

a

$\pi_{S_name} (\sigma_{Location = 'Noida'} (Shop)) \rightarrow X$

① mark

$\pi_{S_name} (\sigma_{tag = 'Dry Mango'} (Items) \bowtie Provides \bowtie Shop)$

Y ←

X n Y

b

$\pi_{Shop-id} (Shop) \setminus \pi_{Shop-id} (Provides \bowtie \sigma_{tag \neq 'Black Pepper'} (Items))$

X ←

$\pi_{S_name} (X \bowtie Shop)$

② marks

c

$\pi_{Shop-id, Item-id} (Provides) \div \pi_{Item-id} (Item)$

X ←

② marks

~~$\pi_{Shop-id} (\sigma_{Location = 'Kamper'} (Shop))$~~

Y ←

X n Y

d

M N O Q R S
12 a 7 12 b 7

Merged Attributes can also be considered correct

12 a b 7

① mark

Q-2

```
<html>
<body>
    <form action="insert.php" method="post">
        Shop ID: <input type="text" name="shopid">
        Shop Name: <input type="text" name="sname">

        Location: <input type="text" name="location">
        Rating: <input type="text" name="rating">
        <input type="submit" Value = "Query">
    </form>
</body>
</html>
```

1 mark HTML

Insert.php

```
<?php
$con=mysqli_connect("localhost","peter","abc123","Shoppers_help");
// Check connection
if (mysqli_connect_errno())
{
    print( "Failed to connect to MySQL: " . mysqli_connect_error());
}

//Insertion-----
//This does not work
```

1 for connection

```
$sql="INSERT INTO Shop (Shop_id, S_name, Location, Rating) VALUES
('$_POST[shopid]',$_POST[sname]',$_POST[location]', $_POST[rating])";

$sql="INSERT INTO persons (FirstName, LastName, Age)VALUES('"
    .$_POST[shopid].
    "','".$_POST[sname].
    "','".$_POST[location].
    "','".$_POST[rating].
    "')";

if (!mysqli_query($con,$sql)) { die('Error: ' . mysqli_error()); }
print( "1 record added");
```

1 for insertion

```
// Updation-----
mysqli_query($con, "UPDATE Shop SET Location = 'Delhi' WHERE Shop_id = 5");
```

1 for update

```
//Display-----

$result = mysqli_query($con,"SELECT * FROM Shop");
while($row = mysqli_fetch_array($result))
{
    print( $row['Shop_id']. " " . $row['S_name']. " " . $row['Location']. " " . $row['Rating']);
    print("<br/>");
}
mysqli_close($con);
?>
```

1 for displaying

Q.3 Find minimal cover

$A \rightarrow C, AB \rightarrow C, C \rightarrow DI, CD \rightarrow I, EC \rightarrow AB, EI \rightarrow C$

① Union Simplification

$A \rightarrow C, AB \rightarrow C, C \rightarrow D, C \rightarrow I, CD \rightarrow I, EC \rightarrow A, EC \rightarrow AB, EI \rightarrow C$

(ii) Removal of Redundant FD

0.5 mark for step 1,

1.5 marks for step 2

2 for step 3

(A)⁺ without using $A \rightarrow C$

$(A)^+ = \{A\}$: $A \rightarrow C$ is not redundant

(AB)⁺ without using $AB \rightarrow C$

$(AB)^+ = \{AB, C, D, I\}$ Since we received $AB \rightarrow C$

$\therefore AB \rightarrow C$ is redundant

(C)⁺ without using $C \rightarrow D$

$C^+ = \{C, I\}$ we didn't get $C \rightarrow D$ (Not redundant)

(C)⁺ without using $C \rightarrow I$

$C^+ = \{C, D\}$ We didn't get $C \rightarrow I$ [Not redundant]

(CD)⁺ without using $CD \rightarrow I$

$(CD)^+ = \{C, D, I\}$ We get $CD \rightarrow I$ [redundant]

(EC)⁺ = $\{EC, D, I, AB, C\}$ we get $EC \rightarrow A$ (didn't)

[Not redundant]

Without using $EC \rightarrow A$

(EC)⁺ without using $EC \rightarrow B$ $(EC)^+ = \{E, C, D, I, A\}$ didn't get $EC \rightarrow B$

[Not redundant]

(EI)⁺ without using $EI \rightarrow C$

$(EI)^+ = \{EI\}$ didn't get $EI \rightarrow C$ [Not redundant]

