DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM & MARKING SCHEME

B.Sc. I, II, III, IV Semester

MATHEMATICS

(Based on Choice Based Credit System)

SESSION : 2025-26

ESTD : 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A+, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email – autonomousdurg2013@gmail.com

DEPARTMENT OF MATHEMATICS
GOVT. V. Y. T. AUTONOMOUS COLLEGE, DURG (C.G)

Approved syllabus for **B.Sc.** by the members of Board of studies for the session 2025-2026. The syllabus with the paper combinations is as under

B.Sc. Semester -I

Core Course (DSC)/ Generic Elective (GEC)	Value Added Course (VAC)
I : Elementary Calculus	Basic Mathematics and Logic

B.Sc. Semester -II

Core Course (DSC)/ Generic Elective (GEC)	Skill Enhancement Course
I : Algebra	Mathematics I - LATEX Mathematics II - Python

The syllabus for B.Sc. is hereby approved by the members of Board of studies for the session 2025-26.

In case, any change or modification is prescribed by central Board of Studies orHigher Education Dept., Govt. of Chhattisgarh with respect to content or distribution ofmarks for Undergraduate syllabi, it will be implemented accordingly.

Name & Signature:

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami –

Faculty Members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -

Govt. V.Y.T. PG Autonomous College, Durg (C.G.)

Examination Cell

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions.
3. Section B shall contain short answer type questions.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely.
5. The scheme of marks should be as follows :

(A). Maximum Marks :**100**

Question Type	**MM 70 (Marks x No. of Questions)**
A (Very short Answer)	1x10 = 10
B (Short Answer)	4x5 = 20
C (Long Answer)	10x4 = 40

(B) Better marks out of two tests/quiz (20 marks) + obtained marks in assignment (10 marks) shall be considered against 30 marks.

6. The students are required to study the content mentioned in the curriculum exhaustively.

Name & Signature

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty Members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -

B. Sc. Semester-I
Paper - Elementary Calculus

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Semester - I	Session:2025-2026
1	Course Code	MASC-01	
2	Course Title	Elementary Calculus	
3	Course Type	Discipline Specific Course (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 Hours
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

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

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	

Chairperson / H.O.D - Dr. Padmavati –
Subject Expert - Dr. Madhu Shrivastava
Subject Expert - Dr. Shabnam Khan
Subject Expert - Dr. S. K. Bhatt

Representative Members
- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty Members –
Dr. Rakesh Tiwari –
Dr. (Smt.) Prachi Singh –
Dr. Shobha Rani –
Smt. Nidhi Sharma -
Ku. Ambalika Chouhan -
Ku. Bijma Kumari –
Ku. Deepak -

B. Sc. Semester-I
Paper – Value Added Course

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Class: B.Sc. I/III/V Sem	Session:2025-2026
1	Course Code	**MAVAC-1**	
2	Course Title	**Basic Mathematics and Logic**	
3	Course Type	Theory	
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 Hours**
	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**
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. Abhijit Guha, 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	

Chairperson / H.O.D - Dr. Padmavati – 26/4 26-04-25

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami –

Faculty Members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -

B. Sc. Semester-II

Paper DSC - Algebra

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		**Semester - II**	**Session:2025-2026**
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

UNIT	Topics	No of Hours
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
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

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.

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

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	

Chairperson / H.O.D - Dr. Padmavati –
Subject Expert - Dr. Madhu Shrivastava
Subject Expert - Dr. Shabnam Khan
Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami –

Faculty Members –
Dr. Rakesh Tiwari –
Dr. (Smt.) Prachi Singh –
Dr. Shobha Rani –
Smt. Nidhi Sharma -
Ku. Ambalika Chouhan -
Ku. Bijma Kumari –
Ku. Deepak -

B.Sc. Semester-II

Skill Enhancement Course (SEC)

Introduction to LATEX

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		SEMESTER-II	Session: 2025-2026
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 Hours**
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

	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	

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/

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

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty Members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak-

List of practicals based on Latex

II	**List of practicals based on Latex :-**	30

1. Write a LaTeX coding for $\varphi(x,z) = z - \gamma x - \sum_{m>2} x^m$ with numbers.
2. Write a LaTeX coding of the following with equation numbers.

