



**C P PATEL AND F H SHAH COMMERCE COLLEGE, ANAND
(AUTONOMOUS)**

(Managed by Sardar Patel Education Trust, Anand)
(Affiliated to Sardar Patel University, Vallabh Vidyanagar)
NAAC Reaccredited CGPA – 3.30 – Grade A+



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

Bachelor of Computer Applications (BCA)

Semester – II

Course Code	US2MDBCA16	Title of the Course	Practical Based On 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

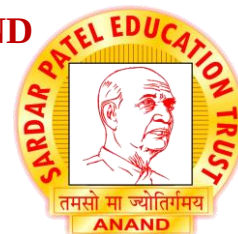
The topics of Vectors and Matrices and Elementary Data Analysis will be taught through a combination of interactive lectures, problem-solving sessions, worked examples, classroom discussions, and practical exercises. Students will engage in numerical computations, real-life applications, case studies,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

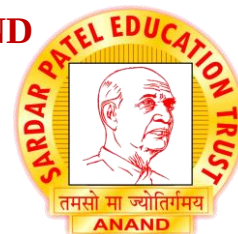
Specifications for CCE and SEE		
Sr. No.	Details of the Evaluation Pattern	Marks
01	Continuous and Comprehensive Evaluation (CCE) (Formative Assessment)	25
	Practical Hands-on Evaluation	
02	Semester End Evaluation (SEE) (Summative Assessment)	25
	Practical Examination (02 Hours)	
	TOTAL(For 02 Credit Courses)	50 Marks

Rubrics – Based Assessment for Mid-Semester Examination (25 Marks)		
Any One Unit or 50% of The Syllabus - 11 Marks Each Question with 3 Marks Journal		
Excellent	09 – 11 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	07 – 09 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	05 – 07 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	03 – 05 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 Assessment for End-Semester Examination (25 Marks)		
All Units of The Syllabus - 11 Marks Each Question with 3 Marks Journal		
Excellent	09 – 11 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	07 – 09 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	05 – 07 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	03 – 05 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.
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.		

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: 00						



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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 Management, Prentice Hall of India, New Delhi.
- <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/>