Final FD's after step 1

$A \rightarrow C, C \rightarrow D, C \rightarrow I, EC \rightarrow A, EC \rightarrow B, EI \rightarrow C$

(11) Removal of Extraneous Attributes, for this consider
 $EC \rightarrow A, EC \rightarrow B, EI \rightarrow C, A \rightarrow C, C \rightarrow D, C \rightarrow I$

(i) Remove E from $EC \rightarrow A$ and with $(C)^+$ by rest of F
 $C^+ = \{C, D, I\}$ didn't get E \therefore E is non redundant

Remove E from $EC \rightarrow A$ and find $(E)^+$

$(E)^+ = \{E\}$ didn't get C \therefore C is non redundant

(ii) Remove E from $EI \rightarrow C$ and find $(I)^+$ by using rest of FD's

$(I)^+ = \{I\}$ [E not redundant]

Similarly for remove I

$(E)^+ = \{E\}$ [I not redundant]

(iii) Consider $EC \rightarrow B$

Remove E from $EC \rightarrow B$ and find $(C)^+$ using rest of FD's

$(C)^+ = \{C, D, I\}$ [not recovered E \therefore E is non redundant]

Remove C from $EC \rightarrow B$ and find $(E)^+$ using rest of FD's

$(E)^+ = \{E\}$ [C not redundant]

\therefore final minimal cover is

$A \rightarrow C, C \rightarrow D, C \rightarrow I, EC \rightarrow A, EC \rightarrow B, EI \rightarrow C$

Q-4

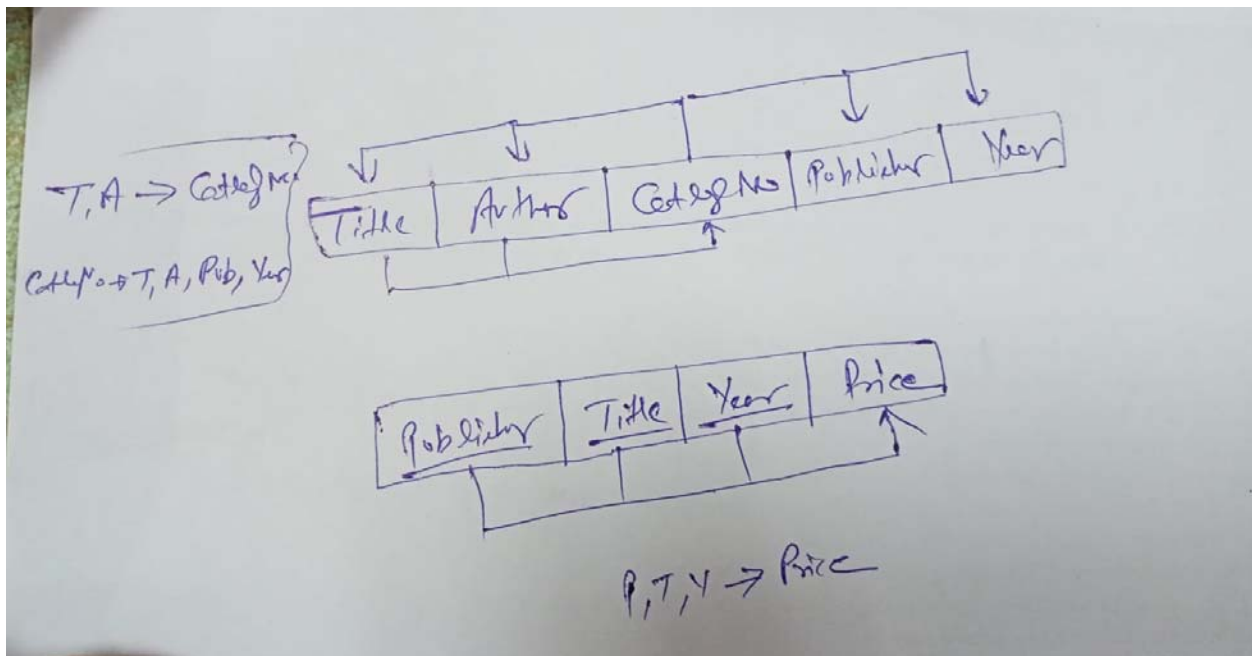
(a) For both the tables, candidate keys are {Title, Author} and {Catalog_no}. 1 mark

(b) What is the highest normal for Book and Collection schemes. 2 marks

Book is 2NF and Collection is in BCNF

(c) The table "Collection" is in BCNF so no need for decomposition. 2 marks

Break the book table as follows:-



Now its in 3NF and BCNF as well.