

SOLUTION: II SESSIONAL EXAMINATION

Q.1

[C] Find out canonical cover of the given function dependency:

$$F = \{ A \rightarrow BC, CD \rightarrow E, E \rightarrow C, D \rightarrow AEH, ABH \rightarrow BD, DH \rightarrow BC \}.$$

1) $CD \rightarrow E$ and $DH \rightarrow BC$ are redundant

Find out $(CD)^+$ using $\{ F - (CD \rightarrow E) \}$ and check RHS is exist or not. If RHS is Exists then $CD \rightarrow E$ is redundant function dependency.

$(CD)^+ \rightarrow ABCDEH$ so RHS i.e. E is exist in the closure set this FD is redundant.

Do same for $DH \rightarrow BC$.

2) $ABH \rightarrow BD$ can be decompose into $ABH \rightarrow B$ and $ABH \rightarrow D$ and B is extraneous in both new FDs so now $ABH \rightarrow B$ will be $AH \rightarrow B$ and $ABH \rightarrow D$ will be $AH \rightarrow D$

3) $AH \rightarrow B$ is also redundant because $A \rightarrow B$ is already in F.

4) So $F_c = \{ A \rightarrow BC, E \rightarrow C, D \rightarrow AEH, AH \rightarrow D \}$

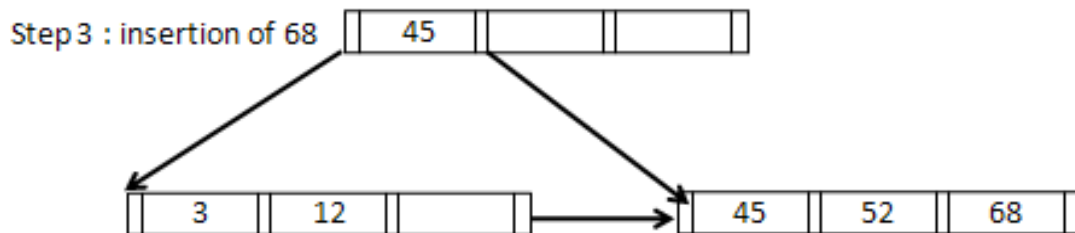
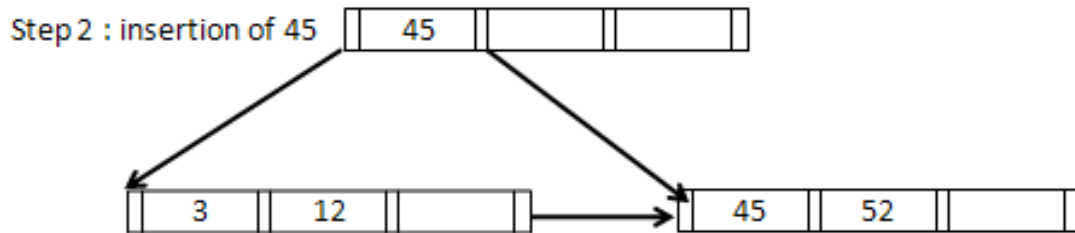
Q.2

