PART A: Introduction				
Program: **Certificate**		Class: **B.C.A.**	Year: **I Year**	Session: **2025-26**
Subject: **Computer Applications**				
1.	Course Code			
2.	Course Title	**Mathematical Foundations to Computer Science (Theory)**		
3.	Course Type (Core Course/DSE/Minor/MD-ID/ SEC/VOC)	**Minor – I**		
4.	Pre-Requisite (if any)	To study this course, a student must have basic knowledge of Computers.		
5.	Course Learning Outcomes (CLO)	**After the completion of this course, a successful student will be able to do the following**: 1. Perform key operations for image processing, computer graphics, and data analysis. 2. Understand and implement linear transformations in 3D modeling, robotics, and neural networks. 3. Solve linear systems that arise in cryptography, game development, and AI algorithms. 4. Use matrices in machine learning models for efficient data manipulation and optimization. 5. Implement algorithms that involve graph theory, network flow analysis, and dynamic systems. Using the principles of logic to distinguish between sound and unsound reasoning in discourse of everybody. 6. Construct truth tables for logical expressions; test statements for logical equivalence and represent mathematical statements in the language of predicate language. 7. Using the appropriate set theoretic concepts, thinking process, tools and techniques in the solution to various conceptual or real-world problems. 8. Understanding Frequency Distributions that helps in efficiently summarizing and analyzing large datasets, detecting anomalies, and optimizing algorithms for better performance in areas like searching, sorting, and recommendation systems.		
6.	Credit Value	**Theory – 4 Credits**		
7.	Total Marks	Max. Marks : **30 + 70**		Min. Passing Marks: **35**

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PART B: Content of the Course		
No. of Lectures (in hours per week): **2 Hrs. per week**		
Total No. of Lectures: **60 Hrs.**		
Module	**Topics**	**No. of Lectures**
I	**Indian Knowledge System:** Basic concepts of Mathematical Logic in ancient India: Panini's Logical Structure, Avaktavtakta, Navya-Nyaya Logic. Indian Contributions in Statistics: P. C. Mahalanobis, C. Radhakrishna Rao, Samanta Chandra Sekhar Harichandan, J. K. Ghose, P. Maiti.	05
	Suggested Activities: Decoding Ancient Logic, Statistical Legends: A Tribute to Indian Pioneers, Logic Meets Statistics: A Fun Debate.	
II	**Determinants:** Basic Properties of Determinants, Minor determinant, Co-factors, Applications of determinants in finding the area of a triangle. **Matrices:** Concept of Matrices, Notation, order and equality of Matrices, Types of Matrices, Operations on Matrices, Addition and multiplication, Multiplication with a scalar, Simple properties of addition, multiplication and scalar multiplication, Transpose of a Matrix, Application of Matrices to solve real world problems.	15
	Suggested Activities: Applications of Matrices to solve the problems related to Industries, Business, Economics and real world problems.	
III	**Statistics:** Frequency distribution, Measures of central tendency: Mean, Median, Mode. Measure of dispersion: mean deviation, variance and standard deviation of ungrouped/grouped data.	20
	Suggested Activities: Applications of Mean, Median, Mode, mean deviation, variance and standard deviation to solve the problems related to Industries, Business, Economics and real world problems.	
IV	**Mathematical Logic:** Statements and notations, Propositions and Truth table, Negation, Conjunction and Disjunction, Implications and Double implication, Bi-conditional propositions, Contrapositive Implication and converse, Contrapositive and inverse propositions, Tautology and Contradiction, Logical equivalences, De-Morgan Law.	20
	Suggested Activities: Applications of Mathematical Logic to solve the problems related to Industries, Business, Economics and real world problems.	

PART C: Learning Resources	
Textbooks, Reference Books, Other Resources	
Suggested Readings:	
Textbooks:	

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1. Gerard G. Emch, R. Sridharan, M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, Vol. 3, 2005.
2. Udayan S. Patankar & Sunil M. Patankar: Elements of Vedic Mathematics, TTU Press, Tallinn 2018.
3. Nita H. Shah, Foram A. Thakkar: Matrix and Determinant Fundamentals and Applications, CRC Press, 2020.
4. H. C. Saxena and J. N. Kapoor: Mathematical Statistics, S. Chand and Company, 2010.
5. R. M. Somasundaram: Discrete Mathematical Structures, PHI Learning Pvt. Ltd., 2003.
6. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें।
Reference Books:
1. Hari Kishan: A Textbook of Matrices, Atlantic Publishers & Dist, 2008
2. Shanti Narayan and P K Mittal: A Textbook of Matrices, S. Chand Publishing, 1953.
3. E. Rukmangadachari: Probability and Statistics, Pearson Education India; First edition, 2012.
4. R. P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.

Suggestive Digital Platform Web Links:

https://www.eshiksha.mp.gov.in/mpdhe
https://epgp.inflibnet.ac.in

Suggested Equivalent Online Courses:

https://nptel.ac.in/courses/111106112/
https://nptel.ac.in/courses/111105090/
https://nptel.ac.in/courses/108104157

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	**100**	
Continuous Comprehensive Evaluation (CCE):	**30** Marks	
University Exam (UE):	**70** Marks	
Internal Assessment: Continuous Comprehensive Evaluation (CCE)		**Total Marks: 30**
External Assessment: University Exam Section Time: 03.00 Hours	**Section (A) :** Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**Total Marks: 70**

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