6.1)

```
Select  B1.sid , B2.sid
from  Catalog B1 , Catalog B2
where (B1.pid = B2.pid) AND (B1.sid = B2.sid) AND
        (B1.price > B2.price)
```

6.2)

```
Select  S1.sid
from  Suppliers
where  S1.address = 'Rustan city'
       S1.sid (select C1.sid)
       where  colour = red and Pid = C.pid
```

8.i) Given functional dependencies are;

HS Code ⟶ HSname, HScity

~~HSCode~~

HScode$^+$: HS Code, HS name, HS City

GPA$^+$: GPA, priority

SSN$^+$: SSN, sname, GPA, Saddress

R((HS Code, HS name, HS City, SSN, sname, saddress, GPA, priority))

So,

SSN, HS Code$^+$: Sname, saddress, GPA, privority, HScode, HSname, Hscity

Therefor SSN, HSCode are primary keys

HSCode ⟶ HSname, HS city (Pd)
SSN ⟶ Sname, Saddress, GPA (Pd)
GpA ⟶ priority (Yti a non-prime)

∴ Violation of BCNF

Using – GpA ⟶ priority
↳ R1 (GpA, priority)
↳ R2 (GpA, HSname, HS Code, Hscity, Saddress, Sname, SSN)

Using SSN – Sname, Saddress, GPA
↳ R21 (SSN, Sname, Saddress, GpA)
↳ R22 (SSN, H City, HSCode, HSname)

Using ~~HSCode~~ HScode ⟶ HSname, Hscity
↳ R221 (HS Code, Hsname, HS City)
↳ R222 (HS Code, SSN)

Therefore,

R_1(GPA, priority), R_{21}(SSN, Sname, Saddress, GPA),

R_{221}(HScode, Hsname, HScity), R_{222}(HScode, SSN)

are BCNF $R_1, R_{21}, R_{221}, R_{222}$

8.2) The checks on parse tree are as follows.

1) Syntax Checks:- It should check weather the Syntax of every operator is Correct?

2) Entity Checks:- Does every relation name refer to a void relation.

3) View expansion:- If a relation name refers to a view replace the relation node with the parse tree view.

4) Attributes Checks:- Does every attribute name refer to valid attributes?

5) Type checks- Does each attribute participating in an expression have the proper type?

9.1)

R

CwID	Name	Subject	location	score
1: 1015673	John	Computer Network	Ruston	96
1014521	John	DBMS	Ruston,	100

R_1

CwID	Name	Subject
1015673	John	CN
1014521	John	DBMS

R_2

CwID	location	score
1015673	Ruston	96
1014521	Ruston	100

Now we are performing $R_1 \cup R_2$

CwID	Name	Subject	location	score
1015673	John	CN	Ruston	96
1014521	John	DBMS	Ruston	100

(i) $R_1 \cup R_2 = R$

ii) $R_1 \cap R_2 =$ CwID i.e, $R_1 \cap R_2 \neq \phi$

iii) $R_1 \cap R_2$ = CwID with the CwID we can access the R_1 table that is CwID, Name, Subject

The 1 satisfies all the three rules above.

∴ It is a lossless Join.

2.

R_1

CwID	Name	location	Score
10156731	John	Rueston	96
10145221	John	Rueton	100

R_2

location	Score
Rueston	96
Rueton	100

i) $R_1 \cup R_2$ =

CwID	Name	location	Score.
10156731	John	Rueston	96
10145221	John	Rueton	100

$\therefore R_1 \cup R_2 \neq R$

ii) $R_1 \cap R_2$ =

location	score.
Rueton	96
Rueston	100

$R_1 \cap R_2 \neq \emptyset$

iii) $R_1 \cap R_2 = R_2 \longrightarrow$ it gives R_2,

The Relation should satisfy the three rules to become lossless join. so the above (2) doesn't satisfy. so it is lossy join.

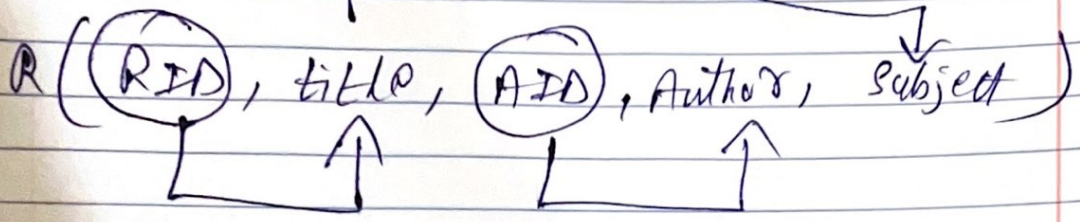
1 is a lossless join and 2 is a lossy join

$\therefore$

9.2) Report (RID, title, AID, Author, Subject)

RID → title,
title → Subject
AID → Author.

Now, we are drawing the edge diagram.



Closure of RID, AID: RID, AID, Author, title, Subject.

∴ RID, AID are Candidate Keys.

RID → title (partial dependency)
title → Subject (transitive dependency)
AID → Author (partial dependency)

R(RID, title, AID, Author, Subject) → R1 (RID, AID)
→ R2 (RID, title, Subject)
↳ R21 (RID, title)
↳ R22 (title, Subject)
→ R3 (AID, Author).

∴ R1, R21, R22, R3 are in 3NF