$$\lim_{n\to\infty}\left(1+\frac{x}{n}\right)^n = e^x$$

$$g(x) = \prod_{i=1}^{n} f_i(x)$$

3. Write align environment coding for

$$\begin{aligned}(a^2-b)^2 &= a^2+b^2-2ab\\ &= |a|^2+|b|^2-2|a||b|\\ &= a^2+b^2-2ab\end{aligned}$$

4. Write a coding for

$$f(x) = e^x \quad g(x) = \log x$$

$$h(x) = \cos x \quad t(x) = x^3$$

5. Write the coding of the following using split environment

$$\begin{aligned}(a+b)^2 &= (a+b)^2(a+b)^2\\ &= (a^2+2ab+b^2)(a^2+2ab+b^2)\end{aligned}$$

6. Create the following matrix

$$\begin{bmatrix}2 & 3\\ 4 & 5\end{bmatrix} \quad \begin{pmatrix}i & j\\ 0 & j\end{pmatrix} \quad \begin{bmatrix}1 & 2\\ 5 & 7\end{bmatrix} \quad \begin{vmatrix}1 & 0\\ 2 & 3\end{vmatrix}$$

7. Create the following using array:

$$\begin{array}{ccc} a+b & \sin 2x & \frac{4e^x}{2} \\ a-b & \log x & q\log 2x \\ a^2-b^2 & 15 & (a+b)^2 \end{array}$$

8. Create the following function:

$$\psi(x) = \begin{cases} Ae^{ix}+Be^{-ix}, & \text{for } x=0 \\ De^{kx}, & \text{for } x\neq 0 \end{cases}$$

9. Write a coding for

$$\binom{x}{y} \quad \begin{pmatrix}2^n-y^n\\ 1+y^{2n}\end{pmatrix}$$

10. How do you create the following statement?

Theorem 1.1.4 (*Euclid*): *The sum of angles of a triangle is 180°.*

Chairperson / H.O.D - Dr. Padmavati –Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt-

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty Members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak-

B. Sc. Semester-II

Skill Enhancement Course(SEC)

Python

Part A: Introduction				
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Class: B.Sc. II Semester		Session: 2025-2026
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**

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

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

Chairperson / H.O.D - Dr. Padmavati

Subject Expert - Dr. Madhu Shrivastava 26-04-25

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty Members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -

DEPARTMENT OF MATHEMATICS
GOVT. V. Y. T. AUTONOMOUS COLLEGE, DURG (C.G)

Approved syllabus for **B.Sc.** by the members of Board of studies for the session 2025-2026.

The syllabus with the paper combinations is as under

B.Sc. Semester -III

Core Course (DSC) /GEC	**Discipline Specific Elective**
I : Differential Equation	Advance Calculus
Value Added Course (VAC)	
Basic Mathematics and Logic	

B.Sc. Semester -IV

Core Course (DSC) / GEC	**Discipline Specific Elective**
I : Abstract Algebra	Mechanics
Skill Enhancement Course	
Mathematics I - LATEX Mathematics II - Python	

The syllabus for B.Sc. is hereby approved by the members of Board of studies for the session 2025-26.

In case, any change or modification is prescribed by central Board of Studies orHigher Education Dept., Govt. of Chhattisgarh with respect to content or distribution ofmarks for Undergraduate syllabi, it will be implemented accordingly.

Name & Signature:

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami –

Faculty members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak –

Govt. V.Y.T. PG Autonomous College, Durg (C.G.)

Examination Cell

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)
3. Section B shall contain short answer type questions.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely.
5. The scheme of marks should be as follows :
   (A). Maximum Marks :**100**

Question Type	**MM 70 (Marks x No. of Questions)**
A (Very short Answer)	**1x10 = 10**
B (Short Answer)	**4x5 = 20**
C (Long Answer)	**10x4 = 40**

(B) Better marks out of two tests/quiz (20 marks) + obtained marks in assignment (10 marks) shall be considered against 30 marks.

