



United International University (UIU)
Dept. of Computer Science & Engineering (CSE)

Final Exam, Trimester: Fall 2023

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:</p> <p>Mr Rahim is a storehouse owner. Recently due to an increase in profit, he wants to expand his business. But he is facing a problem to manage it manually by pen and paper. So, he decided to digitalize the management process.</p> <p>He has 4 storehouses which can each store a different amount of supplies. These storehouses are located in different parts of Chittagong city. Two of four storehouses have humidity controlling features. All of the storehouses have cooling systems that can control the temperature with accuracy of 0.1 C.</p> <p>Mr Rahim's employees usually keep track of how much goods are being stored in each storehouses and how much capacity is unused. They also keep a record of each good with its id no, name, owner, date of entry, agreed date of withdrawal, temperature requirement, humidity requirement, advance(payment). If the product has a humidity requirement, it is needed to be put in the storehouse with humidity control. The employees also keep track of the product owner's information like name, phone number, Nid no, address, bank account. But there have been some problems when multiple people with the same name store products.</p> <p>Mr Rahim has 10 employees who manage his storehouses. Eight of them are assigned to a specific storehouse. Other two work as supervisors. They each supervise two storehouses. Mr Rahim keeps track of his employees. He keeps their name, phone number, job, address, Nid, Bkash number in a book for easy access. He pays his employee through Bkash.</p> <p>Mr Rahim wants a system that can maintain, what he is currently maintaining, digitally where it is easy to enter, search and update the information.</p> <p>Design a Database which is in 3NF(3rd Normal Form) and fulfills all of Mr Rahim requirements.</p>	10
	<p>b) Write short description of the following topics</p> <ul style="list-style-type: none">i) Transitive Dependencyii) Insertion anomaly	2
	<p>c) Consider the relation R1(A, B, C, D, E, F, G) with the following dependency:</p> <p>$AB \rightarrow CD$ $BCD \rightarrow E$ $DG \rightarrow F$ $EF \rightarrow A$ $G \rightarrow B$</p> <p>Find out all the candidate keys.</p>	4

2.	<div>a) Explain how secondary indexing defer in the working mechanism for unique and duplicate data.</div> <div>b) Draw a 5th order B+ tree from the given data. Assume the data are coming from left to right.<div>10, 12, 50, 2, 16, 30, 9, 60, 32, 15, 90, 18, 34</div></div>	<div>2</div> <div>5</div>																																																				
3.	<div>a) How many serial schedules are possible for n transactions?</div> <div>b) Find out whether the following schedule is conflict serializable or not. If it is conflict serializable, show all possible serial schedule(s).</div> <table><tr><td>T1</td><td>T2</td><td>T3</td><td>T4</td></tr><tr><td>read(A)</td><td></td><td></td><td></td></tr><tr><td>read(B)</td><td></td><td></td><td></td></tr><tr><td></td><td>read(B)</td><td></td><td></td></tr><tr><td>write(A)</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>read(C)</td></tr><tr><td></td><td></td><td>read(A)</td><td></td></tr><tr><td></td><td></td><td>write(A)</td><td></td></tr><tr><td></td><td>write(B)</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>write(C)</td></tr><tr><td>Write(C)</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>write(B)</td><td></td></tr><tr><td>read(C)</td><td></td><td></td><td></td></tr></table>	T1	T2	T3	T4	read(A)				read(B)					read(B)			write(A)							read(C)			read(A)				write(A)			write(B)						write(C)	Write(C)						write(B)		read(C)				<div>2</div> <div>5</div>
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4.	<p>a) Consider the following hash function $h(x) = x \bmod 2^{\text{global depth}}$ and the given search keys:</p> <p style="text-align: center;">0, 7, 1, 2, 3, 11, 13, 22</p> <p>Insert the search keys one by one into the extensible hash structure using the given hash function where each bucket can contain at most 3 keys.</p> <p>Initially both the local and global depth are 1.</p> <p>b) Briefly mention a scenario where extensible hashing doesn't work well.</p>	<p>7</p> <p>3</p>
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