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. Dashpute

Dr. Omkar Lal Shrivastava

(Dr. P. K. Sahu)

Dr. A. K. Sahu

Dr. Madhu Shukla

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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 Nath Shivastava

Dr. Madhu Shukla

(Dr. S. Dashpute)

(Dr. P. K. Sahu)

Dr. C. Sparo

Dr. S. Khan

Dr. Radhaw Sharma

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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)	**This Course will enable the students to:** ➢ 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	**Contributions and Biography of Indian Mathematicians:** Bodhayan, Apasthamb, Katyayan, Mahaveeracharya, Brahmagupta and Bhaskarachaya in special context of Leelavati. **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.	15
II	**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.	15
III	**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.	15

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IV	**Integration:** Elementary integration, Integration of Transcendental function, Reduction formulae, Definite integral.	15

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 & BindhyachalRai (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://epgp.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. Dashputre)

Dr. Omkar Nath Shivastava

(Dr. P. K. Sahu)

Dr. S. Khan

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FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

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:** ➢ 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	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	**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

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. RamjiLal (2017). *Algebra 1: Groups, Rings, Fields and Arithmetic*. Springer.
2. Nathan Jacobson (2009). *Basic Algebra* I (2nd edition). Dover Publications
3. John B. Fraleigh (2007). *A First Course in Abstract Algebra* (7th edition). Pearson

Reference Books Recommended-

4. Michael Artin (2014). *Algebra* (2nd edition). Pearson.
5. Stephen H. Friedberg, Arnold J.Insel& Lawrence E. Spence (2003). *Linear Algebra* (4thedition). Prentice-Hall of India Pvt. Lt
6. Joseph A. Gallian (2017). *Contemporary Abstract Algebra* (9th edition). Cengage.
7. Kenneth Hoffman & Ray Kunze (2015). *Linear Algebra* (2nd edition). Prentice-Hall.
8. I. N. Herstein (2006). *Topics in Algebra* (2nd edition). Wiley India.

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https://epgp.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. Omkeshwar Shivastava

(Dr. S. Dashpute)

(Dr. P. K. Sahu)

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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	MAGE-01	
2	Course Title	Elementary Calculus	
3	Course Type	Generic Elective (GE)	
4	Pre-requisite(if any)	Knowledge of basic Differential and Integral calculus	
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ 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	**Contributions and Biography of Indian Mathematicians:** Bodhayan, Apasthamb, Katyayan, Mahaveeracharya, Brahmagupta and Bhaskarachaya in special context of Leelavati. **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.	15
II	**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.	15
III	**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.	15
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-

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4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.

Reference Books Recommended-

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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. Pashpuri

(Dr. P. K. Sahu)

FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		**Semester - II**	**Session:2024-2025**
1	Course Code	**MAGE-02**	
2	Course Title	**Algebra**	
3	Course Type	Generic Elective (GE)	
4	Pre requisite	Knowledge of basic algebra , determinants and matrices.	
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ 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**	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	**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 to 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

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. RamjiLal (2017). *Algebra 1: Groups, Rings, Fields and Arithmetic*. Springer.
2. Nathan Jacobson (2009). *Basic Algebra* I (2nd edition). Dover Publications
3. John B. Fraleigh (2007). *A First Course in Abstract Algebra* (7th edition). Pearson

Reference Books Recommended-

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5. Stephen H. Friedberg, Arnold J.Insel& Lawrence E. Spence (2003). *Linear Algebra* (4thedition). Prentice-Hall of India Pvt. Lt
6. Joseph A. Gallian (2017). *Contemporary Abstract Algebra* (9th edition). Cengage.
7. Kenneth Hoffman & Ray Kunze (2015). *Linear Algebra* (2nd edition). Prentice-Hall.
8. I. N. Herstein (2006). *Topics in Algebra* (2nd edition), Wiley India.

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https://epgp.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-

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FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM -2024-25

Part A: Introduction				
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		SEMESTER-II/IV/V/VI		Session: 2024-2025
1	Course Code	**MASEC-1**		
2	Course Title	**Introduction to LATEX**		
3	Course Type	Skill Enhancement Course (SEC)		
4	Pre-requisite (if, any)	Basic understanding of document editing, familiarity with markup languages, and willingness to learn LaTeX syntax and formatting conventions.		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ Make different Alignments in a document and an Application for a job. ➢ Generate Bio-Data, and Table Structures. ➢ Create Mathematical Statements using LaTex. ➢ Prepare Articles and Inserting Pictures. ➢ Prepare Question paper and PowerPoint presentation in LaTeX format.		
6	Credit Value	2 Credits (1C + 1C)	*Credit = 15 Hours – Theoretical learning and = 30 Hours Laboratory or Field learning/Training*	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

