THE COPPERBELT UNIVERSITY

SCHOOL OF INFORMATION AND COMMUNICATION TECHNOLOGY

IS/CS520 TEST 1 and 2   27$^{\text{TH}}$ NOVEMBER, 2023

TIME: 2hrs.

Answer all questions in both test 1 and test 2 and be as brief and as precise as possible in your explanations.

TEST ONE

Q 1.   State and briefly describe four (4) advantages and two (2) disadvantages of Databases. **[8 marks]**

Q 2   Define the following database keys **[6 marks]**

    i)   Primary Key   ii)   Foreign Key

    iii)   Surrogate Key   iv)   Candidate Key

Q 3   Let R = (ABCDEGHI) and F = {AB $\longrightarrow$ E AG $\longrightarrow$ J, BE $\longrightarrow$ I, E $\longrightarrow$ G, GI $\longrightarrow$ H}. show that AB $\longrightarrow$ GH using the B axioms only**. [8 marks]**

Q 4   Let U j be a subset of the universal set of attributes u. and let X and Y be subsets of Uj. Define the functional dependence X $\longrightarrow$ Y. **[4 marks]**

Q 5   Briefly state the reason as to why **i**n practice the minimal cover is useful and hence or otherwise give any of the algorithms discussed in class used to compute a minimal cover. **[6 marks]**

Q 6   **Given a relation** R = (A, B, C, G, H, I) and a set of multivalued dependencies F ={ A →→ B B →→ HI CG →→ H }. Decompose R into its fourth Normal form. **[8 marks]**

TEST TWO

Q 1. When is a table said to be in second normal form (2NF) and Third normal form (3NF) respectively
[4 Marks]

Q 2. Given the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies. Determine the candidate key of R and hence or otherwise Decompose R into 2NF, then 3NF relations. **[8 marks]**

$$A \longrightarrow D, E$$
$$B \longrightarrow F$$
$$D \longrightarrow I, J$$
$$F \longrightarrow G, H$$
$$A, B \longrightarrow C$$

Q 3. When is a relation said to be in 4th Normal Form and hence or otherwise normalize the following relation with given dependencies into the 4th Normal form. **[6 marks]**

Consumers (name, addr, phones, candiesLiked)

FD: name $\longrightarrow$ addr

MVD's: name $\longrightarrow\longrightarrow$ phones, name $\longrightarrow\longrightarrow$ candiesLiked

Q 4. Write general syntax for creating a PL/SQL procedure and hence or otherwise briefly describe the two main sections of a procedure. **[6 marks]**

Q 5. Write a PL/SQL program that calculates the final exam mark of a student given the following distribution of marks: CA: 40 (Theorytest: 30 (marked out 40), PracticalTest: 10 (marked out of 100) and Exam 60 (marked out of 100). Display the student name, the student number and the final exam of the student with student id 22001233. **[8 marks]**

Q 6. Write PL/SQL code that gets the salary of an employee with man number "3191" and increase his salary by 25% if it is less than the average salary, by 20% if equal to the average salary and 15% if greater than average salary. (note: use the Average function to calculate the average salary).
[8 marks]

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