



Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Final Examination, Summer 2025

Course Code: SE123; Course Title: Discrete Mathematics

Sections & Teachers: All

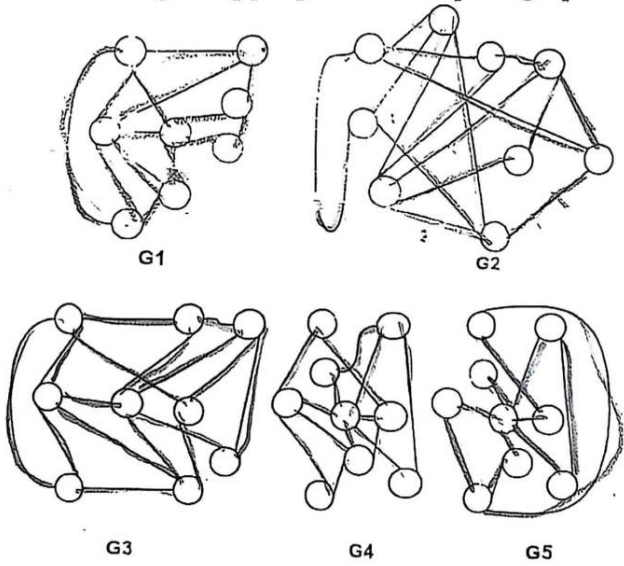
Time: 2:00 Hrs

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	Analyze the following set X and relation R provided below: $X = \{1, 2, 3, 4\}$ and $R = \{(1, 1), (1, 2), (2, 1), (2, 3), (3, 3), (3, 4)\}$.		
	a) Determine if the relation R is reflexive, symmetric, and transitive.		
	b) Graphically express the relation using a directed graph, a tabular array, and an arrow graph.	[Marks-3+4+3]	CLO-3 Level-4
	c) Is the relation R an equivalence relation? If yes, explain why. If not, explain which properties are not satisfied.		
2.	a) Analyze the diagram with your understanding of function, and find out the following: - Domain - Range - Co-Domain - Image - Preimages Figure 1	[Marks-5]	CLO-3 Level-4
	b) Suppose $f: R \rightarrow R$, $f(x) = x+1$. Analyze the function, then classify it and justify your answer (the classification may come under multiple types at the same time).	[Marks-5]	

3.	Evaluate the following hierarchy of University Course Prerequisites. In a university: • Main course: Computer Science ○ Two prerequisites: Programming (P) and Mathematics (M) ○ Programming has two sub-courses: Data Structures (DS) and Algorithms (Algo) ○ Mathematics has one sub-course: Statistics (Stats) ○ Algorithms have two sub-topics: Graph Theory (GT) and Dynamic Programming (DP) a) Sketch the tree structure of course dependencies. b) Determine the Pre-order, In-order, and Post-order traversal sequences. c) Justify the tree as a Full Binary tree	[Marks-2+6+2]	CLO-4 Level-5
4.	Evaluate the characteristics of the graphs illustrated in Figure 2. Redraw the graphs in your script and use proper identifiers. Categorize them into isomorphic and non-isomorphic categories. Finally, justify your categorization using an appropriate concept of graph theory.  Figure 2	[Marks-10]	CLO-4 Level-5

$f(m) = f(n_2)$
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