CANONICAL COVER OR MINIMAL SET OF FUNCTIONAL DEPENDENCIES

First, we need to understand Minimal set:

A minimal cover of a set of functional dependencies (FD) named FD for a given particular relation R, is a minimal set of dependencies FM that is equivalent to R.

R= A, B, C, D, E

FD= {F1, F2, F3, F4}

FM={F1, F3}

Here output of FD should be equal to output of FM.

Means the least number of functional dependencies through which a relation can exists itself. We can remove extra or Extraneous functional dependencies from the set of FDS. For this we remove the attributes from the relation which cannot affect the original relation.

SID	Name	Class	CID	Course	Mobile	Salutation
01	Rajesh	1 year	027	DBMS	68759487	Mr.
01	Rajesh	1 year	049	DSA	68759487	Mr.
02	Vikesh	2 year	032	CN	34980988	Mr.
02	Vikesh	2 year	091	OS	34980988	Mr.
03	Harsh	2 year	027	DBMS	29879878	Mr.
04	Jyoti	3 year	091	OS	48799807	Miss
04	Jyoti	3 year	091	OS	29875099	Miss

SID	Name	Class	CID	Mobile	Salutation
01	Rajesh	1 year	027	68759487	Mr.
01	Rajesh	1 year	049	68759487	Mr.
02	Vikesh	2 year	032	34980988	Mr.
02	Vikesh	2 year	091	34980988	Mr.
03	Harsh	2 year	027	29879878	Mr.
04	Jyoti	3 year	091	48799807	Miss
04	Jyoti	3 year	091	29875099	Miss

Before
SID → Course
SID → CID
CID → Course

After
SID → CID

CID	Course
027	DBMS
049	DSA
032	CN
091	OS

Canonical cover and Minimal cover are same in concept but a differences is there between the both as per given below:

A minimal cover cannot hold more than one attribute on the RHS, but a canonical cover is "allowed" to have more than one attribute on the right hand side.
Canonical cover
A ⟶ B
A ⟶ BC

Minimal cover
A ⟶ B
A ⟶ C

Extra FD can make the database complex. So we need to remove these extra FD. The set of remaining FD is known as Minimal Cover or Canonical Cover.

If we have a set of functional dependencies named FD for a relation R, then to become a minimal set FM it should satisfies the following conditions −

Every dependency in FM has a single attribute for its right-hand side.
A ⟶ B
A ⟶ C

We cannot replace any dependency X ⟶ Z in FM with a dependency Y⟶Z, where Y is a proper subset of X, and still have a set of dependencies that is equivalent to FM.

The given functional dependencies are as follows −

A ⟶ BC
B ⟶ C
A ⟶ B
AB⟶ C

First step − Convert RHS attribute into single attribute.

A ⟶ B
A ⟶ C
B ⟶ C
A ⟶ B
AB⟶ C

Second step − Remove the extra LHS attribute

Find the closure of A.

A+ = {A, B, C}

So, AB -> C can be converted into A ⟶ C

A ⟶ B

A ⟶ C

B ⟶ C

A ⟶ B

A ⟶ C

Third step − Remove the redundant FDs.

A ⟶ B

A ⟶ C

B ⟶ C

Fourth step − Remove the extraneous FDs.

A ⟶ B

[redacted]

B ⟶ C

Minimal Cover

A ⟶ B

B ⟶ C

Canonical Cover

A ⟶ BC

B ⟶ C