Part B: Content of the Course		
Total No. of Teaching–learning Periods: Theory – 15 Periods (15 Hrs) and Lab. or Field learning/Training 30 Periods (30 Hours)		
Unit	**Topics (Course contents)**	**No. of Period**
I	**Basics:** Introduction to LaTeX, Text, Symbols and Commands, Document layout and organization, displayed text. Mathematical formulas, Graphics inclusion and color. Floating tables and figures, User customizations. **Beyond the Basics:** Document management, Postscript and PDF, Beamer, Frames, Bibliographic data bases and BiBTeX, Presentation material.	15
II	**Practicals Based on-** **1.Introduction to TeX and LaTeX-** Creating and typesetting a simple LaTeX document, **2.Adding basic information to documents-** Environments, Footnotes, Sectioning, Displayed material. **3.Accents and symbols-** Mathematical typesetting (elementary and advanced): Subscript/ Superscript, Fractions, Roots, Ellipsis,	30

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	4.Mathematical symbols- Arrays, Delimiters, Multiline formulas, **5.Putting one thing above another-**Spacing and changing style in math mode. **6.Pictures and graphics in LaTeX-**Simple pictures using PSTricks, Plotting of functions. **7.Beamer, Frames-**Setting up beamer document, Enhancing beamer presentation **8.Bibliographic data bases and BiBTeX-**Create and manage bibliographic references using BiBTeX	

Part C - Learning Resource
Text Books, Reference Books, Other Resources
Text Books Recommended- 1. Murugan Swaminathan, Latex For Beginners, Publisher: Notion Press
Reference Books Recommended 2. Dilip Datta,Latex in 24 Hours A Practical Guide for Scientific Writing,Springer
E-resources: Free Online LaTeX Editor- https://www.overleaf.com/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA): 15 Marks
End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Coordinator)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on learned skill - 20 Marks B. Spotting based on tools (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Coordinator as per skilling

Name and signature of convener & members of CBOS-

Dr. S. Dashpreet

10/6/2024
Dr. Omkar U Shivankar

Dr. P. K. Sahu

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FOUR YEAR UNDER GRADUATE PROGRAM(2024-25)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction				
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Class: B.Sc. II/IV/V/VI Semester	Session: 2024-2025	
1	Course Code	**MASEC-2**		
2	Course Title	**Python**		
3	Course Type	**Skill Enhancement Course (SEC)**		
4	Pre-requisite (if, any)	Basic understanding of programming concepts, familiarity with syntax.		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ To write python programs , develop a small application .and logic for problem solving. ➢ To be familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc. ➢ To be familiar with string and its operation. ➢ To develop basic concepts of function and terminology. ➢ To determine the methods to create and develop Python programs by ➢ Utilizing the data structures like lists and tuples.		
6	Credit Value	2 Credits (1C + 1C)	*Credit = 15 Hours – Theoretical learning and = 30 Hours Laboratory or Field learning/Training*	
7	Total Marks	Max. Marks: 50		Min Passing Marks: 20

Part B: Content of the Course		
UNIT	Topics	No. of Hours
I	**(A) Python Basic and IDE :-** Introduction of Python, Installing Python, Running Simple Program, Removing Keys, Traversing a Dictionary . Basic of Python :-Data type of Python., Variable declaration rule, Python Identifier and reserved words, Input Output Function Operator of Python, Advanced Python operator(Membership and identity), Comments in Python, Line and Indentation, **(B) Conditional structure :-** if Statements, if -else and statement, Nested if , if-elif-else ladder Loop Control Structure, While loop, For loop, Nested loop, Break Statement, Continue Statement, Pass Statement - Practical 6 ,7& 8 **(C) String and Function** String Basics, Accessing and updating String, Built-in String Methods Function in Python, Declaration and Calling function, Function Argument, Anonymous Functions Python Lists, Accessing and updating List, Basic List Operation, Built-in List Methods, Python Tuple, Accessing and updating tuple, Basic tuple operation, Built-in tuple Method.	**15**

