contribution ➤ Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various tests to determine convergence. ➤ Understand the consequences of various mean value theorems. ➤ Understand concepts of Curvature and Asymptotes . ➤ Draw curves in Cartesian and polar coordinate systems ➤ Understand the elementary integration of transcendental function and understand applications of reduction formulae. 	
6	Credit Value	4 C	1Credit = 15 hours- Learning and observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course

Total no of teaching – learning period =60 Periods (60 Hours)

UNIT	Topics	No of Periods
I	<p>Contributions and Biography of Indian Mathematicians: Bodhayan, Apasthamb, Katyayan, Mahaveeracharya, Brahmagupta and Bhaskarachaya in special context of Leelavati.</p> <p>Sequences, Continuity and Differentiability : Notion of convergence of sequences and series of real numbers, Definition of limit and continuity of a real valued function; Differentiability and its geometrical interpretation. Elementary Differentiation.</p>	15
II	<p>Expansion of Functions: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem and their geometrical interpretations, Successive differentiation and Leibnitz theorem, Maclaurin's and Taylor's theorems for expansion of a function.</p>	15
III	<p>Curvature, Asymptotes , Curve Tracing: Curvature; Asymptotes of general algebraic curves, Parallel asymptotes, Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of inflection, Tangents at origin, Multiple points, Position and nature of double points; Tracing of Cartesian, polar and parametric curves.</p>	15

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Dr. Omkar Kulkarni

Dr. Nachu Shinde

(Dr. P. K. Sahu)

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IV	Integration: Elementary integration, Integration of Transcendental function, Reduction formulae, Definite integral.	15
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Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition). Wiley India.
2. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.
3. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. Narosa.
4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.

Reference Books Recommended-

5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.
6. Jerrold Marsden, Anthony J. Tromba & Alan Weinstein (2009). Basic Multivariable Calculus, Springer India Pvt. Limited.
7. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.
8. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2011). Calculus (3rd edition). Pearson Education. Dorling Kindersley (India) Pvt. Ltd.

E-resources: <https://onlinecourses.nptel.ac.in>
<https://epqp.inflibnet.aci.in>
<https://swayam.gov.in>
<https://www.mooc.org>

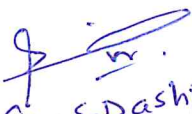
Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

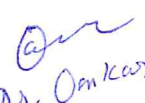
Maximum Marks:	100 Marks
Continuous Internal Assessment (CIA):	30 Marks
End Semester Examination (ESE):	70 Marks

Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
End Semester Examination (ESE)	Two Section-A&B Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

Name and signature of convener & members of CBOS-


Dr. S. Dashputra


(Dr. P. K. Sahu)



Dr. Omkar Lal Shrivastava

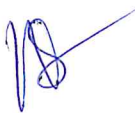









Dr. S. Khan





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DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Semester - II	Session:2024-2025
1	Course Code	MASC-02	
2	Course Title	Algebra	
3	Course Type	Discipline Specific Course (DSC)	
4	Pre requisite	Knowledge of basic algebra , determinants and matrices.	
5	Course Learning Outcome (CLO)	This Course will enable the students to: <ul style="list-style-type: none"> ➤ Learn about the Matrix algebra. ➤ Understand Set theory, Function and Relation ➤ Learn about the theory of equations. ➤ Learn about the fundamental concepts of groups, Subgroups. ➤ Understand cosets and normal subgroups 	
6	Credit Value	4 C	1 Credit = 15 hours- Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course		
Total no of teaching – learning period =60 Periods (60 Hours)		
UNIT	Topics	No of Periods
I	Matrix Algebra : Introduction, elementary operations of matrices, Inverse of a matrix. Special types of matrices: Transpose of a matrix, Symmetric and Skew symmetric matrices, Hermitian and Skew Hermitian matrix, Rank of a matrix, Echelon form of a matrix, Normal form, Application of matrices to a system of linear (both homogeneous and non-homogeneous) equations , Theorems on consistency of a system of linear equations. Eigen values and Eigen vectors, relation between Eigen values and Eigen vectors. Process of finding Eigen values and Eigen vectors, Cayley Hamilton theorem, and its use in finding inverse of a matrix.	15
II	Sets Theory & Functions: Sets, subsets Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of a set. Power set of a set. Difference and symmetric difference of two sets. Set identities, Generalized union and intersection. Relations and Functions: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations. Function, Types of Function, Inverse Function, Composite of functions, Modular arithmetic and basic properties of congruences	15



