# SYLLABUS FOR

## THE FOUR-YEAR UNDERGRADUATE PROGRAMME

## (FYUP)

**B.Sc. First and Second Semester**

**As per provision of NEP-2020(Central Board)**

**Implemented fromAcademic Year 2024-25 onwards**

**Session 2025-26**

***DEPARTMENT OF MATHEMATICS***

**GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE,**

**RAJNANDGAON (C.G.)**

# 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:**<br>➢ Know about ancient Indian Mathematicians and their contribution<br>➢ Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various tests to determine convergence.<br>➢ Understand the consequences of various mean value theorems.<br>➢ Understand concepts of Curvature and Asymptotes .<br>➢ Draw curves in Cartesian and polar coordinate systems<br>➢ 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:**<br>Bodhayan, Apasthamb, Katyayan, Mahaveeracharya, Brahmagupta and Bhaskarachaya in special context of Leelavati.<br>**Sequences, Continuity and Differentiability :**<br>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:**<br>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:**<br>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 |

(Dr. S. Dashpute) Dr. Omkar Shivastava Dr. Madhu Sinha

(Dr. P. K. Sahu) Dr. S. Khan

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|---|---|---|
| IV | **Integration:**<br>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:**

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

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|---|---|---|
| **Continuous Internal Assessment (CIA)**<br>(Conducted by course teacher) | Test /Quiz – 20+20 Marks<br>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**<br>Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks<br>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

# 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:**<br>➢ Know about ancient Indian Mathematicians and their contribution<br>➢ Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various tests to determine convergence.<br>➢ Understand the consequences of various mean value theorems.<br>➢ Understand concepts of Curvature and Asymptotes .<br>➢ Draw curves in Cartesian and polar coordinate systems<br>➢ 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.<br>**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 |

Dr. S Dashpute (Dr. P. K. Sahu)

| Part C - Learning Resource | | |
|---|---|---|
| **Text Books, Reference Books, Other Resources** | | |
| **Text Books Recommended-**<br>1. Howard Anton, I. Bivens& Stephan Davis (2016). Calculus (10th edition). Wiley India.<br>2. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.<br>3. Wieslaw Krawcewicz & BindhyachalRai (2003). Calculus with Maple Labs. Narosa.<br>4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.<br>**Reference Books Recommended-**<br>5. George B. Thomas Jr., Joel Hass, Christopher Heil& Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.<br>6. Jerrold Marsden, Anthony J. Tromba& Alan Weinstein (2009). Basic Multivariable Calculus, Springer India Pvt. Limited.<br>7. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.<br>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<br>https://epgp.inflibnet.aci.in<br>https://swayam.gov.in<br>https://www.mooc.org | | |
| **Part D: Assessment and Evaluation** | | |
| **Suggested Continuous Evaluation Methods:**<br>**Maximum Marks:** **100 Marks**<br>**Continuous Internal Assessment (CIA):** **30 Marks**<br>**End Semester Examination (ESE):** **70 Marks** | | |
| **Continuous Internal Assessment (CIA)**<br>(Conducted by course teacher) | Test /Quiz – 20+20 Marks<br>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**<br>Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks<br>Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks | |

**Name and signature of convener & members of CBOS-**

# 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:**<br>➢ Learn about the Matrix algebra.<br>➢ Understand Set theory, Function and Relation<br>➢ Learn about the theory of equations.<br>➢ Learn about the fundamental concepts of groups, Subgroups.<br>➢ 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.<br>**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-**

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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.
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Dr. S. Dashpute

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(Dr. S. Pashpulay) (Dr. P. K. Sahu)