

Q) The table is not in 1NF Because the attribute courses contains more than value for eg:-  
 ID-1 courses  $\rightarrow$  'OS, DBMS'. So as it is not in 1NF it can't be in 2NF, 3NF.

converted table

ID	Name	Age	Location	Courses
1	Sachin	22	Delhi	OS
1	Sachin	22	Delhi	DBMS
2	Ram	22	Jamshedpur	DBMS
2	Ram	22	Jamshedpur	ML
3	Mike	23	Chennai	OS
3	Mike	23	Chennai	ML
4	Sameer	21	Bengaluru	DBMS
4	Sameer	21	Bengaluru	ML
5	Vijay	22	Mumbai	ML
5	Vijay	22	Mumbai	DBMS

Q) The above Table is in 1NF

Q) Prime Attributes  $\rightarrow$  ID & Name.

Non prime  $\rightarrow$  Age, Location, Courses.

Q) FD  $\rightarrow$  ID  $\rightarrow$  Age, Location, Courses.

Ans 2. The table 2.1 is not in 2NF Because it is not fully functionally independent as:-

$\text{Emp-ID} \rightarrow \text{Name, Age}$

$\text{Emp-ID, Duty-shift-ID} \rightarrow \text{Duty-shift}$

Primary Keys  $\rightarrow$  Emp ID

Candidate keys  $\rightarrow$  Emp ID

Prime attributes  $\rightarrow$  Emp ID Duty shift ID

nonprime  $\rightarrow$  Name, Age, Duty-shift.

Converted Table :-

Table 1 (Emp-ID)

Emp-ID	Name	Age
101	Arun	26
102	Bobby	24
103	Suresh	32
104	Sita	24

Table 2:- (Duty Shift - ID)

Emp-ID	Duty-Shift-ID	Duty-Shift
101	1	morning
102	2	Afternoon
103	3	Night
104	1	morning

Table 2.2 is not 2NF Because it is not fully functionally Independent as:-

Emp-ID  $\rightarrow$  Name

Emp-ID, Project-ID  $\rightarrow$  Project-Name, no. of hours.

Primary Key  $\rightarrow$  Emp-ID

candidate Keys  $\rightarrow$  Emp-ID, Project-ID

Prime attributes  $\rightarrow$  — || —

Non prime  $\rightarrow$  Name, Proj-name, no. of hours.

Converted table :-

Emp-ID	Name
123	Ajay
321	Charu
546	Rajesh
765	Abhishek

Emp-ID	Project-ID	Proj-Name	no. of hours
123	Proj-21	Speech-System	10
321	Proj-45	HR System	15
546	Proj-24	Automate Tickets	23
765	Proj-11	NIP	16

③ ⑥ Here there exist transitive dependency. so it is not in 3NF.

contractor  $\rightarrow$  fee

There should be no transitive dependency in 3NF. There should.

Building  $\rightarrow$  primary key.

contractor, Builder, fee  $\rightarrow$  non prime attributes.

Building  $\rightarrow$  contractor

Building  $\rightarrow$  Builder.

contractor  $\rightarrow$  Fee.

transitive dependency on Building ID

So not in 3NF.

3NF would be

Building	Contractor	Builder
B-2156	Taylor	Prestige
B-8765	Sandeep	Niranandani
B-4567	Vishaka	Tata.

Contractor	fee
Taylor	2567891
Sandeep	3567356
Vishaka	4567990

(R) Not in 3NF, there exists transitive dependency between {cust-address} & {cust-loc} on a non-primary key which is {cust-postcode}.  
3NF would be.

Cust-ID	Cust-Name	Cust-Postcode.
25	DelH	560057
45	Jenora	560046
89	acer	210067.
90	Samsung	4500078.

cust-ID → primary key.

cust - post code	cust - Address	cust - loc
560037	Whitefield	Bangalore
560046	Marathahalli	Bangalore
210067	Bandra	Mumbai
4500078	Delhi central.	Delhi.

cust-postcode → primary key.