National University of Computer and Emerging Sciences

Lahore Campus

Database Systems (CS2005) Sessional-II Exam

Date: Fri, 05 April 2024

Course Instructor(s)

Total Time (Hrs.): 1

Total Marks: 25

Total Questions: 5

Roll No _____ Section _____ Student Signature _____

Do not write below this line.

Note: Please ensure that you attempt all questions and their respective parts in the given order.

CLO # 3

Q. No 1: Consider a relation R (A, B, C, D, E, F), with the set of FDs F= {AB→C, CD→E, EF→A, BC→ D, DE→F}. Find all possible keys (i.e. candidate keys) of this relation? Prove it. [5]

BC, BA, FEB, BED

CLO # 3

Q. No 2: Consider the relation schema R (A, B, C, D, E), with FDs F= {A→BC, BCD→E, BC→D, A→D}. Find a minimal cover of *F* (i.e. F_c). [5]

remove A→D or BC→D

CLO # 3

Q. No 3: Consider two sets of FDs, F and G, F = {A→BC, B→D, C→E, D→E} and G = {A→BC, B→D, C→E, BD→E, A→D}. Are F and G equivalent? Prove it. [5] NOT equivalent

CLO # 3

Q. No 4: Consider the relation R (A, B. C, D, E), with FDs {AC→B, D→E}. State which of the following decompositions of R relation are lossless decomposition. Prove it. [5]

a. R1(A, C, D), R2(A, B, C), and R3(D, E).

b. R1(A, B, D), R2 (A, B, C), and R3(D, E).

CLO # 3

Q. No 5: Consider the relation schema R (A, B, C, D, E), with FDs F= {AB → C, BC → D, D → E, AE → B}. Keys of this relation are AB, AD, and AE. 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. [5]

AEB, BCD, ABC

B

ABCDE

ABCDE } BC→D D→E

(BCD) (ABCE) (AEB) (ABC)

D→E is lost