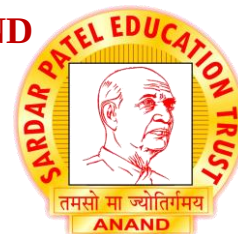




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Revised Syllabus as per NEP 2020 with effect from the Academic Year 2026-2027

Bachelor of Computer Applications (BCA)

Semester – II

Course Code	US2MDBCA15	Title of the Course	Mathematics
Total Credits	02 Credits	Hours per Week	02 Hours / Week

Course Learning Outcomes (CLOs)

CLO 1	Apply the fundamental concepts of vectors and matrices, perform vector and matrix operations, like vector addition, scalar multiplication, matrix addition, matrix multiplication, transpose of matrix, square matrix, special square matrix solve problems in mathematics, science, engineering, and computing applications.
CLO 2	Apply the fundamental concepts of elementary data analysis to collect, organize, and analyze data using elementary statistical techniques, compute and interpret measures of central tendency such as mean, median, and mode, and apply these concepts to summarize data and support informed decision-making in practical situations.

Course Content

Unit No.	Description	Weightage (%)
1.	Vectors and Matrices • Vectors in $\mathbb{R}^n$ • Dot product and norm • Matrix addition and scalar multiplication, Matrix multiplication, transpose of matrix • Square matrices: Row, column, Zero, Diagonal, upper and lower triangular, Orthogonal, symmetric and skew-symmetric matrices • Determinants of matrices up to order 3 • Adjoint of Matrix, • Inverse of Matrix	50%
2.	Elementary Data Analysis • Discrete and continuous frequency distribution • Cumulative frequency distribution • Graphical representation, Measure of central tendency: Mean, Median, Mode, Geometric mean, Harmonic mean, weighted mean, combined mean	50%

Teaching – Learning Methodology

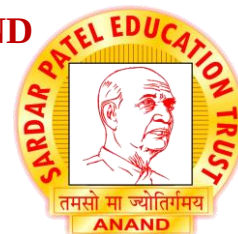
The topics of Vectors and Matrices and Elementary Data Analysis will be taught through a combination of interactive lectures, problem-solving sessions, worked examples, classroom discussions, and practical exercises. Students will engage in numerical computations, real-life applications, case studies, and data



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interpretation activities to develop analytical and computational skills. The use of visual aids, spreadsheets, mathematical software, assignments, quizzes, and collaborative learning activities will further enhance conceptual understanding and practical application of vector operations, matrix methods, and statistical measures such as mean, median, and mode.

Examination Evaluation Pattern		
Sr. No.	Particulars	Weightage (%)
01	Continuous and Comprehensive Evaluation (CCE) (Formative Assessment)	50%
02	Semester End Evaluation (SEE) (Summative Assessment)	50%
	TOTAL	100%

Specifications for CCE and SEE		
Sr. No.	Details of the Evaluation Pattern	Marks
01	Continuous and Comprehensive Evaluation (CCE) (Formative Assessment)	
	A Assignments	10
	B Multiple Choice Questions	05
	C Attendance	05
	D Written Examination (01 Hour)	30
	(Formative Assessment) (A + B + C + D)	50 Marks
	Note:	
	For 02 Credit Courses, the Formative Assessment for students must be from 25 Marks. Thus, the total obtained marks from A + B + C + D (50 Marks) will be divided by 02.	25 Marks
02	Semester End Evaluation (SEE) (Summative Assessment)	
	E Written Examination (01 Hour)	25 Marks
	TOTAL	50 Marks

Rubrics – Based Assessment for Assignments (10 Marks)		
Excellent	09 – 10 Marks	Accurate, error-free, logically presented, timely submission
Good	07 – 08 Marks	Minor errors and good conceptual clarity
Average	05 – 06 Marks	Basic understanding or partially correct
Basic	03 – 04 Marks	Limited clarity, noticeable mistakes, incomplete content
Poor	01 – 02 Marks	Inadequate conceptual clarity, incorrect content
Below Poor	Zero Marks / NA	Content is irrelevant / Not Attempted / Not Submitted

Note:

- Assignments may be taken in forms of written project, computerized and online suggested courses / certificates as per the decision made by the respective faculties of the courses.



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Rubrics – Based Assessment for Multiple Choice Questions (05 Marks)

05 Multiple Choice Questions – 01 Mark Each (05 Marks)

Excellent	01 Mark	The chosen option is correct, no errors in response
Below Poor	Zero Marks / NA	Chosen option is incorrect, completely irrelevant, multiple options chosen / Not Attempted

Rubrics – Based Assessment for Attendance (05 Marks)

As per the Rules and Regulations provided by the Academic Section of Sardar Patel University, Vallabh Vidyanagar, for the students studying in all departments and colleges.

Reference No.: E – 3 / 3127; dated: 07-03-2024.

<https://www.spuvvn.edu/orbit-cdn/uploads/circulars/Circular-NEP-InternalExamMarks-March-April24.pdf>

Excellent	05 Marks	More than 90% (Minimum 27 Hours for 02 Credits Courses)
Good	04 Marks	80% - 89% (24 to 26 Hours for 02 Credit Courses)
Average	03 Marks	70% - 79% (21 to 23 Hours for 02 Credit Courses)
Poor	Zero / NA	Less than 70% (NOT ELIGIBLE TO APPEAR FOR EXAM)

Note:

- Students with below 70% of attendance must submit their written application to their respective class coordinators with genuine reasons and evidence (in case of working or medical emergencies). Students must **not** pursue dual degree programmes that clash with the college's timings.

