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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid Examination, Summer 2026
Course Code: CSE212, Course Title: Discrete Mathematics
Level: 2 Term: 1 Batch: 69

Time: 01:30 Hrs **Marks: 25**

Answer ALL the 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.	**Apply** the laws of logical equivalences to prove whether the following statements are equivalent or not. $[p \wedge (\neg p \rightarrow q)] \vee [\neg(p \vee q) \wedge (r \vee p)] \vee \neg(p \vee \neg q) \equiv p \vee q \vee r$	**[5]**	**CO1**
2.	**Apply** the rules of inference to prove whether the argument is valid or not. If Brazil defeats Argentina, then Brazil reaches the World Cup final. If Brazil reaches the World Cup final, then either Brazil's attack is strong or its midfield is dominant. If Brazil's attack is strong, then Brazil's coach receives a contract extension. If Brazil's midfield is dominant, then Brazil signs a new star playmaker. Neither Brazil's coach did receive a contract extension, nor did Brazil sign a new star playmaker. Therefore, Brazil did not defeat Argentina.	**[5]**	
3.	**a) Change** the following conditional statement into its converse, inverse and contrapositive form. *"If you have a Fan ID and you buy a match ticket, then you can enter the World Cup stadium."*	**[2]**	
	b) Express the following statement in formal logic using predicates and quantifiers. *"Every even integer greater than 2 can be expressed as the sum of two prime integers."*	**[3]**	
4.	During the annual Classic Comedy Festival at the University of Florida, the Department of Film Studies discovered that a large number of participants admired more than one Stooge. While 51 participants expressed admiration for Moe, 49 admired Larry, and 60 favored Curly, many of them shared their admiration across different combinations. Specifically, 34 participants admired both Moe and Larry, 32 admired both Larry and Curly, and 36 admired both Moe and Curly. Furthermore, 24 enthusiastic fans admired all three comedians. Interestingly, only one participant stated that they did not admire any of the Three Stooges. **Calculate** the following from the information given above. i. How many admire Curly, but not Larry nor Moe? ii. How many admire exactly one of the Stooges?	**[5]**	**CO2**
5.	**a)** If $\|A\| = n$, then find the cardinality of $\|P(P(P(A)))\| - \|P(P(A) \times P(A))\|$	**[2]**	
	b) Consider the function $f: \mathbb{N} \rightarrow \mathbb{R}$ defined by $f(x) = x^2 - 4$ **Determine** if the function f is invertible. Also, find out the inverse function $f^{-1}(x)$ if it exists.	**[3]**	