Sant Gadge Baba Amravati University, Amravati

Syllabus for B. Sc. I (Sem I & Sem II) NEP 2024-25

Mathematics

Faculty: Science and Technology

Programme: B. Sc. (Mathematics)

POs:

At the end of the programme, graduates would be able to

1. Enhance the knowledge of the student's in all basic Ssciences.
2. Identify, formulate and develop solutions to computational challenges.
3. Develop scientific temper and think in a critical manner.
4. Build up progressive and successful career in academics, industry and society.
5. Develop student's abilities and aptitudes to apply the mathematical ideas.

PSOs:

Upon completion of the programme successfully, students would be able to

1. Understand major concepts in all disciplines of Mathematics.
2. Formulate and develop mathematical arguments in a logical manner.
3. Gain good knowledge and understanding in advanced Mathematics.
4. Create an awareness of the impact of Mathematics on the environment, society and development outside the scientific community.
5. Create sensitivity towards environmental concerns and contribute in the development of nation.

Employability Potential of the Programme:

Career options for B. Sc. Mathematics students is not just limited to solving complex equation.

Apart from the traditional career route of academics and research, there are many career options offer for B. Sc. Mathematics students that can pick up Banking, Corporate Sector, Accounting and even Teaching field as their career option on completion of B. Sc. Mathematics, even a career in medicine and law is possible for Mathematics students. Also, a degree with Mathematics is even financially supporting for students because they help in landing placement opportunities by giving an edge over students with B. Sc. physics or other major.

After completing B. Sc. Mathematics, a student can either decide to go for higher studies or apply for jobs. In the case of B. Sc. Mathematics, both the options are very promising. After the B. Sc. Mathematics course, students can pursue M. Sc. Mathematics and follow it up with an M. Phil. or Ph. D. students can become a mathematicians' doing research and also become as Assistant Professor. Also,

students can pursue a B. Ed. and become a School Teacher. Moreover, student can work in related field which required mathematical skills (Machine Learning, Data Science etc.). Thus, there exist innumerable B. Sc. Mathematics career options.

The best way to get a prestigious government job is through competitive exams. Exams like UPSC, Railway Rrecruitment Board and Staff Selection Commission etc. are some important competitive examinations that one need to consider as portals for B. Sc. Mathematics career options.

Syllabus Prescribed for the year 2024-25, UG Program (NEP)

Program: B. Sc.- I (Mathematics) Semester - I

Course Code / Subject: 126200 / Mathematics

The Vertical/ Type of Course: Major/Minor: Theory -1

Course Name: Algebra and Calculus

Total Number of Hours / Week: 2 Hrs.

Unit	**Content**
Unit I	Rank of a Matrix, Row Rank, Column Rank, Eigen Values, Eigen Vectors and the Characteristic Equation of a Matrix, Cayley-Hamilton theorem, Inverse by Cayley-Hamilton theorem. **(08 Hrs.)**
Unit II	De Moivre's theorem, Roots of Complex Number, Circular Functions, Hyperbolic Function, Inverse Hyperbolic Function, Relation between Circular Functions and Hyperbolic Functions. **(07 Hrs.)**
Unit III	Limit of a function, ε-δ definition, basic properties of limits, some standard limits, Continuous and Discontinuous functions, Types of Discontinuity. **(08 Hrs.)**
Unit IV	Rolle's theorem, Lagrange's Mean Value theorem, Cauchy's Mean Value theorem, Maclaurin's and Taylor's series expansions. **(07 Hrs.)**
Course Outcomes: After successful completion of this course students will able to: **CO1:** Evaluate the Characteristic equation, Eigen Value and corresponding Eigen Vector of a given matrix. **CO2:** Study applications of De Moivre's theorem. **CO3:** Study of Limit and Continuity of function and its basic properties. **CO4:** Describe the applicability of mean value theorems.	
Internal Assessment **(20 Marks)**	**1.** Two Unit Tests **(10 Marks each)** a. Unit Test 1: MCQ based b. Unit Test 2: Descriptive (Consider best of one for Internal Assessment) **2.** Assignment **(05 Marks)** **3.** Field Work / Quiz / Mini Project Work / Attendance **(05 Marks)**

Text Book:

1] V. A. Sharma, S. R. Bhoyar, V. R. Patil, G. U. Khapekar, A. N. Rangari: A Course of Algebra and Calculus, Dnyanpath Publication, Amravati, (M. S.) India, First Edition, 2024.