6. The students are required to study the content mentioned in the curriculum exhaustively.

Name & Signature

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -

B. Sc. Semester-III
Paper DSC – Differential Equation

Part A: Introduction			
Program: Bachelor in Science (Diploma/Degree/Honors)		**Semester - III**	**Session:2025-2026**
1	Course Code	**MASC-03**	
2	Course Title	**Differential Equations**	
3	Course Type	**Discipline Specific Course (DSC)**	
4	Pre-requisite(if any)	Knowledge of basic Differential and Integral calculus and differential equation.	
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ Learn various techniques of getting exact solutions of certain solvable first order differential equations and linear differential equations of second order. ➢ Understand the genesis of ordinary as well as partial differential equations. ➢ Learn about solution of first order linear partial differential equations using Lagrange's method. ➢ Know how to solve second order linear partial differential equations with constant coefficients.	
6	Credit Value	**4 C**	1Credit = 15 hours- Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

UNIT	Topics	No of Hours
I	**Contributions and Biography of Indian Mathematicians:** Aryabhatta, Varahmihir, Bhaskar-I, Shreedharacharya, Shreepati and Parmeshwar. **First Order and higher degree Differential Equations** : Differential equations of first order and first degree, Equations in which variables are separable, Homogeneous equations, Linear differential equations and equations reducible to linear form, Exact differential equations, Integrating factor, First order higher degree equations solvable for x, y and p, Clairaut's form and singular solutions, orthogonal trajectories.	15
II	**Linear and Ordinary simultaneous differential equations:** Linear differential equations with constant coefficients, Homogeneous linear ordinary differential equations. Linear differential equations of second order.Transformation of the equation by changing the dependent variable/the independent variable.Method of variation of parameters. Ordinary simultaneous differential equations.	15
III	**First order Partial differential equations:** Lagrange's solution, Some special types of equation which can be solved by methods other than general method, Charpit's general method of solution.	15
IV	**Second and higher order Partial differential equations:** Classification of Linear partial differential equation of second order, Homogeneous and non- homogeneous equation with constant coefficients, Partial differential equation reducible to equation with constant coefficients. Monge's Method.	15

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. Dr. M. D. Rajsinghania, Ordinary and partial Differential Equation ,S. Chand and company Pvt.Ltd.
2. A.H. Siddiqi and P. Manchanda , A first course in Differential Equations with Applications, Macmillan India Ltd.

Reference Books Recommended-

3. Erwin Kreyszig (2011). *Advanced Engineering Mathematics* (10th edition). J. Wiley & Sons
4. B. Rai& D. P. Choudhury (2006). *Ordinary Differential Equations - An Introduction*. Narosa Publishing House Pvt. Ltd. New Delhi.
5. Shepley L. Ross (2007). *Differential Equations* (3rd edition). Wiley.
6. George F. Simmons (2017). *Differential Equations with Applications and Historical Notes* (3rd edition). CRC Press. Taylor & Francis.
7. Ian N. Sneddon (2006). *Elements of Partial Differential Equations*. Dover Publications.

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 & Signature :

Chairperson / H.O.D - Dr. Padmavati –
Subject Expert - Dr. Madhu Shrivastava
Subject Expert - Dr. Shabnam Khan
Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami –

Faculty members –

Dr. Rakesh Tiwari –
Dr. (Smt.) Prachi Singh –
Dr. Shobha Rani –
Smt. Nidhi Sharma -
Ku. Ambalika Chouhan -
Ku. Bijma Kumari –
Ku. Deepak -