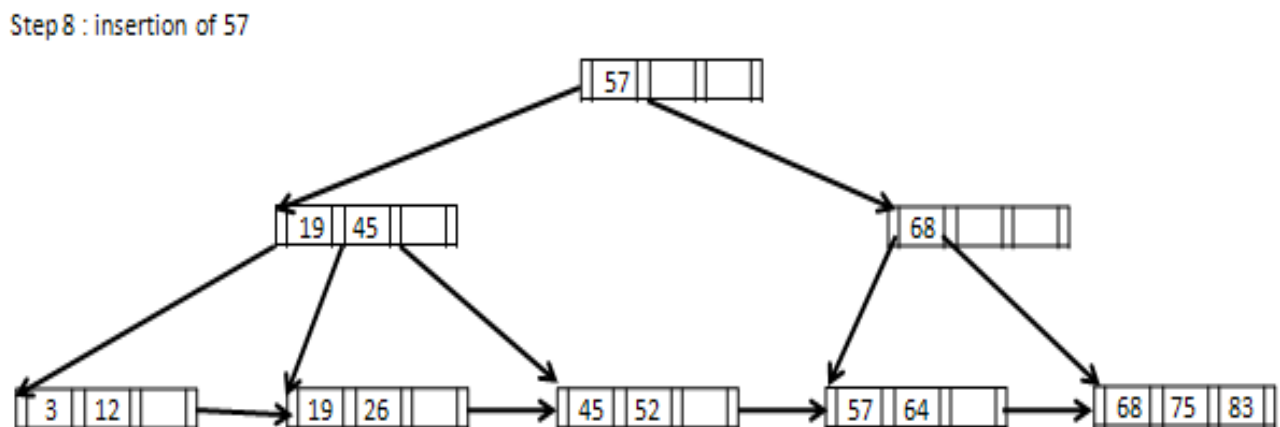
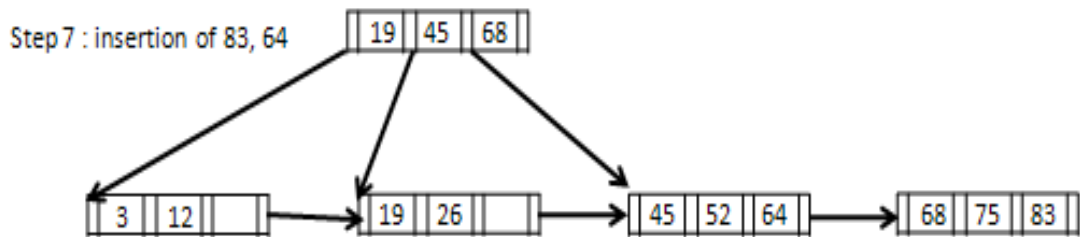
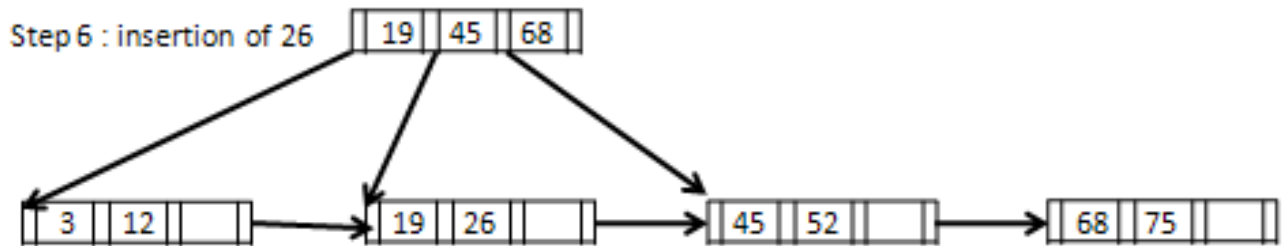
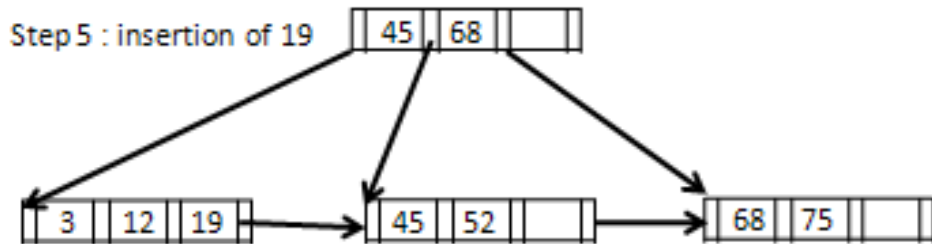
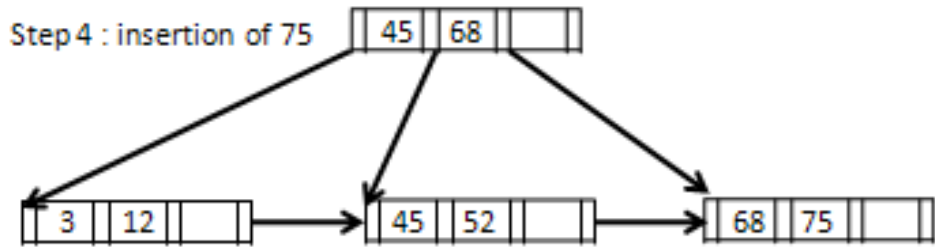
[B]