Reference Books:

1] V. A. Sharma, V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. N. Rangari: A Text book of Algebra and Trigonometry, Dnyanpath Publication, Amravati, First Edition, 2022.
2] V. A. Sharma, V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. N. Rangari: A Text book of Differential and Integral Calculus, Dnyanpath Publication, Amravati, First Edition, 2022.
3] T. M. Karade, Maya S. Bendre, V. G. Mete, V. P. Kadam, S. N. Bayaskar, P. P. Khade, Priyanka B. Gaikwad: Elements of Algebra and Calculus. Sonu-Nilu, Nagpur, 2024.
4] K. B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi, 2000.
5] H. S. Hall and S. R. Knight, Higher Algebra, H. M. Publications, 1994.
6] Hohn Franz E: Elementary Matrix Algebra, Amerind Publishing Co., Pvt. Ltd. 1964.
7] Ayres Jr Frank: Matrices: Schaum's outline series, McGraw Hill Book Company, Singapore, 1983.
8] Shanti Narayan: A Test Book of Matrices, S. Chand & Co. Delhi.
9] Shanti Narayan and Dr. P. K. Mittal: Differential Calculus by, S. Chand and Co. Ltd. Revised Edition 2012 (Reprint 2014).
10] Gorakh Prasad:Text book on Differential Calculus by, Pothishala Private limited Allahabad.
11] Ayres F :Calculus, Schaum's outline series, Mc Graw Hill, 1981.
12] Mac Millan: Differential calculus by Edwards, and Co. Ltd.
13] N. Bali: Golden Differential Calculus, Laxmi Publication Pvt Ltd.
14] Murray and R Spiegel :Theory and Problems on Advance Calculus by, Schaum Pub. Co. New York.
15] Edwards J : Differential Calculus for Beginners, MacMillan and Co.Ltd.,1963.
16] Greenspan D. : Introduction to Calculus, Harper and Row, 1968.
17] Gorakh Prasad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad, 1963

Program: B. Sc.- I (Mathematics) Semester - I

Course Code / Subject: 126201 / Mathematics

The Vertical/ Type of Course: Major/Minor: Lab Course – I

Course Name: Practical Based on **Algebra and Calculus** (126200)

Total Number of Hours / Week: 4 Hrs.

Course Outcomes:

After successful completion of this course students will able to:

CO1: Evaluate the Characteristic equation, Eigen Values and corresponding Eigen Vectors of a given Matrix.
CO2: Study applications of De Moivre's theorem.
CO3: Define Limit and study the basic properties.
CO4: Classify Continuity and Discontinuity of the functions.
CO5: Describe the geometrical applications of mean value theorems.

Sr. No.	List of Practical's to be covered		No. of Examples
Practical Based on Elements of Algebra and Calculus (126200)			
1	To compute Rank, Row Rank and Column Rank of a Matrix.		03
2	To find Eigen values and Eigen vectors of a given matrix.		03
3	To verify Cayley- Hamilton theorem for the given matrix.		03
4	To apply De Moivre's theorem for solution of given polynomial equation.		03
5	To discuss the relation between Circular Functions and Hyperbolic Functions.		03
6	To separate real and imaginary parts of a Circular and Hyperbolic functions.		03
7	To explain basic properties of limit of function (Uniqueness, Addition, subtraction, multiplication and division of two functions).		03
8	To find δ, by using ε-δ definition of limit for various functions.		03
9	To explain the types of discontinuity with various examples		03
10	To discuss applicability of Rolle's mean value theorem for various functions.		03
11	To discuss applicability of Lagrange's and Cauchy's mean value theorem for various functions.		03
12	To discuss applicability of Taylors and Maclaurin's series of expansions for various functions.		03
Practical Assessment (50 Marks)	Internal Practical Assessment **(25 Marks)**	**1.** Practical Record- **15 Marks** **2.** Viva voce – **10 Marks**	
	External Practical Assessment **(25 Marks)**	**1.** Practical Perform – **20 Marks** (Perform any four, each carry **05 Marks**) **2.** Viva voce- **05 Marks**	

Text Book:

1] V. A. Sharma, S. R. Bhoyar, V. R. Patil, G. U. Khapekar, A. N. Rangari : A Course of Algebra and Calculus, Dnyanpath Publication, Amravati (MS), India, First Edition, 2024.

