Consider the universal Relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the Set of Functional dependencies

$F = (\{A, B\} \rightarrow \{C\},\ A \rightarrow \{D, E\},\ \{B\} \rightarrow \{F\},\ \{F\} \rightarrow \{G, H\},\ \{D\} \rightarrow \{I, J\})$

Answer :- First understand the Definition of 2NF

2NF Says that Non prime attribute should fully functionally dependent on the Candidate key (prime Attribute)

first step :- find the candidate key, and prime Attributes and Non prime Attributes list down all the functional Dependencies given in the problem.

$\{A, B\} \rightarrow C$

$A \rightarrow \{D, E\}$

$\{B\} \rightarrow \{F\}$

$F \rightarrow \{G, H\}$

$D \rightarrow \{I, J\}$

} AB is not present in the RHS

Identify the attributes which is not present in the RHS of the dependencies (AB)

find the closure of AB

$(AB)^+ = ABCDEFGHIJ$

AB is the candidate key ∵ you can reach all the attributes through AB.

∴ AB is a ~~candid~~ candidate key.

prime Attributes are A and B

Non prime Attributes are C, D, E, F, G, H, I, J

Decompose the Relation based on the pA

R_1 (A, B, C) $\quad AB \rightarrow C$

R_2 (A, D, E, I, J) $\quad A \rightarrow \{D, E, I, J\}$

R_3 {B, F, G, H} $\quad B \rightarrow \{F, G, H\}$

∴ R_1, R_2, and R_3 contain NO partial dependencies

So they are in 2NF

However R_2 and R_3 are still an issue because they contain transitive dependencies

① $A \rightarrow \{D, E\}$, $D \rightarrow \{I, J\}$ } ~~FD~~ R_{2a} (D, E), R_{2b} (DIJ)

② ~~R~~ $B \rightarrow F$, $F \rightarrow G, H$ — R_{3a} (B, F), ~~R_{3b} (b~~ R_{3b} (FGH)

The above dependencies are in 3NF