B+ Tree	12, 3, 52, 45, 68, 75, 19, 26, 83, 64, 57, 37, 72, 46
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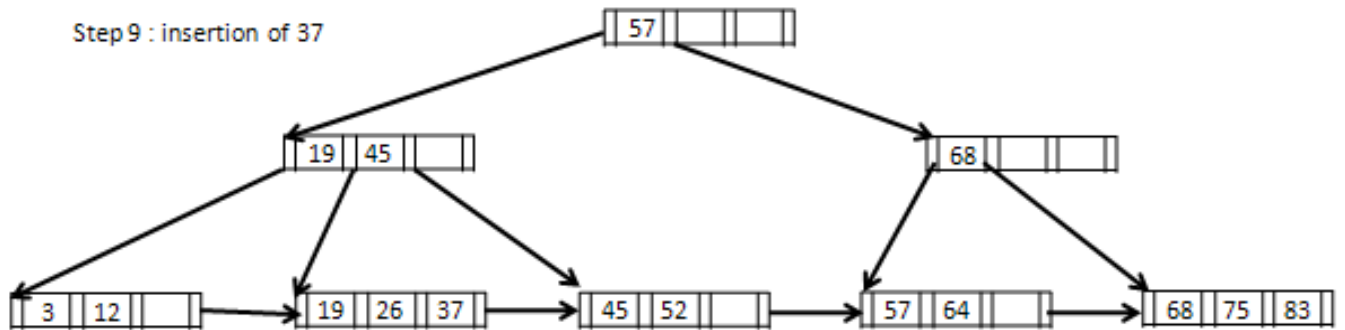
Step1 : insertion of 12, 3, 52

3	12		
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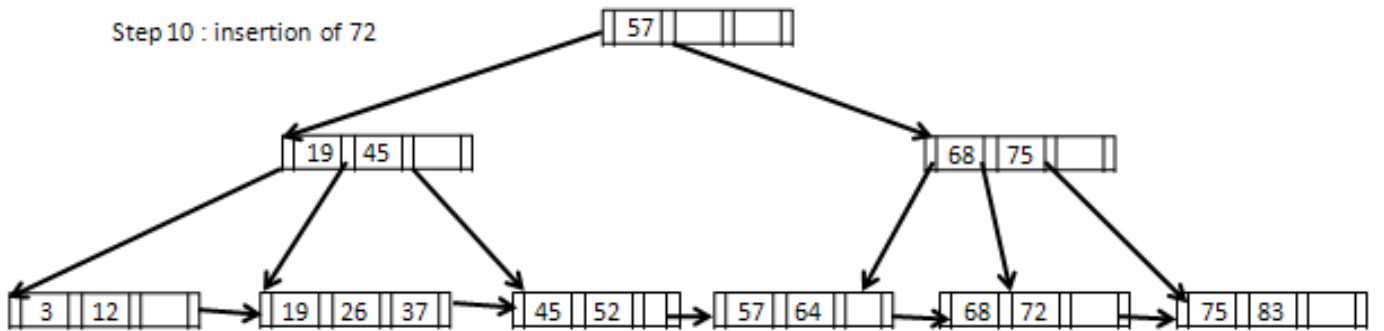