Reference Books:

1] V. A. Sharma, V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. N. Rangari : A Text book of Algebra and Trigonometry, Dnyanpath Publication, Amravati, First Edition, 2022.
2] V. A. Sharma, V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. N. Rangari : A Text book of Differential and Integral Calculus: Dnyanpath Publication, Amravati, First Edition, 2022.
3] Om P. Chug, Kulbhushan Prakash, A. D. Gupta: Topics in Algebra, Anmol Publications Pvt. Ltd., New Delhi, First Edition 1997.
4] Shanti Narayan and Dr. P. K. Mittal: Differential Calculus by, S. Chand and Co. Ltd. Revised Edition 2012 (Reprint 2014).
5] Shanti Narayan : A text books of Matrices, S. Chand & Company Ltd, Ram Nagar, New Delhi.
6] K.B. Datta: Matrix & Linear Algebra, DHI Publication.

7] Shanti Narayan: Differential Calculus by, S. Chand and Co. Ltd.
8] Gorakh Prasad:Text book on Differential Calculus by, Pothishala Private limited Allahabad.
9] Ayres F :Calculus, Schaum's outline series, Mc Graw Hill, 1981.
10] Mac Millan: Differential calculus by Edwards, and Co. Ltd.
11] N. Bali: Golden Differential Calculus, Laxmi Publication Pvt Ltd.
12] Murray and R Spiegel :Theory and Problems on Advance Calculus by, Schaum Pub. Co. New York.
13] Edwards J : Differential Calculus for Beginners, MacMillan and Co.Ltd.,1963.
14] Greenspan D. : Introduction to Calculus, Harper and Row, 1968.
15] Gorakh Prasad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad, 1963.

Program: B. Sc.- I (Mathematics) Semester- I

Course Code / Subject: 126202 / Mathematics

The Vertical/ Type of Course: Generic/ Open Elective / Theory 1

Course Name: Foundation of Mathematics

Total Number of Hours / Week: 2 Hrs.

Unit	Content
Unit I	**Number System:** Natural numbers, properties of Natural numbers, Integers, Rational and Irrational numbers, Real numbers, properties of Real numbers. **(07 Hrs.)**
Unit II	**Co- ordinates Systems and Graphs of Equations:** The co-ordinate of a point on a line, Absolute value, co-ordinate of a point in a plane, Distance formula, Midpoint formulas, Graphs of equation, Straight Line, Slope, Equation of a Line, Parallel Lines, Perpendicular Lines. **(08 Hrs.)**
Unit III	**Sets:** Describing a Set, Subsets, Set operations, indexed collections of sets, partitions of sets, Cartesian Product of sets, Numerically equivalent sets. **(07 Hrs.)**
Unit IV	**Relations and Functions:** Relations, properties of Relations, Equivalence Relations, properties of Equivalence Classes, definition of Function, set of all functions from A to B, one to one and onto functions, Bijective functions, Composition of functions, Inverse Functions. **(08 Hrs.)**
Course Outcomes: After successful completion of this course students will able to: **CO1:** Classify Number System and discuss properties of Real numbers. **CO2:** Find slopes of line and to write the equations of line. **CO3:** Describe sets and perform the basic set operations. **CO4:** Define and identify an equivalence relation and classify the functions.	
Internal Assessment **(20 Marks)**	**1.** Two Unit Tests **(10 Marks each)** a. Unit Test 1: MCQ based b. Unit Test 2: Descriptive (Consider best of one for Internal Assessment) **2.** Assignment **(05 Marks)** **3.** Field Work / Quiz / Mini Project Work / Attendance **(05 Marks)**

Text Book:

1] V. A. Sharma, V. R. Patil, G. U. Khapekar, S. R. Bhoyar, A. N. Rangari: A Text Book of Foundation of Mathematics, Dnyanpath Publication, Amravati (MS), India, First Edition, 2024.

Reference Books:

1] George B. Thomas, Jr. And Ross I.: Finney Calculus and Analytical Geometry (Pearson).

2] Gary Chartrand, Albert D. Polimeni and Ping Zhang:Mathematical Proof A Transition to Advanced Mathematics, 3rd Edition, Pearson.

