

**MASTER OF COMPUTER APPLICATION****Semester: I**

Subject Code	Subject Title	Teaching Scheme					
		(Hours/Week)		Credits	Examination Marks		Total Marks
		Theory	Tutorial		Internal	External	
3050302104	Mathematical Foundations for Computer Science	4	0	4	40	60	100

**Duration of Exam: 2:30 Hours****Objective of the course:**

- To develop analytical and computational skills in discrete mathematics, linear algebra, probability, and graph theory for problem-solving in computer applications.

**Course Outcomes:**

Upon completion of the course, the student shall be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Apply linear algebra techniques to solve systems of equations and find eigenvalues.	15
CO-2	Understand and apply propositional and predicate logic to formulate valid arguments.	20
CO-3	Solve recurrence relations using analytical methods and generating functions.	20
CO-4	Analyze probability distributions and compute expected values and variances.	25
CO-5	Understand graph theory concepts and apply them to represent and solve network problems.	20

**Detail Content:**

<b>Sr. No.</b>	<b>Topic</b>	<b>Total Hrs.</b>
<b>1</b>	<b>Linear Algebra:</b> <ul style="list-style-type: none"><li>• Elementary row transformation of a matrix</li><li>• Rank of a matrix</li><li>• Consistency and Solution of system of linear equations - Gauss-Elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method.</li><li>• Rayleigh's power method to find the dominant Eigen value and the corresponding Eigenvector</li><li>• Problems.</li></ul>	<b>08</b>
<b>2</b>	<b>Mathematical Logic:</b> <ul style="list-style-type: none"><li>• Propositional Logic</li><li>• Applications of Propositional Logic</li><li>• Propositional Equivalences Predicates and Quantifiers</li><li>• Nested Quantifiers</li><li>• Rules of Inference Introduction to Proofs.</li></ul>	<b>10</b>
<b>3</b>	<b>Recurrence Relations:</b> <ul style="list-style-type: none"><li>• Introduction to Recurrence Relations</li><li>• The method of Characteristic Roots</li><li>• Solution of Non-homogeneous Recurrence Relations</li><li>• Generating Functions of Sequences</li><li>• Solving Recurrence Relations by Substitution and Generating Functions.</li></ul>	<b>10</b>
<b>4</b>	<b>Random Variable and Probability Distribution:</b> <ul style="list-style-type: none"><li>• Concept of random variable</li><li>• Discrete and continuous probability distributions</li><li>• Binomial &amp; Poison's, and normal distribution.</li><li>• Mean and variance.</li></ul>	<b>12</b>
<b>5</b>	<b>Graph Theory:</b> <ul style="list-style-type: none"><li>• Definition of graph</li><li>• different types of graphs</li><li>• directed graph</li><li>• representation of graph as matrix</li><li>• connected graph</li><li>• sub-graphs</li><li>• Bi-graphs</li><li>• paths and cycles</li><li>• graph Isomorphism</li><li>• Euler and Hamilton paths</li><li>• planar graphs.</li></ul>	<b>08</b>

**CO-PO Mapping Matrix with Bloom's Levels**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	2	2	1	-	-	-	-	-	-	-	1
<b>CO2</b>	2	3	-	2	-	-	-	1	-	2	-	1
<b>CO3</b>	3	3	2	-	-	-	-	-	-	-	-	2
<b>CO4</b>	3	2	-	3	1	-	-	-	-	-	-	2
<b>CO5</b>	3	3	2	2	-	-	-	-	1	-	-	1

**Scale: 3 = Strong, 2 = Moderate, 1 = Slight, - = No relation**

**Text books:**

1. **Probability and Statistics for Engineers** – Richard A. Johnson and C. B. Gupta – Pearson Education – Latest Edition
2. **Mathematical Foundations of Computer Science** – Peter A. Fejer – Springer, New York, NY – Latest Edition
3. **Mathematical Foundation for Computer Science** – Santha Prasad – Cengage – Latest Edition
4. **Mathematical Foundation for Computer Science** – Shahnaz Bathul – Prentice-Hall of India Pvt. Ltd. – Latest Edition

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