Rayat Shikshan Sanstha's

Sadguru Gadage Maharaj College, karad

(An Autonomous College)

DEPARTMENT OF MATHEMATICS

Department of Mathematics

B.Sc. I

Semester I & II

NEP syllabus to be implemented from July 2023 Onwards

Major Papers

Semester: I

Subject Code: - MJ-BMT23-101

Paper I: Differential Calculus (Credit 02)

Course Outcomes (COs):

On completion of the course, the students will be able to:

1. calculate the limit and examine the continuity of a function at a point.
2. employ theorem on properties of continuity in various examples.
3. understand the consequences of various mean value theorems for differentiable functions.
4. understand Higher order derivatives, Taylor's theorem and indeterminate form

UNIT	**Contents**	**Hours Allotted**
1	**Limit And Continuity:** 1.1 Definition of limit of a real-valued function 1.2 Algebra of limits 1.3 Limit at infinity and infinite limits 1.4 Definition: Continuity at a point and Continuous functions on interval 1.5 Theorem: If f and g are continuous functions at point x = a, then f +g, f- g, f.g and f/g are continuous at point. 1.6 Theorem: Composite function of two continuous functions is continuous. 1.7 Examples on continuity. 1.8 Classification of Discontinuities (First and second kind), Removable Discontinuity, Jump Discontinuity.	08
2	**Properties of continuity of Real Valued functions:** 2.1 Theorem: If a function is continuous in the closed interval [a, b] then it is bounded in [a, b] 2.2 Theorem: If a function is continuous in the closed interval [a, b], then it attains its bounds at least once in [a, b]. 2.3 Theorem: If a function f is continuous in the closed interval [a, b] and if f(a) and f(b) are of opposite signs then there exists c□(a, b) suchthat f(c) = 0, 2.4 Theorem: If a function f is continuous in the closed interval [a, b] and if f (a) □ f(b) then f assumes every value between f (a) and f (b). 2.5 Uniform continuity.	05
3	**Differentiability:** 3.1 Differentiability of a real-valued function 3.2 Geometrical interpretation of differentiability 3.3 Relation between differentiability and continuity 3.4Chain rule of differentiation 3.5 Mean Value theorems: Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem 3.6 Geometrical interpretation of mean value theorems. 3.7 Partial differentiation	08
4	**Successive differentiation** 4.1 Successive differentiation definition and examples 4.2 Leibnitz's theorem and its application	09

	4.3Maclaurin's and Taylor's theorems 4.4 Maclaurin's and Taylor's expansion for standard function 4.5 Indeterminate form.	

Recommended Books:

1. Shanti Narayan, Dr. P. K. Mittal, Differential Calculus, S. Chand Publications

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

Reference Books:

1. Hari Kishan, Calculus, Atlantic Publishers.

2. Michael Spivak, Calculus, Cambridge University Press.

Subject Code: - MJ-BMT23-102

Paper II: Basic Algebra and Complex Numbers (Credit 02)

Course Outcomes (COs)

On completion of the course, the students will be able to:

1. understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots
2. employ De Moivre's theorem in a number of applications to solve numerical problems.
3. recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.
4. find eigenvalues and corresponding eigenvectors for a square matrix.

UNIT	Contents	Hours Allotted
1	**Theory of Equations** 1.1 Elementary theorems on the roots of an equations 1.2 The remainder and factor theorems, Synthetic division 1.3 Factored form of a polynomial. 1.4 The Fundamental theorem of algebra. 1.5 Relations between the roots and the coefficients of polynomial equations 1.6 Integral and rational roots.	07
2	**Complex Numbers:** 2.1 Introduction 2.2 Polar representation of complex numbers 2.3 De Moivre's theorem (integer and rational indices) 2.4 Roots of a complex number, expansion of $\cos n\theta, \sin n\theta$ 2.5 Euler's exponential form of a complex number 2.6 circular function and its periodicity 2.7 Hyperbolic function	08
3	**Matrices:** 3.1 Transpose of matrix, Conjugate of matrix, Transposed- conjugate of a matrix 3.2 Row reduction and echelon forms 3.3The rank of a matrix and applications, Inverse of matrix 3.4 Eigenvalues and eigenvectors of matrix 3.5 Cayley-Hamilton theorem and its application	08
4	**System of linear equations** 4.1 Homogeneous linear equations 4.2 Nature of solution of homogeneous equation 4.3 Non – Homogeneous linear equations 4.4 Working rule for finding solution of homogeneous equation 4.5 Examples.	07

