6.1 Select C1.Sid, C2.sid From CATALOG C1, CATALOG C2
where (C1.Pid = C2.Pid) and (C1.Sid = C2.Sid)
and (C1.Price > C2.Price)

6.2 Select S.sid From Supplier S where
S.address = "Ruston City" (or) S.sid in (select
C.sid From Part P X CATALOG C where
P.Color = "red" and P.Pid = C.Pid.)

8.1 As per the Functional Dependency.

HScode$^+$: HScode, HSname, HScity

GPA$^+$: GPA, Priority

SSN$^+$: SName, SSN, Saddress, GPA, Priority

Student(SSN, SName, Saddress, HScode, HSname, HScity, GPA, Priority)

SSN, HScode is a potential candidate key

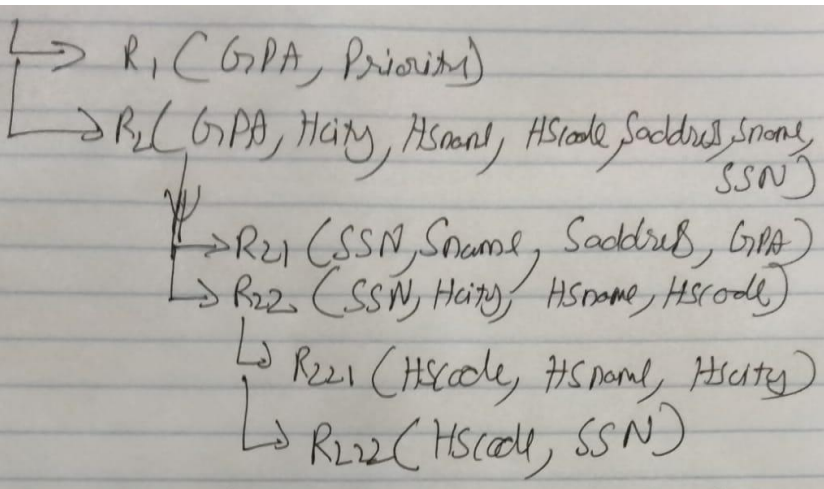
SSN, HScode$^+$; Sname, SSN, Saddress, HScode, HSname, HScity, GPA, Priority

HSCode → HSname, HScity (This a Partial Dependency)

SSN → Sname, Saddress, GPA, (This is P.D)

GPA → Priority (These are non prime attributes)

and this is a violate of BCNF



Hence R_1, R_{21}, R_{221}, R_{222} are in BCNF

8.2 Types of checks on Parse tree are

Syntax checks: Checks if syntax of Every operator is correct.

Entity Check: Checks if Every relation name refers to a valid Relation.

View Expansion: If a Relation name refers to a view, replace the relation Node with the Parse tree of the view.

Attribute checks: If every attribute name refers to valid attribute or Not

- Type Checks: Checks if Each attribute Participating in an Expression have the proper type (or) Not.

Q.1

$\mathcal{R}$

CWID	NAME	Subject	Location	Score
10156731	John	Computer Networks	Ruston	96
10145221	John	DBMS	Ruston	100

R_1

CWID	NAME	SUBJECT
10156731	John	CN
10145221	John	DBMS

R_2

CWID	Location	Score
10156731	Ruston	96
10145221	Ruston	100

$R_1 \cup R_2$

CWID	NAME	SUBJECT	Location	Score
10156731	John	CN	Ruston	96
10145221	John	DBMS	Ruston	100

$R_1 \cup R_2 = \mathcal{R}$ ✓

$R_1 \cap R_2 \neq \emptyset$ ✓

CWID
10156731
10145221

$R_1 \cap R_2 \rightarrow R_1$ ✓

(or)

$R_1 \cap R_2 \rightarrow R_2$ ✗

As per the FDs:

$CWID^+$: CWID, NAME, SUBJECT, (R1)

$CWID^+$ ~~[illegible]~~ gives rise t

R1

Hence this is a | lossless Join |

9.1 2.)

R_1

CWID	NAME	LOCATION	SCORE
10156731	John	Ruston	96
10145221	John	Ruston	100

R_2

LOCATION	SCORE
Ruston	96
Ruston	100

$R_1 \cup R_2$

CWID	NAME	LOCATION	SCORE
10156731	John	Ruston	96
10145221	John	Ruston	100

$R_1 \cup R_2 = R$ X

Since the First Rule of the 3 Identification Rules Failed.
This is considered to be a lossy join.

Hence the answer for 9.1 is

(b.) 1 is lossless but 2 is lossy

9.2

Candidate Key

Report(RID, Title, AID, Author, Subject)

$(RID, AID)^+$: RID, AID, Subject, Title, Author

(RID, AID) is a potential candidate key

Report(RID, Title, AID, Author, Subject) → R_1(RID, Title, Subject)

→ R_{11}(RID, Title)

→ R_{12}(Title, Subject)

→ R_2(AID, Author)

→ R_3(RID, AID)

Hence the relations are 3NF