Ahsanullah University of Science & Technology

Department of Computer Science & Engineering

Subject: Database System (CSE 3103)

Semester: FALL 2020

Quiz: 03

Marks: 20

Instructions:

i. *You need to submit this QUIZ as handwritten document. You need to write in formal A4 paper one sided for the answers. Maintain 1.0'' inch margin in the left and 1.5"inch margin on the top of the page.*

ii. ***IMPORTANT:*** *A Top Sheet Need to Make with Mentioning* ***Name, ID, Couse No, Course Name, Semester -FALL 2020, Date and Signature****. In every page need to have the page number in below.* ***ID and Signature*** *need to enclose in the top margin in each of the paper. If you forgot to write in some page that page will not be evaluated.*

iii. *After completion of the task, you need to scan the whole document. Use CamScanner App from mobile, or if you have scanner at home you can use that too and Upload in PDF format. For capturing picture try to capture with decent light, do not use flash light for capture image/scan. You need to rename your script in ID_Q2_FL2020 (****Example : 180104001_Q3_FL2020****) before uploading the PDF.*

1. a) The following relation holds data about course enrollment of students and assigned teachers. How can a deletion anomaly occur in this relation? Explain with a suitable example. [4]

course_id	student_id	d a t e	teacher_id	t o p i c	r o o m	g r a d e	b o o k	teacher_email
C-1	S-1	23.02.17	T-1	topic1	629	3.7	book1	t1@uni.edu
C-2	S-1	18.11.16	T-3	topic2	631	4.0	book2	t3@uni.edu
C-1	S-4	23.02.17	T-1	topic1	629	3.3	book1	t1@uni.edu
C-5	S-2	05.05.17	T-3	topic3	632	4.0	book3	t3@uni.edu
C-4	S-2	04.07.16	T-5	topic4	621	3.0	book4	t5@uni.edu

Figure 1: A sample relation

b) Figure 1 shows a relation that is already in first normal form (1NF). Decompose the relations to the third normal form (3NF). Explain each decomposition step you applied. Finally show the decomposed relations. [6]

2. Consider the relation **BOOK** (Book_Name, Author, Edition, Year). A sample instance of the relation is given below. [4]

Book_name	Author	Edition	Copyright_year
DB Fundamentals	Alice	4	1990
DB Fundamentals	Bob	4	1990
DB Fundamentals	Bob	5	1995
DB Fundamentals	Alice	5	1995

a) Based on a common-sense understanding of the above data, what are the possible candidate keys of this relation?
b) Find multivalued dependencies in the given relation.
c) What would be the decomposition of this relation based on the multivalued dependencies? Show the resulting relations after decomposition. Argue that your decomposition satisfies lossless-join decomposition.

3. Consider the following schedule S. [6]

Sl.	**T1**	**T2**	**T3**	**T4**
1	read(X)			
2		read(Y)		
3			read(Y)	
4		write(Y)		
5	write(X)			
6				read(X)
7		read(X)		
8		write(X)		
9			write(X)	
10	commit			
11		commit		
12				commit
13			commit	

a) Is this schedule conflict-serializable? Justify your answer. If yes, find the equivalent serial schedule.
b) Is this schedule recoverable? Justify your answer.