Recommended Books:

1. W. S. Bunside and A. R. Panton: The Theory of Equations: With an Introduction to theTheory of Binary Algebraic Forms, Dover Phoenix Editions, 2005.
2. Brown and Churchill, Complex Variables and Applications, 7th Edition, McGraw Hill, 2010.
3. Serge Lang: Introduction to Linear Algebra, Second Edition, 1986

Reference Books:

1.M.L. Khanna, Theory of Equations, Jai Prakash Nath and Company

2.P.N. Wartikar, J.N. Wartikar, A Textbook of Applied Mathematics, Pune Vidyarthi Griha Prakashan, Pune

3.A. R. Vasishtha, A. K. Vasishtha, Matrices, Krishna Prakashan Media(P) Ltd,Meerut

4. S. Kumaresan, Linear Algebra: A Geometric Approach, Prentice Hall of India, New Delhi, 1999

Subject Code: - MJ-BMP23-103

Mathematical Practical-I

1. Rolle's theorem.
2. Lagrange's mean value
3. Indeterminate form.
4. Successive differentiation
5. Factor theorem and Synthetic division
6. De Moivre's theorem
7.. Eigenvalues and Eigenvectors
8. Cayley-Hamilton theorem
9. Homogeneous linear equation
10. Non homogeneous linear equation

Semester: II
Subject Code: - MJ-BMT23-201

Paper III: Differential Equations - I (Credit 02)

Course Outcomes (COs)
On completion of the course, the students will be able to:

1. learn various techniques of getting exact solutions of solvable first order differential equations and linear differential equations
2. calculate Particular integral and Complementary function of different types of differential equation
3. solve differential equation of degree more than one.
4. learn techniques of solving Clairaut's Equation.

UNIT	Contents	Hours Allotted
1	**Differential Equations of first order and first degree:** 1.1 Revision: Types of Differential equation, order and degree of Differential equation. 1.2 Definition: Exact Differential equations. 1.2.1 Theorem: Necessary and sufficient condition for exactness. 1.2.2 Working Rule for solving an exact differential equation 1.2.3 Integrating Factor (I.F.) by using rules (without proof). 1.3Linear Differential Equation: Definition, Method of solution. 1.4 Bernoulli's Differential Equation: Definition, method of solution 1.5 Orthogonal trajectories: Cartesian and polar co-ordinates.	08
2	**Linear Differential Equations with constant Coefficients:** 2.1 Definition: Complementary function (C.F.) and particular integral (P.I.), operator D. 2.2 General Solution of f(D) y=0. 2.2.1 Solution of f(D) y = 0 when A.E. has non-repeated real and complex roots. 2.2.3 Solution of f(D) y = 0 when A.E. has non-repeated roots real and complex roots. 2.3 Solution of D(y) = X, where X is of the form 2.3.1 $e^{ax}, where\ a\ is\ constant$ 2.3.2 $\sin(ax)\ and\ \cos(ax)$ 2.3.3 x^m, m is positive integer 2.3.4 $e^{ax}V, where\ V\ is\ a\ function\ of\ x$ 2.3.5 $xV, where\ V\ is\ a\ function\ of\ x.$	12
3	**Equations of first order but not first degree**: 3.1 Equations that can be factorized 3.1.1 Equation solvable for p 3.2 Equations that cannot be factorized 3.2.1 Equation solvable for x 3.2.2 Equation solvable for y	06
4	**Clairaut's Equation**: 4.1 Clairaut's form 4.2 Method of solution and examples	04