3] Ian Stewart and Daavid Tall : The Foundations of Mathematics, 2nd Edition, Oxford.

Program: B. Sc.- I (Mathematics) Semester- I

Course Code / Subject: 126203 / Mathematics

The Vertical/ Type of Course: Generic/ Open Elective / Theory - 2

Course Name: Financial Mathematics-I

Total Number of Hours / Week: 2 Hrs.

Unit	**Content**
Unit I	Fractions, Decimal Numbers, Algebra of Numbers. **(07 Hrs.)**
Unit II	Profit and Loss, Percentages, Averages. **(07 Hrs.)**
Unit III	Ratio and Proportion, Simple and Compound Interest. **(08 Hrs.)**
Unit IV	Data Interpretation, Linear Programming Problem. **(08 Hrs.)**

Course Outcomes:

After successful completion of this course students will able to:
CO1: Solve the problems using the concepts of fractions, decimal numbers and algebra of numbers.
CO2: Analyse the financial problems using the concepts of profit, loss, percentages and averages.
CO3: Evaluate the financial condition based on one's income or expenditure using the concepts of ratio, proportion and interest etc.
CO4: Apply the techniques of LPP to solve real world problems.

Internal Assessment **(20 Marks)**	**1.** Two Unit Tests **(10 Marks each)** a. Unit Test 1: MCQ based b. Unit Test 2: Descriptive (Consider best of one for Internal Assessment) **2.** Assignment **(05 Marks)** **3.** Field Work / Quiz / Mini Project Work / Attendance **(05 Marks)**

Text Book:

1] V. A. Sharma, G. U. Khapekar, S. R. Bhoyar, V. R. Patil, S. R. Kumbhare : A Text Book of Financial Mathematics-I, Dnyanpath Publication, Amravati (MS), India, First Edition, 2024.

Reference Books:

1] K. Selva Kumar: Financial Mathematics and its Applications, Notion Press Chennai.
2] A. Lenim Jothi: Financial Mathematics, Himalaya Publication, Mumbai, No. 1, 2009.
3]A. P. Verma: Business Mathematics, Asian Books Private Limited, New Delhi, No. 3 January 2007.

Program: B. Sc.- I (Mathematics) Semester- I

Course Code / Subject: 126204 / Mathematics

The Vertical/ Type of Course: SEC (Skill Enhancement Course) / Lab Course 2

Course Name: Applied Mathematics

Total Number of Hours/ Week: 4 Hrs.

Unit	Content
Unit I	**Mensuration:** Perimeter of Circle, Square and Rectangle, Area of Circle, Square, Rectangles and Triangles, Surface Area of Cylinder, Sphere, Cone. **(07 Hrs.)**
Unit II	**Time, Work, Wages:** Introduction, Finding Time and Amount of Work, Finding Speed, Distance and Time, Finding Speed of Boats and Stream. **(08 Hrs.)**
Unit III	**Trigonometry:** Degree and Radian, Trigonometric Ratio and Identities, Angle of Elevation and Depression, Height and Distance Problem. **(08 Hrs.)**
Unit IV	**Data Interpretation:** Tabulation, Missing Data Problem. Graph and Charts- Table, Line, Bar, Pie. **(07 Hrs.)**
Course Outcomes: After successful completion of this course students will able to: **CO1:** Acquire the knowledge of geometrical shapes and their equations. **CO2:** Evaluate the problems on Time, Work and Wages. **CO3:** Apply the various trigonometric concepts in real life situations. **CO4:** Achieve skills of comparison through graphs and charts.	

Reference Books:

1] R. S. Agrawal**:** Objective Arithmetic, S. Chand & Company Ltd.
2] S. K. Sharma and G. Kaur**:** Business Mathematics, Sultan Chand & Sons.

Sr. No.	List of Practical's to be covered
	Practical Based on Group A
1	To find Perimeter of Circle, Rectangle and Square.
2	To find the Area of Circle with different radius.
3	To find Surface Area of Cylinder, Cone and Sphere.
4	To evaluate the problems of Work, Time, Distance and Wages.
5	To evaluate the problems of Displacement, Velocity and Acceleration.