B. Sc. Semester-III
Paper DSE – Advanced Calculus

Part A: Introduction			
Program: Bachelor in Science (Diploma/Degree/Honors)		**Semester - III**	**Session:2025-2026**
1	Course Code	**MASE-01**	
2	Course Title	Advanced Calculus	
3	Course Type	Discipline Specific Elective (DSE)	
4	Pre-requisite (if any)	Basic idea of elementary differential and integral calculus	
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ Calculate the limit and examine the continuity and understand the concepts of limit , continuity and differentiability of functions of more than one variable with geometrical interpretation. ➢ To Understand the concepts of mean value theorems with their applications . ➢ To understand the concept of maxima and minima for functions of two and three variables with their uses and techniques ➢ Understand conceptual variations while advancing from one variable to severalvariables in calculus. ➢ Understand the concept of integration of functions of two and three variables and their evaluation technique with emphasis on beta and gamma functions ..	
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 Hours
I	Limit and continuity of function of two and three variables. Mean value theorems of function of two variables- First mean value theorem and taylor's theorem. Partial Differentiation and Euler's theorem on homogeneous functions, Change of variables.	15
II	Partial Derivation and differentiability of function of two variables. Schwartz's theorem, Young's theorem, Implicit function theorem. Fourier series, Fourier expansion of piece wise monotonic function.	15
III	Jacobians , Maxima, Minima and saddle points of function of two variables. Lagrange's multipliers method. Envelopes, Evolutes	15
IV	Beta and Gamma function. Double and triple integrals .Dirichelet's integrals. Change of order of integration.	15

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.
2. Mathematical Analysis, S.C. malik and S. Arora, New age international,Delhi
3. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition).Wiley India.
4. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.
5. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs.
6. Principles of Mathematical analysis, W.Rudin,McGraw Hill Publication
7. Jerrold Marsden, Anthony J. Tromba & Alan Weinstein (2009). Basic
8. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.

E-resources: https://onlinecourses.nptel.ac.in
https://epgp.inflibnet.aci.in
https://swayam.gov.inhttps://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 & Signature :

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava 26-04-25

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty members –

Dr. Rakesh Tiwari –
Dr. (Smt.) Prachi Singh –
Dr. Shobha Rani –
Smt. Nidhi Sharma -
Ku. Ambalika Chouhan -
Ku. Bijma Kumari –
Ku. Deepak -

B. Sc. Semester III
Paper – Value Added Course (VAC)

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Class: B.Sc. III Sem	Session:2025-2026
1	Course Code	**MAVAC-1**	
2	Course Title	**Basic Mathematics and Logic**	
3	Course Type	Theory	
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 Hours**
	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**
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	

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan –

Ku. Bijma Kumari –

Ku. Deepak -

B.Sc. Semester IV
Paper DSC – Abstract Algebra

Part A: Introduction

Program: Bachelor in Science (Diploma/Degree/Honors)		Semester - IV	Session:2024-2025
1	Course Code	MASC-04	
2	Course Title	Abstract Algebra	
3	Course Type	Discipline Specific Course (DSC)	
4	Pre-requisite(if any)	Knowledge of algebra, vector space and inner product space.	
5	Course Learning Outcome (CLO)	➢ Understand of Homomorphism, Isomorphism of Group ➢ Understand Cyclic and Permutation Groups. ➢ Understand vector spaces, subspaces, basis, dimension and their properties. ➢ Learn about properties of linear transformation and isomorphism theorems. ➢ Understand the concept of linear transformations.	
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 Hours
I	**Isomorphism Theorems , Cyclic and Permutation Groups :** Group homomorphism and isomorphism with properties; First, second and third isomorphism theorems for groups, Cyclic groups and properties, Classifications of subgroup of cyclic groups, Permutation group and properties, Even and odd permutations, Cayley's theorem.	15
II	**Ring, Field and Integral Domain, Ideals:** Definition and properties of a ring, example of rings, Subrings, Integral domain and fields, characteristic of ring and field. Ring Homomorphism, Ideals and Quotient Rings. Field of Quotients of an Integral Domain, Euclidean Rings, Polynomial Rings, Polynomials over the Rational Field. The Eisenstein Criterion, Polynomial Rings over Commutative Rings, Unique factorization domain. R unique factorization domain implies so is R [x1, x2 ….. xn].	15
III	**Vector Spaces:** Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces, Linear span. Linear dependence, independence and their basic properties. Basis. Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.	15
IV	**Linear Transformation**: Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space. Bi-dual space and natural isomorphism. Adjoint of a linear transformation.	15

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. Nathan Jacobson (2009). *Basic Algebra* I (2nd edition). Dover Publications.
2. Nathan Jacobson (2009). *Basic Algebra* II (2nd edition). Dover Publications.