Rubrics – Based Assessment for Mid-Semester Examination (30 Marks)

Any One Unit or 50% of The Syllabus - 15 Marks Each Question

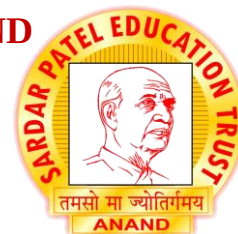
Excellent	13 – 15 Marks	Accurate and comprehensive understanding of Vectors and Matrices and Elementary Data Analysis concepts. Demonstrates excellent application of vector operations, matrix algebra, determinants, inverse matrices, and statistical measures. Performs calculations correctly and interprets data effectively with high-level analytical ability and logical conclusions.
Good	10 – 12 Marks	Good understanding of vector and matrix concepts, matrix operations, and basic data analysis techniques. Explanations are clear with proper application. Minor calculation or conceptual errors may be present, but answers remain well-organized and relevant.
Average	07 – 09 Marks	Basic understanding and recall of vector, matrix, and elementary data analysis concepts with limited application and analysis. Answers show average presentation and lack detailed explanations or complete interpretations of results.
Basic	04 – 06 Marks	Partial understanding of vector operations, matrices, and statistical measures. Explanations are incomplete, organization is weak, and noticeable mistakes occur in calculations or interpretation of data.



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Poor	01 – 03 Marks	Very limited conceptual clarity with incorrect explanations, major computational errors, insufficient content, and poor presentation.
Below Poor	Zero Marks / NA	No attempt or completely irrelevant answer.

Note:

- Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.

Rubrics – Based Evaluation Pattern for End-Semester Examination (25 Marks)

Multiple Choice Questions (05 Marks) – 01 Mark Each from all Units

Excellent	01 Mark	The chosen option is correct, no errors in response
Below Poor	Zero Marks / NA	Chosen option is incorrect, completely irrelevant, multiple options chosen / Not Attempted

Short Question (08 Marks) – 4 Question from all Units

Excellent	02 Marks	Demonstrates accurate understanding of concepts related to questions. Provides correct calculations, appropriate formulas, and clear explanations with complete answers.
Good	01 Mark	Shows partial understanding of concepts with some correct steps or explanations. Minor errors or incomplete answers may be present.
Poor	00 Mark	Incorrect, irrelevant, or no response provided.

UNIT I - 06 Marks Each Question

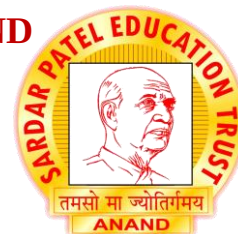
Excellent	05 – 06 Marks	Demonstrates deep understanding and critical analysis of vector concepts, matrix operations, determinants, inverses, and applications. Explanations are logical, precise, and supported with accurate calculations and interpretations.
Good	04 – 05 Marks	Good understanding and analysis of vectors and matrices. Explanations are clear with proper application of vector operations, matrix algebra, and determinants. Minor conceptual or computational errors may be present.
Average	03 – 04 Marks	Basic recall and understanding of vector and matrix concepts. Limited analytical depth and application of operations. Answers show average presentation with incomplete explanations or calculations.
Basic	02 – 03 Marks	Partial understanding with incomplete explanations of vector operations, matrix multiplication, determinants, or inverses. Calculations contain noticeable errors and lack proper organization..
Poor	01 – 02 Marks	Very poor understanding with major conceptual mistakes regarding vectors and matrices. Answers contain incorrect procedures, significant computational errors, and insufficient content.
Below Poor	Zero Marks / NA	No attempt or completely irrelevant answer.



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UNIT II - 6 Marks Each Question

Excellent	05 – 06 Marks	Demonstrates deep understanding and critical analysis of elementary data analysis concepts, including data collection, classification, tabulation, graphical representation, and measures of central tendency and dispersion. Explanations are logical, precise, and supported with accurate calculations and meaningful interpretations
Good	04 – 05 Marks	Good understanding and analysis of data analysis concepts and statistical measures. Explanations are clear with proper application of tables, charts, and basic descriptive statistics. Minor conceptual or computational errors may be present.
Average	03 – 04 Marks	Basic recall and understanding of data analysis concepts. Limited analytical depth regarding data organization, graphical representation, and computation of statistical measures. Answers show average presentation with incomplete explanations or interpretations.
Basic	02 – 03 Marks	Partial understanding with incomplete explanations of data collection, tabulation, graphical methods, or measures of central tendency and dispersion. Calculations contain noticeable errors and lack proper organization.
Poor	01 – 02 Marks	Very poor understanding with major conceptual mistakes regarding elementary data analysis. Answers contain incorrect calculations, improper interpretation of data, and insufficient content.
Below Poor	Zero Marks / NA	No attempt or completely irrelevant answer.

Note:

- Multiple Choice Questions of 5 Marks will be based on various levels of Revised Bloom's Taxonomy.
- Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.

PLO – CLO Mapping

Mathematics

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CLO 1	03	02	02	00	02	00
CLO 2	02	03	02	00	01	03

Note:

- High: **03**; Moderate: **02**; Low: **01**; No Mapping: **00s**



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Suggested References and E-Resources for Further Reading

- S C Gupta: Fundamentals of Statistics, Himalaya Publishing House
- R P Hooda: Statistics for Business and Economics, Mac Million Publication, New Delhi
- Levin & Rubin: Statistics for Manasgement, Prentice Hall of India, NewDelhi.
- <https://www.dcpehvpm.org/E>
- Content/Stat/FUNDAMENTAL.MATHEMATICAL.STATISTICS-
- S.C.GUPTA&KAPOOR.pdf
- <https://civildatas.com/download/fundamentals-of-mathematical-statistics-by-s-c-gupta>
- <https://www.learnbse.in/statistics-for-economics-class-11-notes-chapter-5/>
- <https://byjus.com/commerce/measures-of-central-tendency-arithmetic-mean/>