6	To find the Speed of Boat and Stream.
Practical Based on Group B	
1	To evaluate the problems on Trigonometric Ratio and Identities.
2	To solve the problems Angle of Elevation and Angle of Depression.
3	To evaluate problems on height and distances.
4	To perform graphical representation of data.
5	To plot the Line and Bar graphs of various data.
6	To plot Pie charts for different data.
Internal Practical Assessment **(50 Marks)**	**1.** Practical Perform – **30 Marks** (Perform any one from group A and B, each carry **15 marks**) **2**. Practical Record- **10 Marks** **3.** Viva voce – **10 Marks**

SEMESTER II

Program: B. Sc.- I (Mathematics) Semester - II

Course Code / Subject: 126205 / Mathematics

The Vertical/ Type of Course: Major/Minor: Theory - 2

Course Name: Vector Analysis and Geometry

Total Number of Hours / Week: 2 Hrs.

Unit	**Content**
Unit I	Scalar and Vector Product of three vectors, Product of four vectors, Vector Differentiation and Vector Integration. **(08 Hrs.)**
Unit II	Space Curve, t, n, b Vectors, Fundamental Planes, Curvature, Torsion, Frenet- Serret Formula. **(07 Hrs.)**
Unit III	Gradient, Divergence and Curl, Directional Derivative. **(08 Hrs.)**
Unit IV	Sphere: Different forms of Sphere, Section of a Sphere by a Plane, Sphere through a given Circle, Orthogonal Sphere and Condition of Orthogonality. **(07 Hrs.)**
Course Outcomes: After successful completion of this course students will able to: **CO1:** Interpret the vectors, their products, differentiation and integration. **CO2:** Define and determine the curvature and torsion of a curve. **CO3:** Apply the concepts of divergence, curl which are useful in Physics. **CO4:** Study different forms of sphere.	
Internal Assessment **(20 Marks)**	**1.** Two Unit Tests **(10 Marks each)** a. Unit Test 1: MCQ based b. Unit Test 2: Descriptive (Consider best of one for Internal Assessment)

	2. Assignment **(05 Marks)** **3.** Field Work / Quiz / Mini Project Work / Attendance **(05 Marks)**

Text Book:

1] V. A. Sharma, G. U. Khapekar, V. R. Patil, S. R. Bhoyar, A. N. Rangari : A Course of Vector Analysis and Geometry, Dnyanpath Publication, Amravati (M.S.), India, First Edition, 2024.

Reference Books:

1] V. A. Sharma, V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. N. Rangari : A Text book of Vector Analysis and Geometry, Dnyanpath Publication, Amravati, First Edition, 2022.
2] T. M. Karade, Maya S. Bendre, A. S. Nimkar, S. A. Salve, K. V. Somwanshi: Vector Analysis and Geometry, Sonu Nilu, Nagpur, 2024.
3] Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York,1981.
4] N. Saran and S. N. Nigam, Introduction to vector Analysis Pothishala Pvt. Ltd. Allahabad.
5] Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co. New Delhi.
6] R. J. T. Bell, Elementary Treatise on Co-ordinate Geometry of Three Dimensions, Macmillan India Ltd., 1994.
7] P. K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd., 1999.
8] N. Saran and R. S. Gupta, Analytical Geometry of three dimensions, Pothishala Pvt. Ltd. Allahabad, 2000.

Program: B. Sc.- I (Mathematics) Semester - II

Course Code / Subject: 126206 / Mathematics

The Vertical/ Type of Course: Major/Minor: Lab Course - 3

Course Name: Practical Based on Vector Analysis and Geometry (126205)

Total Number of Hours / Week: 4 Hrs.

Course Outcomes:

After successful completion of this course students will able to:
CO1: Interpret the vectors, their products, differentiation and integration.
CO2: Studies space curves and fundamental planes.
CO3: Apply the concepts of divergence, curls which are useful in Physics.
CO4: Study of sphere and its orthogonality.