	4.3 Equation reducible to Clairaut’s form 4.4 Special form reducible to Clairaut’s form	

Recommended Books:

1. Daniel A. Murray, Introductory course in Differential Equations, Orient Longman

2. Diwan, Agashe, Differential Equations, Popular Prakashan, Mumbai

Reference Books:

1. M. L. Khanna, Differential Equations, Jai Prakash Nath and Company

2. Dr. M. D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand Publications

Subject Code: - MJ-BMT23-202

Paper IV: Geometry (Credit 02)

Course Outcomes (COs)

On completion of the course, the students will be able to:

1. define the translation, rotation and understand relation between rotation and translation.
2. estimate polar equation of circle, conic, chord, tangent.
3. understand the various equation form sphere.
4. learn various equation forms of cone.

UNIT	Contents	Hours Allotted
1	**Changes of axes:** 1.1 Translation 1.2 Rotation 1.3 Translation and Rotation 1.4 Rotation followed by Translation 1.5 Translation followed by Rotation 1.6 Invariants, Basic theorems	06
2	**Polar Coordinates** 2.1 Polar equation of circle: 2.1.1 Centre – radius form 2.1.2 Centre at the pole 2.1.3 Passing through the pole and touching the polar axis at the pole 2.1.4 Passing through the pole and with centre on the initial line 2.1.5 Passing through the pole and the diameter through pole making an angle α with initial line 2.2 Equation of chord, tangent and normal to the circle $r = 2acos\theta$ 2.3 Polar equation of a conic in the form $\frac{l}{r} = 1 \pm ecos\theta$ 2.4 Polar equation of a conic in the form $\frac{l}{r} = 1 \pm ecos(\theta - \alpha)$ 2.5 chord, tangent and normal of conic	08
3	**Sphere:** 3.1 Equation in different form of sphere 3.1.1 Centre – radius form 3.1.2 General form 3.1.3 Diameter form 3.1.4 Intercept form 3.2 Intersection of sphere with straight line and a plane 3.3 Power of a point and radical plane 3.4 Tangent plane and condition of tangency 3.5 Equation of circle 3.6 Intersection of (i) two sphere (ii) a sphere and plane 3.7 Orthogonality of two spheres	09
4	**Cone** 4.1 Definitions of cone, vertex, generators 4.2 Equation of a cone with vertex at a point (X_1, Y_1, Z_1) 4.3 Equation of a cone with vertex at origin	07

	4.4 Right circular cone and equation of a right circular cone 4.5 Enveloping cone and equation of an enveloping cone 4.6 Equation of a tangent plane 4.7 Condition of tangency	

Recommended Books:

1. Shanti Narayan: Analytical Solid Geometry, S. Chand and Company Ltd, New Delhi, 1998.

Reference Books:

1. S.P. Patankar, S.P. Thorat, Geometry, Nirali Prakashan.

2. Askwyth, E. H: The Analytical Geometry of the Conic Sections.

3. P.K.Jain and Khalil Ahmad, A Textbook of Analytical Geometry of Three Dimensions, Wiley Estern Ltd. 1999.

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Subject Code: - MN-BMP23-203

Mathematical Practical-I

Practical: Examples on

1. Exact differential equation
2. Orthogonal trajectories
3. D(y) = X, where X is of the form $e^{ax}, where\ a\ is\ constan$,$\sin(ax)\ and\ \cos(ax)$
4. D(y) = X, where X is of the form x^m, m is positive integer, $e^{ax}V$, where V is function of X
5. Equation solvable for p
6. reducible to Clairaut's equation
7. Translation
8. Rotation
9. Polar coordinates
10. Equation of sphere in different forms

Minor Papers

Semester: I

Subject Code: - MN-BMT23-101

Paper I: Differential Calculus (Credit 02)

Course Outcomes (COs):

On completion of the course, the students will be able to:

1. calculate the limit and examine the continuity of a function at a point.
2. employ theorem on properties of continuity in various examples
3. understand the consequences of various mean value theorems for differentiable functions.
4. understand Higher order derivatives, Taylor’s theorem and indeterminate form

UNIT	Contents	Hours Allotted
1	**Limit And Continuity:** 1.1 Definition of limit of a real-valued function 1.2 Algebra of limits 1.3 Limit at infinity and infinite limits 1.4 Definition: Continuity at a point and Continuous functions on interval 1.5 Theorem: If f and g are continuous functions at point x = a, then f +g, f- g, f.g and f/g are continuous at point. 1.6 Theorem: Composite function of two continuous functions is continuous. 1.7 Examples on continuity. 1.8 Classification of Discontinuities (First and second kind), Removable Discontinuity, Jump Discontinuity.	08
2	**Properties of continuity of Real Valued functions:** 2.1 Theorem: If a function is continuous in the closed interval [a, b] then it is bounded in [a, b] 2.2 Theorem: If a function is continuous in the closed interval [a, b], then it attains its bounds at least once in [a, b]. 2.3 Theorem: If a function f is continuous in the closed interval [a, b] and if f(a) and f(b) are of opposite signs then there exists c□(a, b) suchthat f(c) = 0, 2.4 Theorem: If a function f is continuous in the closed interval [a, b] and if f (a) □ f(b) then f assumes every value between f (a) and f (b). 2.5 Uniform continuity.	05
3	**Differentiability:** 3.1 Differentiability of a real-valued function 3.2 Geometrical interpretation of differentiability 3.3 Relation between differentiability and continuity 3.4Chain rule of differentiation 3.5 Mean Value theorems: Rolle’s theorem, Lagrange’s mean value theorem, Cauchy’s mean value theorem 3.6 Geometrical interpretation of mean value theorems. 3.7 Partial differentiation	08
4	**Successive differentiation:** 4.1 Successive differentiation 4.2 Leibnitz’s theorem and its application 4.3Maclaurin’s and Taylor’s theorems 4.4 Maclaurin’s and Taylor’s expansion for standard function Indeterminate form.	09

Recommended Books:

1. Shanti Narayan, Dr. P. K. Mittal, Differential Calculus, S. Chand Publications
2. Gorakh Prasad (2016). Differential Calculus (19 th edition). Pothishala Pvt. Ltd.

Reference Books:

1. Hari Kishan, Calculus, Atlantic Publishers.
2. Michael Spivak, Calculus, Cambridge University Press

Subject Code: - MN-BMT23-102

Paper II: Basic Algebra and Complex Numbers (Credit 02)

Course Outcomes (COs)

On completion of the course, the students will be able to:

1. understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots
2. employ De Moivre's theorem in a number of applications to solve numerical problems.
3. recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.
4. find eigenvalues and corresponding eigenvectors for a square matrix.

UNIT	Contents	Hours Allotted
1	Theory of Equations 1.1 Elementary theorems on the roots of an equations 1.2 The remainder and factor theorems, Synthetic division 1.3 Factored form of a polynomial. 1.4 The Fundamental theorem of algebra. 1.5 Relations between the roots and the coefficients of polynomial equations 1.6 Integral and rational roots.	07
2	Complex Numbers: 2.1 Introduction 2.2 Polar representation of complex numbers 2.3 De Moivre's theorem (integer and rational indices) 2.4 Roots of a complex number, expansion of $\cos n\theta, \sin n\theta$ 2.5 Euler's exponential form of a complex number 2.6 circular function and its periodicity 2.7 Hyperbolic function	08
3	Matrices: 3.1 Types of matrix: Triangular matrix, Symmetric matrix, Skew-symmetric matrix, singular matrix, non-singular matrix 3.2 Transpose of matrix, Conjugate of matrix, Transposed- conjugate of a matrix, Hermition matrix, Skew- Hermition matrix 3.3 Row reduction and echelon forms 3.4The rank of a matrix and applications, Inverse of matrix 3.5 Eigen values and eigen vectors of matrix 3.6 Cayley-Hamilton theorem and its application	08
4	System of linear equations 4.1 Homogeneous linear equations 4.2 Nature of solution of AX = 0 4.3 Non – Homogeneous linear equations 4.4 Working rule for finding solution of AX = B 4.5 Examples.	07

Recommended Books:

1. W. S. Bunside and A. R. Panton:The Theory of Equations: With an Introduction to the Theory of Binary Algebraic Forms, Dover Phoenix Editions, 2005.

