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

Bachelor of Business Administration (BBA) (General)

Semester – I

Course Code	UM1MDBBA11	Title of the Course	Business Mathematics-I
Total Credits	04 Credits	Hours per Week	04 Hours / Week

Course Learning Outcomes (CLOs)	
CLO 1	Student will be applying the concepts of sets, set operations, determinants and Cramer's Rule to analyze and solve business and commercial problems involving classification, relationships and systems of linear equations.
CLO 2	Student will be using matrix algebra, inverse matrices and matrix methods to solve systems of linear equations and interpret business-related quantitative problems.
CLO 3	Student will apply interpolation and extrapolation techniques such as Newton's, Binomial Expansion and Lagrange's methods to estimate unknown values and support business forecasting and decision-making.
CLO 4	Student will be analyzing project networks using PERT and CPM techniques to determine critical paths, scheduling parameters, and project completion strategies for effective managerial decision-making.

Course Content		
Unit No.	Description	Weightage (%)
1.	**Set Theory:** Concept of sets, subsets, equality of sets, null set, universal set, power set, complement of a set, union and intersection of sets, difference of sets, Venn	25%

	diagrams (concept only), laws of algebra of sets, De Morgan's laws, Cartesian product of two sets, and applications of set theory in commerce. **Determinants:** Meaning and evaluation of second-order (2 × 2) determinants, expansion of third-order determinants, properties of determinants (without proofs), and solution of systems of linear equations in two and three variables using Cramer's Rule.	
2.	**Matrices:** Definition and concept of matrices, types of matrices including row matrix, column matrix, square matrix, null matrix, diagonal matrix, scalar matrix, identity matrix, symmetric matrix and skew-symmetric matrix. Transpose of a matrix, adjoint of a matrix, inverse of a matrix, operations on matrices including addition, subtraction, scalar multiplication and matrix multiplication. Solution of systems of linear equations involving two and three variables using matrices. Applications of matrices in commerce and business.	**25%**
3.	**Interpolation and Extrapolation:** Meaning and concepts of interpolation and extrapolation, assumptions underlying interpolation and extrapolation, importance and applications of interpolation and extrapolation in business and economic analysis. Operators Δ (Delta) and E (Shift Operator) (without proof). Methods of interpolation and extrapolation including: (i) Newton's Method, (ii) Binomial Expansion Method, and (iii) Lagrange's Method, along with application-based numerical examples.	**25%**
4.	**PERT and CPM:** Meaning and characteristics of Program Evaluation and Review Technique (PERT), PERT network/chart with explanation of activities and events, D. R. Fulkerson's rules for numbering events, dummy activity, estimation of activity times, Earliest Start Time (EST), Earliest Finish Time (EFT), Latest Start Time (LST), Latest Finish Time (LFT) and Float Time (FT). Concept and meaning of Critical Path Method (CPM), differences between PERT and CPM, uses and	**25%**

	limitations of PERT and CPM, applications of PERT and CPM in project planning, scheduling, and management.	

Teaching – Learning Methodology
The course will be delivered through a combination of traditional and ICT-enabled teaching methods, including audio-visual presentations and digital learning resources, will be employed to make learning more engaging and effective. Mathematical concepts will also be demonstrated using appropriate digital tools and software to facilitate better understanding.

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	Active Learning Activities	05
	C	Attendance	05
	D	Written Examination (01 Hour)	30
		(A + B + C + D)	50 Marks
02	Semester End Evaluation (SEE) (Summative Assessment)		
	E	Written Examination (02 Hours)	**50 Marks**
		TOTAL	**100 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.		

Rubrics – Based Assessment for Active Learning Activities (05 Marks)		
Excellent	05 Marks	Explanation is clear, detailed and covered all key points
Good	04 Marks	Good conceptual clarity, minor details may be missing
Average	03 Marks	Basic explanation or partially correct
Basic	02 Marks	Limited clarity, noticeable mistakes, lacks depth
Poor	01 Mark	Poorly presented or not understandable
Below Poor	Zero / NA	Content is irrelevant / Not Attempted / Not Submitted
Note: Active Learning Activities may be taken in forms of classwork, viva, oral presentations, PowerPoint presentations, problem solving, group discussions, online tests, Q & A, case studies, etc. as per the decision made by the respective faculties of the courses.		