Sr. No.	List of Practical's to be covered	No. of Examples
Practical Based on Vector Analysis and Geometry (126205)		
1	To solve the examples on Scalar and Vector triple product of three vectors.	03
2	To calculate product of four vectors.	03

3	To solve the problems on Vector Differentiation.		03
4	To solve the problems on Vector Integration.		03
5	To obtain the expression for t, n, b vectors.		03
6	To determine the equations of Fundamental Planes.		03
7	To obtain the formulae for Curvature and Torsion of curve.		03
8	To prove Frenet-Serret formulae.		03
9	To demonstrate the concept of Gradient, Divergence and Curl of a vector function.		03
10	To solve the problems on Directional Derivative.		03
11	To obtain different forms of Sphere.		03
12	To solve examples on Orthogonality of Sphere.		03
Practical Assessment (50 Marks)	Internal Practical Assessment **(25 Marks)**	**1.** Practical Record- **15 Marks** **2.** Viva voce– **10 Marks**	
	External Practical Assessment **(25 Marks)**	**1.** Practical Perform – **20 Marks** (Perform any two from group A and B, each carry **05 Marks**) **2.** Viva voce- **05 Marks**	

Text Book:

1] V. A. Sharma, G. U. Khapekar, V. R. Patil, S. R. Bhoyar, A. N. Rangari : A Course of Vector Analysis and Geometry, Dnyanpath Publication, Amravati (MS), India, First Edition, 2024.

Reference Books:

1] V. A. Sharma**,** V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. N. Rangari : A Text book of Vector Analysis and Geometry, Dnyanpath Publication, Amravati, First Edition, 2022.
2] Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York,1981.
3] N. Saran and S. N. Nigam, Introduction to vector Analysis Pothishala Pvt. Ltd. Allahabad.
4] Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co. New Delhi.
5] R. J. T. Bell, Elementary Treatise on Co-ordinate Geometry of Three Dimensions, Macmillan India Ltd., 1994.
6] P. K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd., 1999.
7] N. Saran and R. S. Gupta, Analytical Geometry of three dimensions, Pothishala Pvt. Ltd. Allahabad, 2000.

Program: B. Sc.- I (Mathematics) Semester- II

Course Code / Subject: 126207 / Mathematics

The Vertical/ Type of Course: Generic/ Open Elective / Theory-3

Course Name: Numerical Ability- I

Total Number of Hours/week: 2 Hrs.

Unit	**Content**
Unit I	Number System, H.C.F and L.C.M of Numbers. **(07 Hrs.)**

Unit II	Square Roots and Cube Roots, Surds and Indices. **(08 Hrs.)**
Unit III	Permutations and Combinations, Probability. **(07 Hrs.)**
Unit IV	Boats and Stream, Problems on Train, Allegation or Mixture. **(08 Hrs.)**
Course Outcomes: After successful completion of this course students will able to: **CO1:** Restate the ideas and concepts of L.C.M and H.C.F of a numbers. **CO2:** Restate the ideas and concept of Surds and Indices and also find Square and Cube Roots. **CO3:** Understand the concept of Permutations and Combinations as well as Probability. **CO4:** Restate the ideas and concepts of Boats and Stream.	
Internal Assessment **(20 Marks)**	**1.** Two Unit Tests **(10 Marks each)** a. Unit Test 1: MCQ based b. Unit Test 2: Descriptive (Consider best of one for Internal Assessment) **2.** Assignment **(05 Marks)** **3.** Field Work / Quiz / Mini Project Work / Attendance **(05 Marks)**

Text Book:

1] V. A. Sharma, V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. P. Wasnik: A Text Book of Numerical Ability-I, Dnyanpath Publication, Amravati (MS), India, First Edition, 2024.

Reference Books:

1] R. S. Agrawal: Quantitative aptitude for Competitive examination, S. Chand Publication.

2] Arun Sharma: How to Prepare for quantitative Aptitude for CAT, Mac Grow Hill Publication.

3] Abhijit Guha: Quantitative Aptitude for competitive examinations, Tata McGraw Hill Education Private Ltd. (Fourth Edition).

Program: B. Sc.- I (Mathematics) Semester - II

Course Code / Subject: 126208 / Mathematics

The Vertical/ Type of Course: Generic/ Open Elective / Theory-4

Course Name: Mathematics for Social Sciences

Total Number of Hours / Week: 2 Hrs.