Reference Books Recommended-

3. I. M. Gel'fand (1989). *Lectures on Linear Algebra*. Dover Publications.
4. Kenneth Hoffman & Ray Kunze (2015). *Linear Algebra* (2nd edition). Prentice-Hall.
5. Serge Lang (2005). *Introduction to Linear Algebra* (2nd edition). Springer India.
6. Gilbert Strang (2014). *Linear Algebra and its Applications* (2ndedition). Elsevier

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 & Signature :

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

Faculty members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -

B.Sc. Semester IV
Paper DSE – Abstract Algebra

Part A: Introduction			
Program: Bachelor in Science (Diploma/Degree/Honors)		**Semester - IV**	**Session:2024-2025**
1	Course Code	**MASE-02**	
2	Course Title	**MECHANICS**	
3	Course Type	**Discipline Specific Elective (DSE)**	
4	Pre-requisite(if any)	Basic idea of Statics and Dynamics	
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ The object of the paper is to give students knowledge of basic mechanics such as simple harmonic motion, motion under other laws and forces. ➢ Learn about a nul point, a nul line, and a nul plane with respect to a system of forces acting on a rigid body together with the idea of central axis. ➢ Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body. Determine the centre of gravity of some materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight. ➢ Deal with the kinematics and kinetics of the rectilinear and planar motions of a particle including the constrained oscillatory motions of particles. Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton. ➢ Understand the reduction of force system in three dimensions to a resultant force acting at a base point and a resultant couple, which is independent of the choice of base of reduction.	
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	Analytical conditions of equilibrium of Coplanar Forces. Forces in three dimensions, Poinsot's central axis, Wrenches, Null lines and planes.	**15**
II	Virtual work, Stable and Unstable equilibrium, Catenary.	**15**
III	Velocities and accelerations along and transverse directions, and along tangential and normal directions, Simple harmonic motion, Motion under other law of forces. Elastic strings.	**15**

IV	Motion in resisting medium, Constrained motion, Motion on smooth and rough plane curves. Motion of particles of varying mass, Central orbit, Keplers laws of motion, Rocket motion, Motion of particle in three dimensions.	15

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1.R.S. Verma (1962). a text books of statics Pothishala Pvt. Ltd.

2. P.L. Shrivastava (1964). Elementary dynamics. Ram Narayan Lal, Beni Prasad Publishers Allahabad

Reference Books Recommended-

3. A.S. Ramsey (2009), Statics, Cambridge University Press

4. A.S. Ramsey (2009), Dynamics, Cambridge University Press

5. S.L. Loney (2006) , An Elementary Treatise on the dynamics of a partical and of rigid bodies. .

6. J.L. Synge an Griffith (1949). Principal of Mechanics, McGraw-Hill.

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: **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 & Signature :

Chairperson / H.O.D - Dr. Padmavati –

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami –

Faculty members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -

B.Sc. Semester-IV
Skill Enhancement Course (SEC)
Introduction to LATEX

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		SEMESTER-IV	Session: 2025-2026
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*

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 Hours**
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, 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.	30

	7. **Beamer, Frames**-Setting up beamer document, Enhancing beamer presentation	
	8. Bibliographic data bases and BiBTeX-Create and manage 9. 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

Chairperson / H.O.D - Dr. Padmavati
Subject Expert - Dr. Madhu Shrivastava
Subject Expert -Dr. Shabnam Khan
Subject Expert - Dr. S. K. Bhatt
Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami -

26-04-25

Faculty members –
Dr. Rakesh Tiwari –
Dr. (Smt.) Prachi Singh –
Dr. Shobha Rani –
Smt. Nidhi Sharma -
Ku. Ambalika Chouhan –
Ku. Bijma Kumari –
Ku. Deepak -

B.Sc. Semester- IV
Skill Enhancement Course (SEC)
Introduction to Python

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Class: B.Sc. IV Semester	Session: 2025-2026
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**

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

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

Chairperson / H.O.D - Dr. Padmavati

Subject Expert - Dr. Madhu Shrivastava 26-04-25

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

- Dr. Anil Kashyap –
- Shri A. K. Pandey –
- Dr. Mayur Puri Goswami –

Faculty members –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

Dr. Shobha Rani –

Smt. Nidhi Sharma -

Ku. Ambalika Chouhan -

Ku. Bijma Kumari –

Ku. Deepak -