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 54 Hours for 04 Credits Courses)

Good	04 Marks	80% - 89% (48 to 52 Hours for 04 Credit Courses)
Average	03 Marks	70% - 79% (42 to 46 Hours for 04 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 TWO UNIT OR 50% OF THE SYLLABUS - 15 Marks Each Question		
Excellent	13 – 15 Marks	Demonstrates thorough understanding of concepts and principles; applies appropriate formulas and methods correctly; calculations are accurate; solution steps are logically organized; interpretation of results is clear and complete with negligible errors.
Good	10 – 12 Marks	Shows good understanding of concepts; applies relevant methods correctly with minor errors; calculations are mostly accurate; logical presentation of steps; interpretation is generally correct.
Average	07 – 09 Marks	Demonstrates basic understanding of concepts; some errors in formula selection, calculations, or application of methods; solution is partially complete; interpretation lacks depth or clarity.
Basic	04 – 06 Marks	Limited understanding of concepts; frequent errors in calculations or procedures; incomplete solution steps; weak logical organization; interpretation is unclear or incorrect.
Poor	01 – 03 Marks	incorrect or unclear explanations, fails to address core topics, no logical analysis, no coherent structure followed by severe language problems.
Below Poor	Zero Marks / NA	Not attempted or response is completely irrelevant to the question asked.
Note: Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.		

Rubrics – Based Evaluation Pattern for End-Semester Examination (50 Marks)		
Multiple Choice Questions (10 Marks) – 01 Mark Each from all Units		
Excellent	01 Mark	The chosen option is correct, no errors in response
Below Poor	Zero Marks / NA	The chosen option is incorrect, completely irrelevant, multiple options chosen / Not Attempted
Long Answer Questions - 10 Marks Each Question		
Excellent	09 – 10 Marks	Demonstrates thorough understanding of concepts and principles; applies appropriate formulas and methods correctly; calculations are accurate; solution steps are logically organized; interpretation of results is clear and complete with negligible errors.
Good	07 – 08 Marks	Shows good understanding of concepts; applies relevant methods correctly with minor errors or omissions; calculations are mostly accurate; logical presentation of steps; interpretation is generally correct.
Average	05 – 06 Marks	Demonstrates basic understanding of concepts; some errors in formula selection, calculations, or application of methods; solution is partially complete; interpretation lacks depth or clarity.
Basic	03 – 04 Marks	Limited understanding of concepts; frequent errors in calculations or procedures; incomplete solution steps; weak logical organization; interpretation is unclear or incorrect.
Poor	01 – 02 Marks	Very little understanding of concepts; incorrect application of formulas and methods; major calculation errors; solution lacks logical structure and fails to address the requirements of the question.
Below Poor	Zero Marks / NA	Not attempted or response is completely irrelevant to the question asked.
Note: Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.		

PLO – CLO Mapping										
	Business Mathematics-I									
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10
CLO 1	2	2	3	1	1	0	0	1	0	2
CLO 2	2	3	3	1	1	0	0	1	0	3
CLO 3	3	2	3	1	2	0	0	2	0	3
CLO 4	3	3	3	2	2	1	0	1	0	3
Note: High: **03**; Moderate: **02**; Low: **01**; No Mapping: **00**										

Suggested References and E-Resources for Further Reading

1 Trivedi and Trivedi (2009): Business Mathematics, Pearson India Limited. New Delhi.
2 Sharma, J. K (2006): Quantitative Techniques for Managerial Decisions, Macmillan
3 Taha H. A (2007): Operations Research: An Introduction, Pearson/ Prentice Hall
4 Sing J K (2017): Business Mathematics, Himalaya Publishing House
5 Soni, R. S (2009): Business Mathematics, Pitamber Publishing House.
6 H R Vyas (2017): Business Mathematics: B S Shah Publication, Ahmedabad
7 https://atozmath.com/default.aspx
8 https://www.geeksforgeeks.org/maths/set-theory/
9 https://ncert.nic.in/
10 https://people.math.carleton.ca/~kcheung/math/notes/MATH1107/06/06_matrices.pdf
11 https://www.pw.live/school-prep/exams/lagrange-interpolation-formula
12 https://www.pw.live/school-prep/exams/lagrange-interpolation-formula
13 https://asana.com/resources/critical-path-method

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