Unit	**Content**
Unit I	**Algebra:** Inequalities, Algebra of Numbers, Transposition of formulae, National Income Determination. **(07 Hrs.)**
Unit II	**Linear Equations:** Graphs, Solution of Simultaneous Equations, Supply and Demand Analysis. **(08 Hrs.)**
Unit III	**Non-linear Equations:** Quadratic Functions, Revenue, Cost and Profit, Indices and Logarithms, Exponents and Natural Logarithmic Functions. **(07 Hrs.)**
Unit IV	**Mathematical Logic:** Statements and Notation, propositional connectives, Normal Forms, truth tables. **(08 Hrs.)**
Course Outcomes:	

After successful completion of this course students will able to: **CO1:** Solve application problems on Interest with emphasis on Business and Social Sciences. **CO2:** Understand the concept of Interest and its computations. **CO3:** Perform the calculations using Logarithms. **CO4:** Apply Mathematical Logic to solve problems.	
Internal Assessment **(20 Marks)**	**1.** Two Unit Tests **(10 Marks each)** a. Unit Test 1: MCQ based b. Unit Test 2: Descriptive (Consider best of one for Internal Assessment) **2.** Assignment **(05 Marks)** **3.** Field Work / Quiz / Mini Project Work / Attendance **(05 Marks)**

Text Book:

1] V. A. Sharma, S.R. Bhoyar, G. U. Khapekar, V. R. Patil, T. D. Nakade: A Text Book of Mathematics for Social Sciences, Dnyanpath Publication, Amravati (MS), India, First Edition, 2024.

Reference Books:

1] Ian Jacques: Mathematics for Economics and Business, 5th Edition, Pearson Education Limited.

2] Steven T. Karris: Mathematics for Business, Science and Technology, Third Edition, Orchard Publication.

3] Luis Moises Pena-Levano: Calculus for Business, Economics and Finance (Schaum's Outline), Fourth Edition, McGraw Hill.

4] J. P. Tremblay, R. Manohar: Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill Edition.

Program: B. Sc.- I (Mathematics) Semester-II

Course Code / Subject: 126209 / Mathematics

The Vertical/ Type of Course: VSC (Vocational Skill Course) / Lab Course-4

Course Name: Mathematics in MS-Office

Total Number of Hours/Week: 4 Hrs.

Unit	**Content**
Unit I	**Basics of MS-Office Word:** Overview of MS Word, Options for viewing a document in Word, writing right away– some important buttons and guidelines, Saving documents using files and folders, Save and Save As, Closing a document. **(07 Hrs.)**
Unit II	**Setting in MS-Office:** Changing the Font and Font Size, Bold, italic, and Underline, Paragraph Formatting, Borders and Shading, Working with Indents, working with Line Spacing, Using Tabs. **(07 Hrs.)**

Unit III	**Mathematical Type Setting in MS-Office Word:** Introduction to Equation Editor, How to type mathematical symbol and equations, Adding page numbers, Header and Footer to documents. **(08 Hrs.)**
Unit IV	**Power Point Presentation for Mathematics:** Introduction to Presentation – Opening New Presentation, Different Presentation Templates, Setting Backgrounds, Selecting Presentation Layouts, Creating a presentation-Setting, Presentation Style, Adding Text to the Presentation, Formatting a Presentation-Adding style, Colour, Arranging Objects, Adding Header & Footer, Slide Background, Slide Layout. **(08 Hrs.)**

Course Outcomes:

After successful completion of this course students will able to:

CO1: Perform various features of MS Word as like Viewing, Writing, Saving and Closing a word document.

CO2: Apply various settings in MS-Word file.

CO3: Learn to type of different mathematical equations/expressions using Equation Editor.

CO4: Prepare presentation using Power Point.

Reference Books:

1] K. Selva Kumar: Financial Mathematics and its Applications, Notion Press Chennai.

2] A. Lenim Jothi: Financial Mathematics, Himalaya Publication, Mumbai, No. 1, 2009.

3] A. P. Verma: Business Mathematics, Asian Books Private Limited, New Delhi, No. 3 January 2007.

Sr. No.	List of Practical's to be covered
	Practical Based on Group A
1	To create a document and apply different formatting options.
2	To design a Greeting Card using Word Art for different festivals.
3	To create your biodata and use page borders and shading.
4	To create a document and insert header and footer, page title etc.
5	To create a document, set the margins, orientation, size column, water mark, page colour and page border.
	Practical Based on Group B
1	To insert a table into the document.
2	To prepare a marksheet of your class subjects.
3	To type various mathematical equations using Equations Editor.
4	To create power point presentation, insert tables, images and shapes.
5	To make power point slide by adding transitions and animations.
Internal Practical Assessment **(50 Marks)**	**1.** Practical Perform – **30 Marks** (Perform any one from group A and B, each carry **15 marks**) **2.** Practical Record- **10 Marks** **3.** Viva voce– **10 Marks**

Program: B. Sc.- I (Mathematics) Semester - II

Course Code / Subject: 126210 / Mathematics

The Vertical/ Type of Course: SEC (Skill Enhancement Course) / Lab Course - 5

Course Name: Transportation and Game Theory

Total Number of Hours/ Week: 4 Hrs.