2. Brown and Churchill, Complex Variables and Applications, 7th Edition, McGraw Hill, 2010.

3. Serge Lang: Introduction to Linear Algebra, Second Edition, 1986

Reference Books:

1.M.L.Khanna, Theory of Equations, Jai Prakash Nath and Company

2.P.N. Wartikar, J.N. Wartikar, A Textbook of Applied Mathematics, Pune Vidyarthi Griha Prakashan, Pune

3.A. R. Vasishtha, A. K. Vasishtha, Matrices, Krishna Prakashan Media(P) Ltd,Meerut

4. S. Kumaresan, Linear Algebra: A Geometric Approach, Prentice Hall of India, New Delhi, 1999

Subject Code: - MN-BMP23-103

Mathematical Practical-I

Practicals: Examples on

1. Rolle’s theorem.
2. Lagrange’s mean value
3. Indeterminate form.
4. Successive differentiation
5. Factor theorem and Synthetic division
6. De Moivre’s theorem
7. Eigenvalues and Eigenvectors
8. Cayley-Hamilton theorem
9. homogeneous linear equation
10. homogeneous linear equation

Semester: II

Subject Code: - MN-BMT23-201

Paper III: Differential Equations - I (Credit 02)

Course Outcomes (COs)

On completion of the course, the students will be able to:

1. learn various techniques of getting exact solutions of solvable first order differential equations and linear differential equations
2. calculate P.I and C.F. of different types of differential equation
3. solve differential equation of degree more than one.
4. learn techniques of solving Clairaut's Equation.

UNIT	Contents	Hours Allotted
1	**Differential Equations of first order and first degree:** 1.1 Revision: Definition of Differential equation, order and degree of Differential equation. 1.2 Definition: Exact Differential equations. 1.2.1 Theorem: Necessary and sufficient condition for exactness. 1.2.2Working Rule for solving an exact differential equation 1.2.3 Integrating Factor (I.F.) by using rules (without proof). 1.3 Linear Differential Equation: Definition. 1.3.1 Method of solution. 1.4 Bernoulli's Differential Equation: Definition. 1.4.1 Method of solution. 1.5 Orthogonal trajectories: Cartesian and polar co-ordinates.	08
2	**Linear Differential Equations with constant Coefficients:** 2.1 Definition: Complementary function (C.F.) and particular integral (P.I.), operator D. 2.2 General Solution of f(D) y=0. 2.2.1 Solution of f (D) y = 0 when A.E. has non-repeated roots. 2.2. 2 Solution of f (D) y = 0 when A.E. has repeated roots. 2.2.3 Solution of f (D) y = 0 when A.E. has non-repeated roots real and complex roots. 2.3 Solution of D(y) = X, where X is of the form 2.3.1 $e^{ax}, where\ a\ is\ constant$ 2.3.2 $\sin(ax)\ \ and\ \cos(ax)$ 2.3.3 x^m, m is positive integer 2.3.4 $e^{ax}V, where\ V\ is\ a\ function\ of\ x$ 2.3.5 $xV, where\ V\ is\ a\ function\ of\ x.$	12
3	**Equations of first order but not first degree:** 3.1 Equations that can be factorized 3.1.1 Equation solvable for p 3.2 Equations that cannot be factorized 3.2.1 Equation solvable for x 3.2.2 Equation solvable for y	06
4	**Clairaut's Equation:** 4.1 Clairaut's form 4.2 Method of solution	04

	4.3 Equation reducible to Clairaut’s form 4.4 Special form reducible to Clairaut’s form	

Recommended Books:

1. Daniel A. Murray, Introductory course in Differential Equations, Orient Longman

2. Diwan, Agashe, Differential Equations, Popular Prakashan, Mumbai

Reference Books:

1. M. L. Khanna, Differential Equations, Jai Prakash Nath and Company

2. Dr. M. D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand Publications

Subject Code: - MN-BMT23-202

Paper IV: Geometry (Credit 02)

Course Outcomes (COs)

On completion of the course, the students will be able to:

1. define the translation, rotation and understand relation between rotation and translation.
2. estimate polar equation of circle, conic, chord, tangent.
3. understand the various equation form sphere.
4. learn various equation forms of cone.

UNIT	Contents	Hours Allotted
1	**Changes of axes:** 1.1 Translation 1.2 Rotation 1.3 Translation and Rotation 1.4 Rotation followed by Translation 1.5 Translation followed by Rotation 1.6 Invariants, Basic theorems	06
2	**Polar Coordinates** 2.1 Polar equation of circle: 2.1.1 Centre – radius form 2.1.2 Centre at the pole 2.1.3 Passing through the pole and touching the polar axis at the pole 2.1.4 Passing through the pole and with center on the initial line 2.1.5 Passing through the pole and the diameter through pole making an angle α with initial line 2.2 Equation of chord, tangent and normal to the circle $r = 2a\cos\theta$ 2.3 Polar equation of a conic in the form $\frac{l}{r} = 1 \pm e\cos\theta$ 2.4 Polar equation of a conic in the form $\frac{l}{r} = 1 \pm e\cos(\theta - \alpha)$ 2.5 chord, tangent and normal of conic	08
3	**Sphere:** 3.1 Equation in different form 3.1.1 center – radius form 3.1.2 General form 3.1.3 Diameter form 3.1.4 Intercept form 3.2 Intersection of sphere with straight line and a plane 3.3 Power of a point and radical plane 3.4 Tangent plane and condition of tangency 3.5 Equation of circle 3.6 Intersection of (i) two sphere (ii) a sphere and plane 3.7 Orthogonality of two spheres	09
4	**Cone** 4.1 Definitions of cone, vertex, generators 4.2 Equation of a cone with vertex at a point (X_1, Y_1, Z_1) 4.3 Equation of a cone with vertex at origin 4.4 Right circular cone and equation of a right circular cone	07

	4.5 Enveloping cone and equation of an enveloping cone 4.6 Equation of a tangent plane 4.7 Condition of tangency	

Recommended Books:

1. Shanti Narayan: Analytical Solid Geometry, S. Chand and Company Ltd, New Delhi, 1998.

Reference Books:

1. S.P. Patankar, S.P. Thorat, Geometry, Nirali Prakashan.

2. Askwyth, E. H: The Analytical Geometry of the Conic Sections.

3. P.K.Jain and Khalil Ahmad, A Textbook of Analytical Geometry of Three Dimensions, Wiley Estern Ltd. 1999.

Subject Code: - MJ-BMP23-203

Mathematical Practical-I

Practicals: Examples on

1. Exact differential equation
2. Orthogonal trajectories
3. D(y) = X, where X is of the form e^{ax}, $where\ a\ is\ constan$, sin(ax) and cos(ax)
4. D(y) = X, where X is of the form x^m, m is positive integer, $e^{ax}V$, where V is function of x
5. Equation solvable for p
6. Reducible to Clairaut's equation
7. Translation
8. Rotation
9. Polar coordinates
10. Equation of sphere in different forms

Paper Code: - GE-BMT23-101

Logical Reasoning (Credit 02)

Course Outcome (COs)

On completion of the course, the students will be able to:

1. understand the basic concepts of logical reasoning Skills
2. understand basic concepts Integers, Rational and Irrational numbers.
3. solve the problems on Clock Train and Calendar
4. solve campus placements aptitude papers covering Quantitative Ability, Logical reasoning Ability

