United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final Exam, Trimester: Summer 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. a) Consider the following relation and find out **4 *valid Functional Dependencies*** from the given relation: **3**

Publisher			
ID	**Name**	**Rating**	**Number of Books Published**
1	Samin	4.5	30
2	Tuhin	4.9	20
3	Niloy	4.2	12
4	Samin	4.5	5
5	Shakil	4.6	20
6	Niloy	4.1	13

b) Consider the following ***relation, R*** and a set of ***functional dependencies***: **2**

R={A, B, C, D, E, I}

FD={ A→C, AB→C, C→DI, CD→I, EC→AB, EI→C } **2**

i. Find out all the ***Candidate keys*** from the given dependencies.

ii. Check and justify in which ***Normal form*** the relation is. **4**

iii. Find the ***Minimal Cover*** of the relation, R

c)

i. Distinguish between ***Partial Dependency*** and ***Transitive Dependency***. **3**

ii. Check whether the following ***decomposition*** of the relation, R will ***Preserve the dependencies*** or ***not***.

R={A, B, C, D, E, G }

FD = { AB → C,
AC → B,
AD → E,
B → D,
BC → A,
E → G}

Decompose to: R1 (A, B)
R2 (B, C)
R3 (A, B, D, E)

2. a) How can we ensure ***Isolation*** and ***Consistency*** of Transactions? Explain with an example. **2**

	b) Consider the following **schedule** of ***6 transactions***: | T1	T2	T3	T4	T5	T6
---	---	---	---	---	---
Read (A)					
		Read (B)			
	Write (C)				
					Write (B)
		Read (D)			
				Read (A)	
Write (A)					
	Read (B)				
			Write (C)		
			Write (D)		
				Read (B)	
Read (C)					
					Read (A)
		Write (D)			
					Read (C)
Read (D)					
				Write (B)	
	Read (C)				| i. Draw the ***Precedence graph*** from the given schedule. ii. Is the ***Schedule Serializable***? If yes then show all ***equivalent serial schedule***.	**8**
3.	**a)** Differentiate between ***indexing*** and ***hashing*** techniques in terms of memory management. **b)** Consider an ***extendible hashing*** scheme for the given values below. Assume that the bucket capacity is 3 and the initial local and global depths are 1. Considering that LSB (Least-significant bit) is checked to find any data record, insert the following records in the hash table. Show the necessary steps while inserting the data. Search key: 845, 452, 855, 489, 325, 654, 159, 357 Corresponding hash value: 9, 21, 46, 5, 30, 13, 2, 10	**2** **5**
4.	**a)** Explain why ***Secondary indexing*** is always ***dense*** with a proper example. **b)** Consider the following data coming from left to right. Construct a right biased ***B+ tree*** of ***order 4*** for the incoming data and show all the necessary steps while inserting. 10, 15, 30, 12, 28, 40, 3, 34, 8, 21, 60, 18	**2** **5**