Unit	Content
Unit I	Transportation Problem and its mathematical formulation, North-West Corner Method, Least Cost Method. **(08 Hrs.)**
Unit II	Assignment problem and its mathematical formulation, Unbalanced Assignment Problems. **(07 Hrs.)**
Unit III	Game Theory, Formulation of Two-person Zero-sum Game, solving two-person zero-sum game in terms of mixed strategies. **(07 Hrs.)**
Unit IV	Graphical solution problem, concept of Dominance. **(08 Hrs.)**

Course Outcomes:

After successful completion of this course students will able to:

CO1: Interpret the transportation models' solutions and infer solutions to the real-world problems.
CO2: Finding initial basic feasible and optimal solution of the Transportation problems.
CO3: Compute Game Theory Problems.
CO4: Recognize and solve game theory and Aassignment problems.
CO5: Analyse pure and mixed strategy games.
CO6: Determine the best strategy and value of the given game model.

Reference Books:

1] H. A. Taha, Operation Research-an Introduction, Macmillan Publishing Company, Inc, New York.
2] Operations Research - H. A. Taha, Pearson, 7th Edition, June 2002.
3] Introduction to Operations Research - Hiller and Liberman, MGH, 7th Edition, 2002.
4] Prem Kumar Gupta and D.S. Hira, Operation Research-an Introduction, Chand & Company Ltd., New Delhi.
5] F.S. Hillier and G.J. Lieberman, Introduction to Operations Research (6thEd.) McGraw Hill International Edition, Industrial Engineering Series,1995.
6] Wagner H. M., "Principles of Operations Research", Prentice Hall India.
7] Kanti Swaroop, P. K. Gupta and Manmohan, Operations Research, Sultan Chand &Sons, New Delhi 2007.
8] Operations Research - S.D. Sharma, Kedarnath Ramnath & Co, 2008.
9] Operations Research - Theory and Applications, J.K Sharma, Macmillan Publications India Ltd, 2013.

Sr. No.	List of Practical's to be covered
Practical Based on Group A	
1	To solve the transportation problems by North West Corner Rule for IBFS.
2	To solve the transportation problems by Least Cost method for IBFS.
3	To solve the balanced assignment problems.
4	To solve the unbalanced assignment problems.
5	To solve the travelling salesman problems.
6	To solve the algorithm for North West Corner method.
Practical Based on Group B	
1	To solve the Maxmin and Minmax Principle.
2	To solve the game problems with saddle point.

3	To solve the 2 x 2 game without saddle point.
4	To obtain the graphical solution of 2 x n game.
5	To obtain the graphical solution of m x 2 game.
6	To find the solution of game by using dominance property.
Internal Practical Assessment **(50 Marks)**	**1.** Practical Perform – **30 Marks** (Perform Any one from group A and B, each carry **15 marks**) **2**. Practical Record- **10 Marks** **3.** Viva voce – **10 Marks**

Appendix-A
INSTRUCTIONS FOR THE PAPER SETTERS
2024-25
Subject: Mathematics

External University Examination

Sr. No	Program	Marks of theory paper	Internal Marks	Total	Instructions
1	UG – NEP (Mathematics) Major/Minor/Generic/ Open Elective	30	20	50	Total Units: 04 **(Two units for 08 Marks and Two units for 07 Marks)**
	SEM I AND SEM II				**Paper setting for 08 Marks:** Question 1. a) 04 Marks OR b) 04 Marks Question 1. c) 04 Marks OR d) 04 Marks **Paper setting for 07 Marks:** Question 2. a) 04 Marks OR b) 04 Marks Question 2. c) 03 Marks OR d) 03Marks

Note: The strength of the batch of the practical for UG classes shall be of 16 students with an addition of 10% with the permission of Honourable Vice Chancellor. (As per NEP-2020 Scheme of SGBAU, Amravati, A-1686).