



United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final Exam, Trimester: Spring 2024

Course Code: CSE-3521 Course Title: Database Management Systems

Total Marks: 40

Duration: 2 hours

Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules.

1.	<p>a) Read the following scenario and answer the following question: You and your teammates, Lionel Messi and Cristiano Ronaldo, are working on a DBMS project for your lab class. The project involves designing a database schema to manage player statistics for Wakanda Premier League (WPL). As part of the project, you need to determine the best decomposition strategy for a given relation R. Messi and Ronaldo have each proposed a solution for decomposing the relation $R=(A,B,C,D,E)$ with the following functional dependencies:</p> <p style="text-align: center;">$A \rightarrow BC$ $CD \rightarrow E$ $B \rightarrow D$ $E \rightarrow A$</p> <table><tr><th>Messi's Proposal</th><th>Ronaldo's Proposal</th></tr><tr><td>$R_1 = (A,B,C)$</td><td>$R_1 = (A,B,C)$</td></tr><tr><td>$R_2 = (A,D,E)$</td><td>$R_2 = (C,D,E)$</td></tr></table> <p>Both are convinced their plan is the ticket to victory! As the team captain, it's up to you to settle the score and lead the project to glory. You must carefully evaluate both proposals and find their validity considering factors such as normalization, data loss, and preservation of functional dependencies.</p> <ul style="list-style-type: none">• If both solutions are valid then choose the decomposition strategy that is the most suitable for the project and justify your answer.• If none of them are valid then propose your solution which will overcome the issues of Messi and Ronaldo's proposal.• Prepare a comparison table which will compare the considering factors of each proposal. <p>Your decision will determine the direction of the project and contribute to its success.</p>	Messi's Proposal	Ronaldo's Proposal	$R_1 = (A,B,C)$	$R_1 = (A,B,C)$	$R_2 = (A,D,E)$	$R_2 = (C,D,E)$	10
Messi's Proposal	Ronaldo's Proposal							
$R_1 = (A,B,C)$	$R_1 = (A,B,C)$							
$R_2 = (A,D,E)$	$R_2 = (C,D,E)$							
2.	<p>Consider the relation $R_1(A, B, C, D, E, F, G)$ with the following dependency:</p> <p style="text-align: center;">$A \rightarrow B$ $AG \rightarrow C$ $B \rightarrow C$ $AC \rightarrow D$ $CD \rightarrow E$ $F \rightarrow G$ $E \rightarrow F$ $AE \rightarrow B$</p> <p>i) Find minimal cover of the given relation. ii) Find the set of non prime attributes of R.</p>	4 2						

3.	<p>a) Explain the cases when secondary and cluster indexing works as dense indexing with proper examples</p> <p>a) Draw a left biased B+ tree of order 3 for the following data.</p> <p style="text-align: center;">18, 3, 8, 16, 7, 19, 28, 31, 24, 6, 1, 50, 8, 74</p>	<p>3</p> <p>6</p>
4.	<p>Explain, Which ACID properties are ensured by “rolled back” and “committed” operations, providing examples for each?</p>	<p>3</p>
5.	<p>Consider the given precedence graphs below (i, ii and iii) and find out if the schedule is conflict serializable or not. If yes, then find out all possible valid schedules. If not, explain why it is not conflict serializable?</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div> <p style="text-align: center;">i</p> </div> <div> <p style="text-align: center;">ii</p> </div> </div> <div> <p style="text-align: center;">iii</p> </div>	<p>5</p>

6.	<p>a) Consider the following hash function $h(x) = x * (\text{max_input_size} - \text{current_size}) \% (\text{current_size} + 1)$ and the given search keys:</p> <p style="text-align: center;">15, 19, 5, 3, 2, 8, 4, 1, 7, 10, 3, 20</p> <p>Find out the type of hashing method and Insert the search keys one by one into the extensible hash structure using the given hash function where each bucket can contain at most 2 keys.</p>	7
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