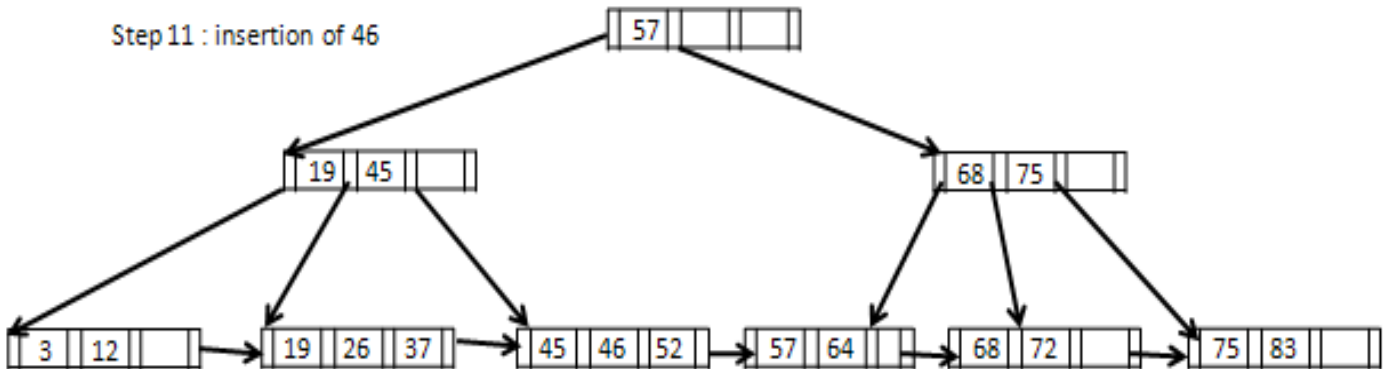
Step 9 : insertion of 37



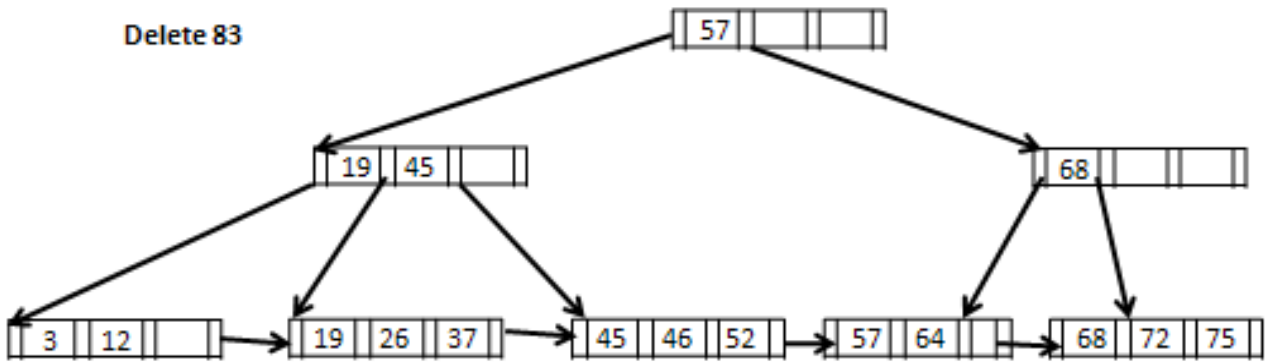
Step 10 : insertion of 72



