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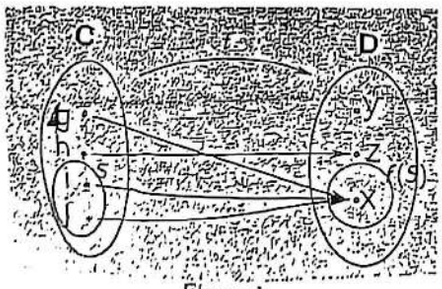
Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Final Examination, Summer 2025
Course Code: SE123; Course Title: Discrete Mathematics
Sections & Teachers: All

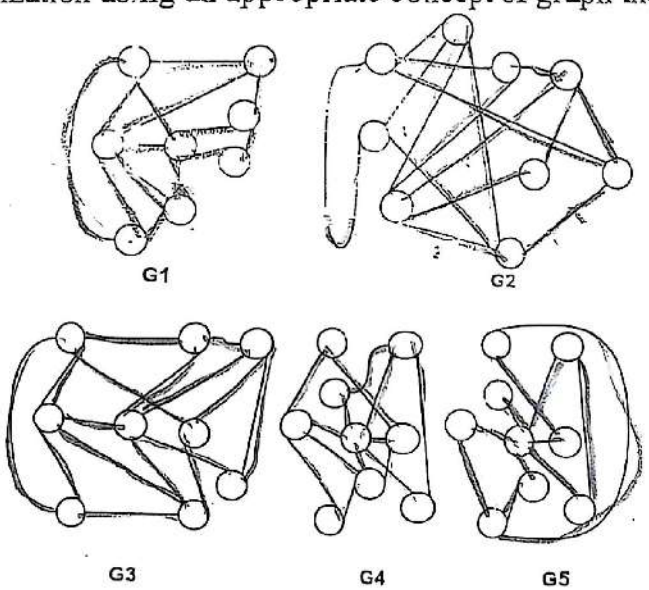
Time: 2:00 Hrs | Marks: 40

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)}.	[Marks-3+4+3]	CLO-3 *Level-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.		
	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: 1. Domain 2. Range 3. Co-Domain 4. Image 5. Preimages  *Figure 1*	[Marks-5]	CLO-3 *Level-4*
	b)	Suppose f: R → 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]	

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3.		**Evaluate** the following hierarchy of University Course Prerequisites. In a university: • Main course: Computer Science o Two prerequisites: Programming (P) and Mathematics (M) o Programming has two sub-courses: Data Structures (DS) and Algorithms (Algo) o Mathematics has one sub-course: Statistics (Stats) o 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*