National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	**Database Systems**	**Course Code:**	**CS2005**
Degree Program:	**BS(computer science)**	**Semester:**	**Spring 2024**
Date:		**Total Marks:**	**15**
Section:	**BCS-6A**	**Type:**	**Assignment(4)**
		Name:	
		Roll no:	

INSTRUCTIONS:

1. Handwritten Submissions: All assignments should be submitted in handwritten form. This means that you should physically write out your answers, rather than typing or printing them. Make sure your handwriting is clear and legible to ensure that your work can be properly assessed.

2. No Plagiarism: Plagiarism is strictly prohibited and will result in severe penalties. Ensure that your work is entirely your own . Any form of academic dishonesty, including copying from classmates or using online resources without proper attribution, will not be tolerated.

3. Submission Deadline: Assignments must be submitted on or before the specified deadline. Late submissions will not be accepted, and a score of zero will be awarded for assignments submitted after the due date .

Q1. Consider the relation R (A, B, C, D, E, I) and a set of FDs F = { A → C, AB → C, C → DI, CD → I, EC → AB, EI → C }. Compute the minimal cover for *F* (i.e. F_c). Also find all possible Keys (minimal of super keys i.e. candidate keys) of R.

Q2. Find out whether the following set of functional dependencies for the relation R (A, B, C, D, E, G) are equivalent or not. Show all the steps. F1 = {A→C, AB→C, C→DG, CD→G, EC→AB, EG→C} and F2 = {A→C, C→D, C→G, EC→A, EC→B, EG→C}

Q3. Consider the relation R (A, B, C, D, E, G) and a set of FDs F = {D→E, ABC→BDE, B→G, A→C, ABC→G}. Compute the minimal cover for *F* (i.e. F_c). Also find all possible Keys (i.e. minimal of super keys) of R.

Q4. Consider the relation R (A, B, C, D, E) and a set of FDs F = {C→AB, A→E, D→E, BD→C, CD→B}. Find all possible Keys of R.

Q5. Consider the relation R (A, B, C, D) and a set of FDs F = {AB→C, CD→B, AD→B, AC→D}. Find all possible Keys of R.

Q6. Consider the relation R (A, B, C, D, E) and a set of FDs F = {A→C, C→BD, D→A}. Find all possible Keys of R.

Q7. Consider the relation R (A, B, C, D, E, G) and a set of FDs F = {ABC→CDEG, C→E, A→B, D→G}. Compute the minimal cover for *F* (i.e. F_c). Also find all possible Keys (i.e. minimal of super keys) of R.

Q8. (10 points) Consider a relation with schema R(A, B,C,D), with FDs F = {BC → A, AD → B, CD → B, AC → D}.

Assume possible keys of this relation are {BC}, {CD}, and {AC}. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF). Justify your answer. If R is not in BCNF, decompose it into a set of BCNF relations and show your steps. Indicate which dependencies if any are not preserved by the BCNF decomposition.

Q9. Consider the relation R(A, B, C, D, E, F, G, H), with FDs {BC → AD, E → F, F → GH}.

a. Find all the keys for this relation R. (you don't need to list super keys that are not keys.)

b. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF). Justify youranswer.

c. If R is not in BCNF, decompose it into a set of BCNF relations.

Q10. Consider the relationR(A,B.C,D,E),withFDsF={A→BC,C→D,E→D,BE→A}.

a. IsthedecompositionR1(A,E),R2(A,B,C),andR3(D,E)alosslessdecomposition?Proveit.

b. IsthedecompositionR1(A,E),R2(A,B,C),andR3(C,D)alosslessdecomposition?Proveit.