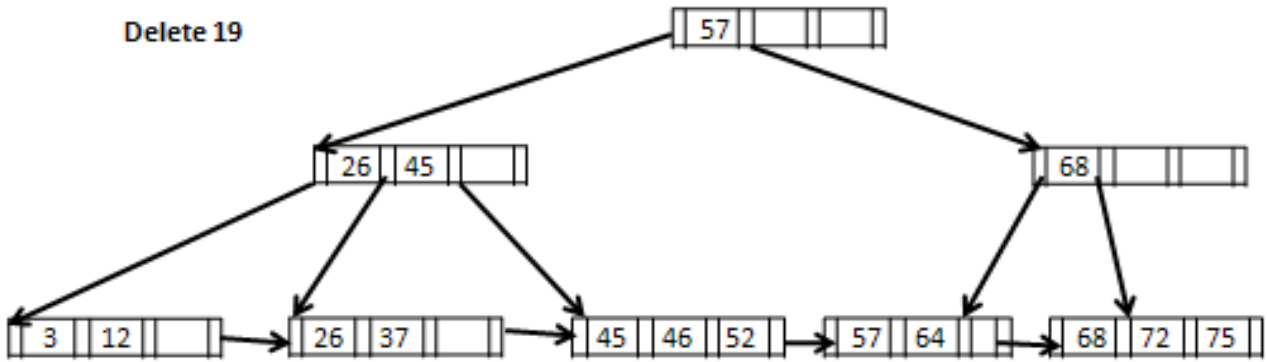
Step 11 : insertion of 46



Delete 83



Delete 19



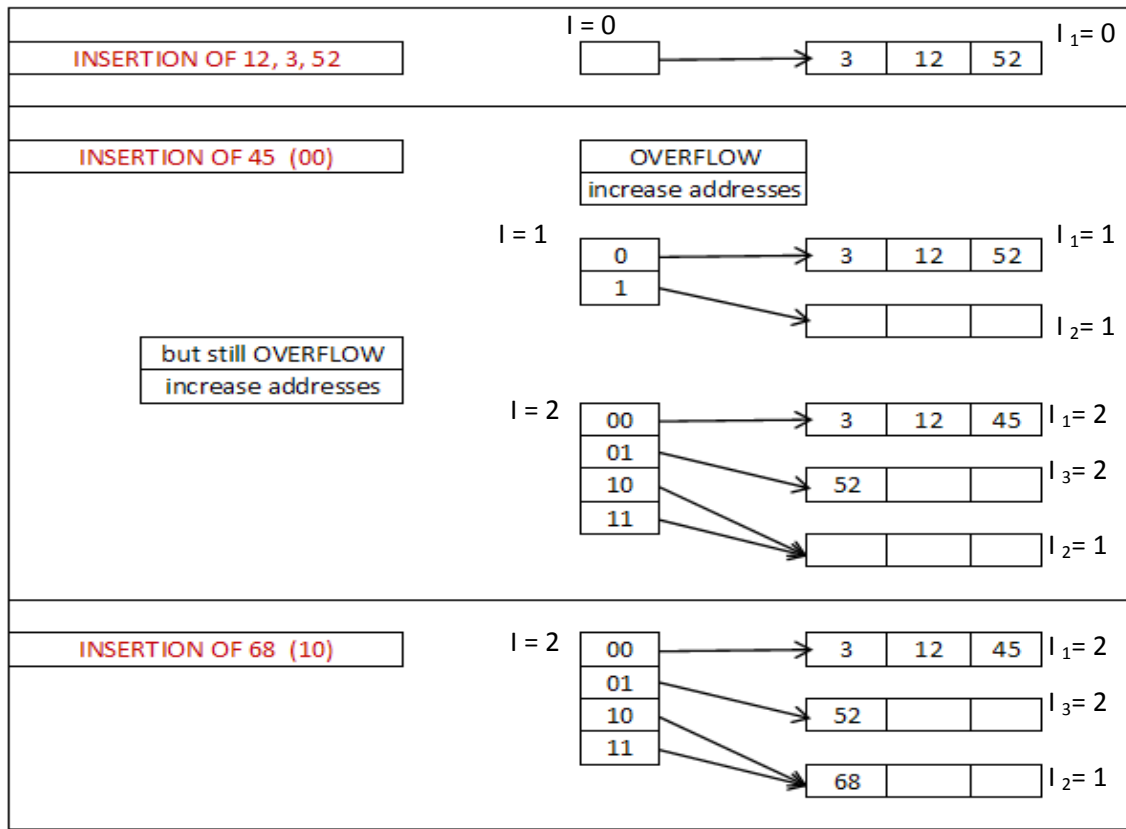
[B]

