DEPARTMENTOF
COMPUTERSCIENCE&ENGINEERING

Discover. Learn. Empower.

Experiment 9

Student Name: Ayush Tiwari **UID:** 23BCS11366
Branch: BE-CSE **Section:** WWC-5
Subject name: ADBMS **Subject code**: 23CSP-333

1. Consider a relation R(ABCDEFGHI) having FDs as:

AB → C
AD → GH
BD → EF
A → I
H → J

• Identify that relation is in which normal form and the candidate key by determining the prime and non-prime attributes.
• Apply the decomposition if needed to remove the redundancy.
• Identify how many new tables will be formed after the decomposition.

Ans:

Given: R(ABCDEFGHIJ), FDs: AB→C, AD→GH, BD→EF, A→I, H→J

Step 1: Find candidate key (C.K) by closure: (ABD)+ = ABCDEFGHIJ → **C.K = {ABD}**

Step 2: Identify prime and non-prime attributes:

- Prime: A, B, D
- Non-prime: C, E, F, G, H, I, J

Step 3: Check 1NF, 2NF, 3NF:

- 1NF & 2NF satisfied
- 3NF violated due to H→J (H not CK) → **Highest NF = 2NF**

Step 4: Decompose to remove redundancy:

- R1(H, J), R2(A, I), R3(AB, C), R4(AD, G, H), R5(BD, E, F), R6(ABD, remaining)

Step 5: Number of new tables after decomposition = **6**

Answer:

- **Highest Normal Form = 2NF**
- **Candidate Key = {ABD}**
- **Tables after decomposition = 6**

Question 2:

Relation R having attributes as (A, B, C, D, E) having the functional dependencies as follows:

A → B
B → E
C → D

• Identify that relation is in which normal form and the candidate key by determining the prime and non-prime attributes.
• Apply the decomposition if needed to remove the redundancy.
• Identify how many new tables will be formed after the decomposition.

Given Relation: R(A, B, C, D, E) with FDs: A → B, B → E, C → D.

Candidate Key: Compute closure: {A}+ = {A, B, E}; {C}+ = {C, D}; {A, C}+ = {A, B, C, D, E} → Candidate Key = {A, C}.

Prime Attributes: A, C; **Non-prime Attributes:** B, D, E.

Check 1NF: All attributes are atomic → R is in 1NF.

Check 2NF: B and E depend on part of key A → violates 2NF.

Decomposition: R1(A, B, E), R2(C, D), R3(A, C) (to preserve candidate key).

Result: 3 new tables formed, all in 2NF/3NF, redundancy removed.

DEPARTMENTOF

COMPUTERSCIENCE&ENGINEERING