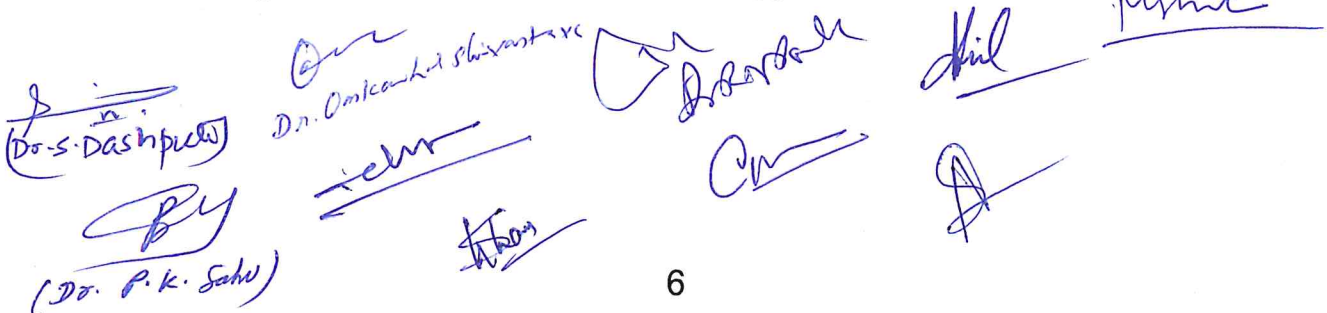
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III	Theory of equations: Symmetric functions of the roots of an equation Root of a multiplicity, Synthetic division, Greatest common Divisors, Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardon method) , Biquadrate equation.	15
IV	Group Theory: Definition and properties of a group, Abelian groups, Examples of groups, Subgroups and examples, Cosets and their properties, Lagrange's theorem and its applications, Normal subgroups and their properties, Simple groups, Factors groups .	15

Part C - Learning Resource		
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Text Books Recommended-		
1. RamjiLal (2017). <i>Algebra 1: Groups, Rings, Fields and Arithmetic</i> . Springer. 2. Nathan Jacobson (2009). <i>Basic Algebra I</i> (2 nd edition). Dover Publications 3. John B. Fraleigh (2007). <i>A First Course in Abstract Algebra</i> (7 th edition). Pearson		
Reference Books Recommended-		
4. Michael Artin (2014). <i>Algebra</i> (2 nd edition). Pearson. 5. Stephen H. Friedberg, Arnold J.Insel& Lawrence E. Spence (2003). <i>Linear Algebra</i> (4 th edition). Prentice-Hall of India Pvt. Lt 6. Joseph A. Gallian (2017). <i>Contemporary Abstract Algebra</i> (9 th edition). Cengage. 7. Kenneth Hoffman & Ray Kunze (2015). <i>Linear Algebra</i> (2 nd edition). Prentice-Hall. 8. I. N. Herstein (2006). <i>Topics in Algebra</i> (2 nd edition). Wiley India.		
E-resources: https://onlinecourses.nptel.ac.in https://epqp.inflibnet.aci.in https://swayam.gov.in https://www.mooc.org		

Part D: Assessment and Evaluation		
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Maximum Marks:		100 Marks
Continuous Internal Assessment (CIA):		30 Marks
End Semester Examination (ESE):		70 Marks
Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
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Name and signature of convener & members of CBOS-



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