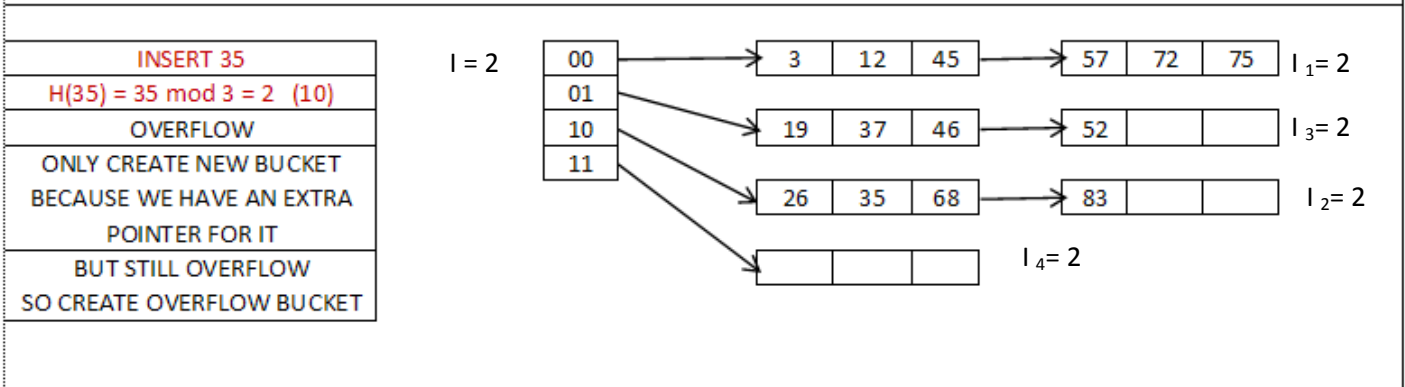
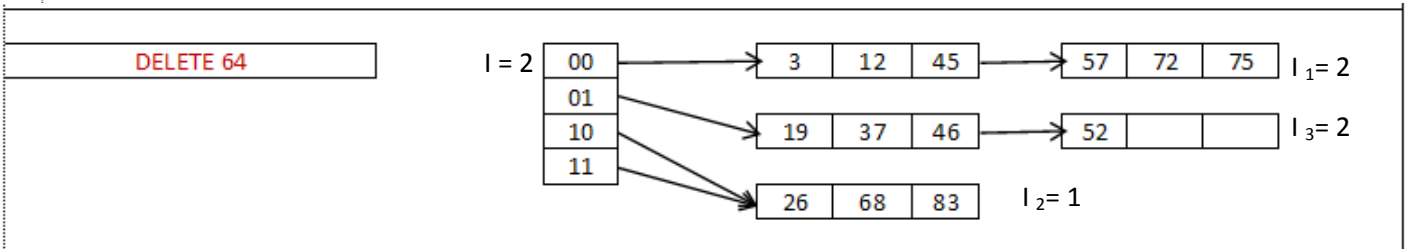
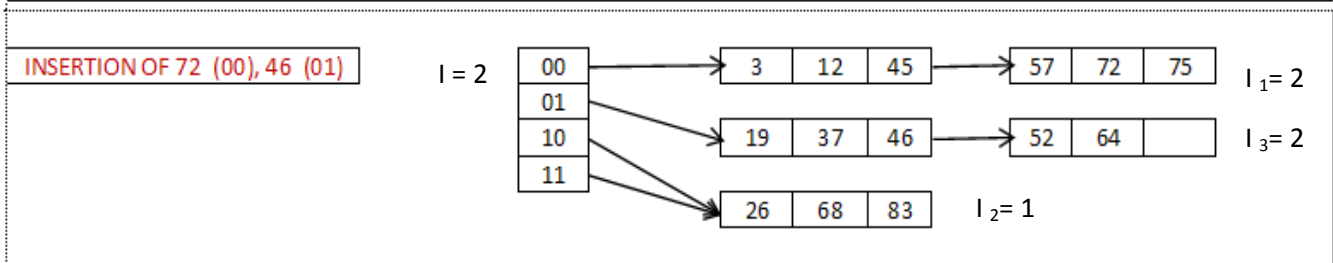
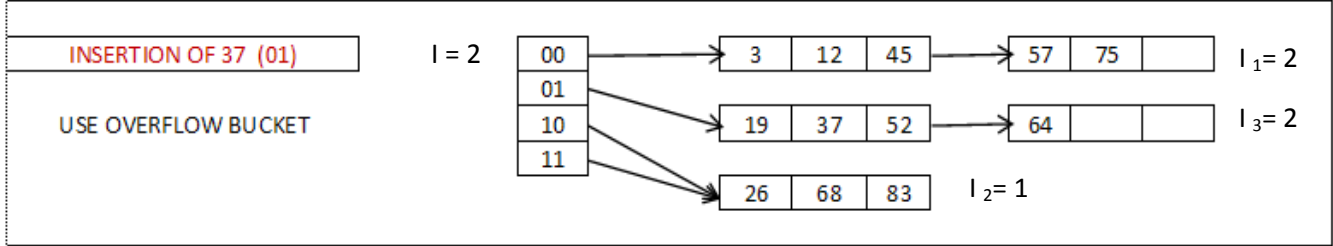
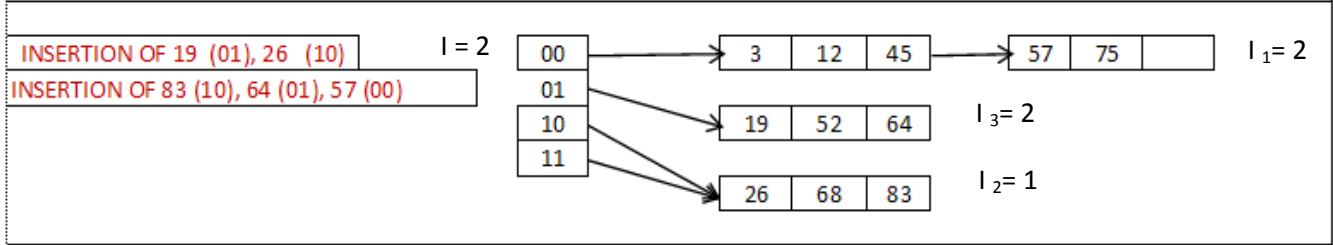
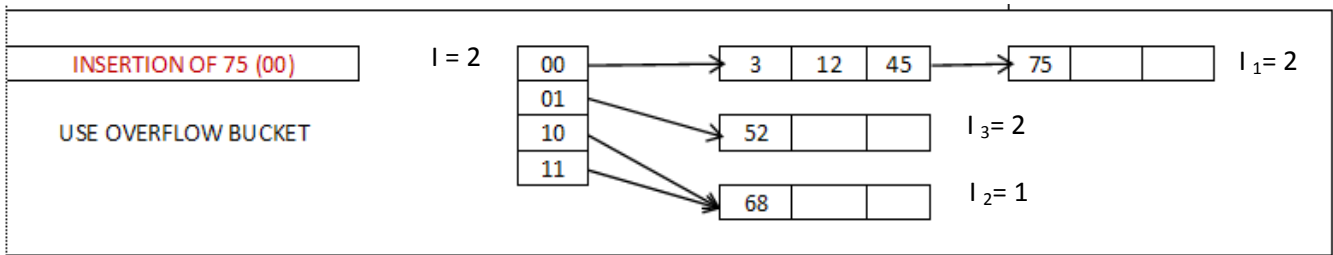
Extendable Dynamic Hashing	12, 3, 52, 45, 68, 75, 19, 26, 83, 64, 57, 37, 72, 46
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Hashing Function: $H(x) = x \bmod 3$