UNIT	Contents	Hours Allotted
1	1.1 Number system 1.2 Fractions 1.3 Surds and Indices 1.4 Squares and Square Roots 1.5 Cubes and Cube Roots 1.6 HCF and LCM 1.7 Logarithm	08
2	2.1 Alphabet 2.2 Series 2.3 Analogy 2.4 Coding/ Decoding 2.5 Blood Relationship	10
3	3.1 Distance and direction 3.2 Ranking/ arrangement 3.3 Syllogism 3.4 Inequalities 3.5 Problems Based on Ages	06
4	4.1 Problems on Clock 4.2 Problems on Calendar 4.3 Problem solving	06

Reference Books:

R. S. Aggarwal, A Modern Approach to Verbal Non Verbal Reasoning, S. Chand Publications

Paper Code: - GE-BMT23-102
Quantitative aptitude (Credit 02)

Course Outcomes (COs)
On completion of the course, the students will be able to:

1. Understand the basic concepts of quantitative ability
2. Familiarize basic concepts of Permutation and Combinations.
3. Solve geometrical problems by using short-cut method
4. Compete in various competitive exams like CAT, CMAT, GRE, GATE,UPSC, GPSC etc.

UNIT	Contents	Hours Allotted
1	1.1 Progression and Sequence 1.2 Series 1.3 Progression and Sequence 1.4 Fractions	06
2	2.1Percentage 2.2Profit and Loss 2.3 Allegation and Mixtures 2.4 Ratio and Proportion	08
3	3.1Triangles 3.2Quadrilaterals 3.3Circles 3.4Cylinders 3.5Cones 3.6Spheres	10
4	4.1 Permutation 4.2 Combination	06

Reference Books:

R. S. Aggarwal, Quantitative Aptitude, S. Chand Publications

Subject Code: - GE-BMP23-103

Mathematical Practical-I

1. HCF and LCM
2. Coding/ Decoding
3. Problem based on ages
4. Problem on clocks
5. Problem on calendars
6. Series
7. Percentage
8. Triangle
9. Cones
10. Permutation and Combination

SEMESTER II
Subject Code: GE-BMT23-201
Quantitative Analysis (Credit 02)

Course Outcomes (COs)
On completion of the course, the students will be able to:

1. understand basic concepts Polynomials, Quadratic equations
2. understand basic concepts of simple and compound interest.
3. interpret the bar, pie, line chart
4. analyze the problems on Heights, Distances and speed

UNIT	Contents	Hours Allotted
1	1.1 Algebra of Polynomials 1.2 Quadratic Equations 1.3 Partnership 1.4 Simple Interest. 1.5 Compound Interest	08
2	2.1 Time, Speed and distance 2.1 Time and Work 2.3 Boat streams 2.4 Height and Distance 2.5 Relative speed	10
3	3.1 Work and Wages 3.2 Pipes and Cistern 3.3 Allegation 3.4 Problems on Trains 3.5 Averages	06
4	4.1 Tabulation 4.2 Line Chart 4.3 Pie chart 4.4 Bar Chart	06

Reference Books:

1.R. S. Aggarwal, Quantitative Aptitude, S. Chand Publications

Subject Code: - GE-BMT23-202

Introduction to Business Mathematics (Credit 02)

Course Outcomes (COs)
On completion of the course, the students will be able to:

1. find determinant of second and third order matrices and inverse of matrix by adjoint method
2. understand basic concept of set theory and recognize different types of functions
3. Solve examples on permutation and combination
4. Learn to find feasible solution of linear programming problem.