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II	**List of practicals based on Python :-** ▪ Practical 1 - Write a Python program that asks the user for their name and age, then prints a message greeting the user with their name and mentioning their age. ▪ Practical 2 - Define a list with at least three elements of different data types and print the list. ▪ Practical 3- Writeaprogram thattakestwonumberandprint thesumof thesenumbers. ▪ Practical 4 -Writeaprogramtocheckwhethertheinputnumberiseven orodd. ▪ Practical 5- Write a program to compare three numbers and print the largest one. ▪ Practical 6- Writeaprogramtoprintfactors ofagivennumber. ▪ Practical 7-Writeaprogram toprint tableusingwhileLoop. ▪ Practical 8 -Writeaprogramtocreatethe followingPattern ▪ Practical 9- Write a Python program that takes a lowercase string from the user and converts it to uppercase. ▪ Practical 10- Write a function that takes a string input and checks if it is a palindrome or not. ▪ Practical 11- Write a Python program that defines a function to calculate the sum of two numbers. ▪ Practical 12- Create a tuple representing the days of the week and update the last element with "Sunday". Print the updated tuple. ▪ Practical 13- Write a Python program that concatenates two tuples and prints the concatenated tuple. ▪ Practical 14- WAP to create a list of numbers and sort the list in ascending order. ▪ Practical 15- Write a list function to convert a string into a list, as in list (-abc) gives [a, b, c].	30

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. Fundamentals of Python first programs, 2nd Edition, Kenneth A. Lambert.
2. Beginning Python from Novice to Professional, Third Edition, Magnus Lie Hetland

Reference Books Recommended-

3. Python for Science and Engineering, Hans-PetterHalvorsen.
4. Python Programming: An Introduction to Computer Science, Third Edition, John Zelle.
5. Introduction to Scientific Computing in Python, Continuum Analytics and Robert Johansson.

E-Recourses:

https://onlinecourses.nptel.ac.in
https://epgp.inflibnet.aci.in
https://swayam.gov.in
https://www.mooc.org

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	50 Marks
Continuous Internal Assessment (CIA):	15 Marks
End Semester Exam (ESE):	35 Marks

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Continuous Internal Assessment (CIA): (By Course Coordinator)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on learned skill - 20 Marks B. Spotting based on tools (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Coordinator as per skilling

Name and signature of convener & members of CBOS-

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FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Class: B.Sc. I/III/V Sem	Session:2024-2025
1	Course Code	**MAVAC-1**	
2	Course Title	**Basic Mathematics and Logic**	
3	Course Type	**Value Addition Course**	
4	Course Learning Outcome (CLO)	**This Course will enable the students-** ➢ To orient them towards life-long learning, to develop power of concentration and to overcome the fear of mathematics from their mind. ➢ To cultivate scientific temper through systematic, critical and lateral thinking. ➢ To enhance their logical, analytical and reasoning skills useful for competitive exams. ➢ To make understand the relevance and need of quantitative methods for making business decisions.	
5	Credit Value	2 Credits	*Credit = 15 Hours - learning & Observation*
6	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course		
Total No. of Teaching–learning Periods (01 Hr. per period) - 30 Periods (30 Hours)		
Unit	Topics (Course contents)	No. of Period
	Basic Mathematics	
I	Brief history of Vedic Mathematics (In Indian Knowledge Tradition), Sanskrit terminology involved in 16 Sutras and 13 Sub-Sutras and their meaning , Addition , Subtraction , Multiplication & Division using different techniques of Vedic Mathematics , Squaring numbers , Square roots of perfect squares , Cube roots of perfect cubes , Methods of quick verification of answers through Digit Sum Method	8
II	Problem based on Numbers, Decimal Fractions, Average, Simple Interest , Percentage ,Clocks	8
III	Problems on Profit & Loss , Discount, Ages, Speed, Time & Distance, Train , Ratio & Proportion, Mixture	8

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IV	**Logical Ability:** Problems on Series Completion , Coding- Decoding , Inserting the Missing Character , Problems on Mirror Image & Water Image Problems on Blood relations , Direction Sense Tests , Cubes & Dice , Logical Deductions based on Universal, Particular, Affermative & Negative Premises.	6

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. Dr. R.S. Aggarwal, Quantitative Aptitude, S. Chand and Company Ltd., New Delhi.
2. AbhijitGuha, Quantitative Aptitude, Tata McGraw Hill Publishing Company Limited.,New Delhi.
3. Dr. R.S. Aggarwal , Verbal & Non –Verbal Reasoning , S. Chand and Company Ltd., New Delhi

Reference Books Recommended-

4. Rajesh Kumar Singh , Tricky Mathematics , Success Mantra Publications , Patna
5. Govind Prasad Singh &Rakesh Kumar , Text Book of Quickest Mathematics (For all Competitive Examinations)
6. Vedic Mathematics Made Easy Published by Dhaval Bhatia

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	50 Marks
Continuous Internal Assessment (CIA):	15 Marks
End Semester Exam (ESE):	35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 05 x1= 05 Mark; Q2. Short answer type- 5x2 =10 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit- 4x05 =20 Marks	

Name and signature of convener & members of CBOS-

(Dr. S. Dashpute) Dr. Omkar Lal Shrivastava DRNP Dr. Madhu Shrivastava (Dr. P. K. Sahu) Dr. S. Khan Dr. Aradhana Sharma

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