Maximum capacity of each bucket is 3

- $H(12) = 12 \bmod 3 = 0$ (00)
- $H(3) = 3 \bmod 3 = 0$ (00)
- $H(53) = 52 \bmod 3 = 1$ (01)
- $H(45) = 45 \bmod 3 = 0$ (00)
- $H(68) = 68 \bmod 3 = 2$ (10)
- $H(75) = 75 \bmod 3 = 0$ (00)
- $H(19) = 19 \bmod 3 = 1$ (01)
- $H(26) = 26 \bmod 3 = 2$ (10)
- $H(83) = 83 \bmod 3 = 2$ (10)
- $H(64) = 64 \bmod 3 = 1$ (01)
- $H(57) = 57 \bmod 3 = 0$ (00)
- $H(37) = 37 \bmod 3 = 1$ (01)
- $H(72) = 72 \bmod 3 = 0$ (00)
- $H(46) = 46 \bmod 3 = 1$ (01)





Q. 3

[A] Consider the following relation **CUSTOMER_ORDER(CustName, OrderNo, ProdNo, ProdDesc, Qty, CustAddress, DateOrdered)**

Assumption: A customer can have multiple orders but an order can be for only 1 product. CustName and OrderNo preassigned as keys.

Convert the relation into 3NF.

Solution:

CUSTOMER_ORDER(CustName, OrderNo, ProdNo, ProdDesc, Qty, CustAddress, DateOrdered)

CustName → CustAddress

CustName → OrderNo

CustName OrderNo → ProdNo ProdDesc Qty DateOrdered

OrderNo → ProdNo ProdDesc Qty DateOrdered

ProdNo → ProdDesc

2NF - remove partial dependencies

CUSTOMER (CustName, CustAddress)

CUSTOMER ORDER (CustName, OrderNo)

ORDER (OrderNo, ProdNo, ProdDesc, Qty, DateOrdered)

3NF - remove transitive dependencies

CUSTOMER (CustName, CustAddress)

CUSTOMER ORDER (CustName, OrderNo)

ORDER (OrderNo, ProdNo, Qty, DateOrdered)

PRODUCT (ProdNo, ProdDesc)

Q.3 OR

[A] Consider the following relation **CHARGE(proj_no, emp_no, proj_name, emp_name, job_class, chg_hours, hours)**

Convert the relation into 3NF.

Solution:

CHARGE(proj_no, emp_no, proj_name, emp_name, job_class, chg_hours, hours)

Relation is in first normal form.

proj_no → proj_name

emp_no → emp_name job_class chg_hours

proj_no emp_no → proj_name emp_name job_class chg_hours hours

job_class → chg_hours

2NF - remove partial dependencies

Project(proj_no, proj_name)

Emp(emp_no, emp_name, job_class, chg_hours)

Assign(proj_no, emp_no, hours)

3NF - remove transitive dependencies

Project(proj_no, proj_name)

Assign(proj_no, emp_no, hours)

Emp(emp_no, emp_name, job_class)

Job(job_class, chg_hours)