UNIT	Contents	Hours Allotted
1	Determinants and Matrices: 1.1 Determinant and Matrix 1.1.1 Definition of second and third order determinant 1.1.2Condition of consistency 1.1.3 properties of determinant (thermos on determinant) 1.1.4Cramer’s rule, Area of triangle and collinearity of three points and examples 1.2 Definition of matrix 1.3Types of matrices 1.4 Equality of matrices 1.5 Algebra of matrices (Addition and Subtraction of matrices, scalar multiplication and Multiplication of matrices) 1.6 Transpose of matrices and examples 1.7 Inverse of matrix, minor and cofactors, Finding the inverse of matrix by using ad-joint method.	10
2	Permutation and combination: 2.1 Introduction 2.2 Sum and product rule 2.3 Permutation and circular permutations 2.4 Permutations with restrictions 2.4 Combinations 2.5 Some properties and Some results	08
3	Set theory: 3.1 set, subset, types of set 3.2 Relations 3.2.1 Types of relation 3.3 Function 3.3.1 Types of function	06
4	Linear Programming Problem 4.1 Introduction, Definition: Linear Programming 4.2 Objective function, decision variables, constraints, Formulation of L.P.P. (Two variable only) 4.3 Definition: Solution to L.P.P., Feasible Solution, Optimal Solution, Solution of L.P.P. by graphical method (Cases having no solution, multiple solutions, unbounded solution) Examples.	06

Reference Books:

1. Kumbhojkar G.V., Business Mathematics

2. Shantinarayan, Text Book of Matrices

3. Soni R. S., Business Mathematics

Subject Code: - GE-BMP23-203

Mathematical Practical-I

1. Simple and compound interest
2. Time and work
3. 3.Work and wages
4. Averages
5. Line, bar, pie chart
6. Determinants
7. Inverse of matrix by adjoint method
8. Permutation and combination
9. Set theory
10. Solution of L.P.P. by graphical method

SEMESTER I

(IKS)

Subject Code: IKSM23-101

Mathematics in Ancient India (Credits – 02)

Course Outcomes (COs)
On completion of the course, the students will be able to:

- An overview of the Development of Mathematics in India
- Mathematics contained in the Sulbasutra
- Weaving Mathematics into Beautiful Poetry
- The Evolution of Sine Function in India

UNIT	Contents	Hours Allotted
1	Geometry in the ´Sulvasutras	08
2	Development of Decimal System in India	08
3	Ganitpad of Aryabhatta	08
4	Work of Bhaskaracharya	06

Reference Books:

1. Studies in the History of Indian Mathematics, C.S. Seshadri (Editor),Hindustan Book Agency, 2010.
2. Aryabhattacha Ganitapadvatyacha Marathi anuvad, S. K. Abhyankar, Bhaskaracharya Pratishthana, 1979.
3. The Mathematics of India Concepts, Methods, Connections, P. P. Divakaran, Hindustan Book Agency, 2018.

SEMESTER II

SEC-I

Subject Code:

SECM23-201

Foundation of Mathematics (credits -02)

Course Outcomes (COs)
On completion of the course, the students will be able to:

1. Describe fundamentals of set theory, relations, functions, equivalence classes.
2. Apply techniques of proof to prove the statement in different ways.
3. Evaluate the images and inverse images of elements under functions.
4. Analyze statements logically and write it using quantifiers

UNIT	Contents	Hours Allotted
1	Statements and Logic 1.1 Statements 1.2 Statements with quantifiers 1.3 Compound Statements 1.4 Implications	06
2	Sets and Relations : 2.1Definition 2.2Operations on sets 2.3Family of sets, Power set, Cartesian product of sets2.4Types of relation 2.5 Equivalence relations 2.6 Equivalence classes and partition of set.	10
3	Functions: 3.1 One-one function 3.2 Onto function 3.3 Bijective function 3.4Composition of functions 3.5Inverse of function, Inverse Image of sets	07
4	Induction Principle 3.1 The induction principle 3.2 The strong induction principle 3.3 Well-ordering principle	07

Recommended Books:

1. Ajit Kumar, S. Kumaresan and B. K. Sarma, A Foundation Course in Mathematics, Narosa

Reference Books:

1. Robert Bartle and Donald Sherbert, Introduction to real Analysis (Fourth Edition), John Wiley and Sons Inc.
2. Kenneth Rosen, Discrete Mathematics and its Applications (Seventh Edition), Mc Graw Hill.