1. 14.14

A. patientNo → fullName, wardNo, bedNo
wardNo → wardName
wardName → wardNo
drugNo → name, description, dosage, methodOfAdm
~~patientNo →~~
patientNo, drugNo, startDate → unitsPerDay, finishDate

B. 1st NF

patientNo, drugNo, startDate, fullName, wardNo, wardNam
bedNo, unitsPerDay, finishDate, name, description,
dosage, methodOfAdmin

2 NF
partial dependency on patientNo and drugNo exists
so move them to different relations.

i. patientNo, drugNo, startDate, unitsPerDay, finishDate

ii. ~~Drug~~ drugNo, name, description, dosage, methodOfAdmi
~~patientNo → wardNo, wardName, bedNo, fullName~~

iii. patientNo, fullName, wardNo, wardName, bedNo

3 NF
Transitive dependency on patientNo due to wardNo → wardName
i. patientNo, drugNo, startDate, unitsPerday, finishDate
ii. drugNo, name, description, dosage, methodOfAdmin
iii. patientNo, fullName, wardNo, bedNo
iv. wardNo, wardName

1. 14.14. c.

i. patientNo (FK), drugNo (FK), startDate, unitsPerDay, finishDate

ii. drugNo, name, description, dosage, methodOfAdmin.

iii. patientNo, fullName, wardNo (FK), bedNo
(bedNo → (AK))

iv. wardNo, wardName (AK)

Underlined fields are primary keys.

2. 14.15. a. insertion anomaly
To enter new patient data that doesn't have dentist already assigned, we can't ~~enter~~ insert NULL values in staffNo field, it is primary key.

deletion anomaly
If we delete dentist, we also lose appointment details of a patient.

update anomaly
If we update patient, we have to update both patientNo and patientName

b. - a patient is registered for only one surgery.

i. staffNo, aptDate, aptTime → patientNo, patientName
ii. staffNo, aptDate → surgeryNo
iii. staffNo → dentistName
iv. patientNo → patientName, surgeryNo
v. patientNo, aptDate, aptTime → staffNo, dentistName

2-14-15-C

## 1NF

PK

staffNo, aptDate, aptTime, dentistName, ~~patNo~~, patientNo,

patientName, surgeryNo

## 2NF

partial dependencies

staffNo ⟶ dentistName

staffNo, aptDate → surgeryNo

i.) staffNo, aptDate, aptTime, patientNo, patientName

ii.) staffNo, dentistName

iii) staffNo, aptDate, surgeryNo

## 3NF

patientNo → patientName

i. staffNo, aptDate, aptTime, patientNo

staffNo: Fk; patientNo: Fk; (staffNo, aptDate, aptTime, patientNo): PK; (aptDate, aptTime, patientNo): AK

ii. staffNo, dentistName

staffNo: PK

iii. staffNo, aptDate, surgeryNo [∵ surgery relation exists assumed]

staffNo: Fk; surgeryNo: Fk; (staffNo, aptDate): PK

iv. patientNo, patientName

patientNo: PK

3.

**Hotel**

hotelNo – secondary & index (∵ used on join)
hotelName – ~~no index~~ secondary index (∵ search details for a particular hotel with name)
~~hotel~~ city – secondary index (~~this~~ selection on this field)

**Room**

roomNo – secondary index (use on joins)
hotelNo – secondary index (use on joins)
type – no index (unlikely to search frequently with type)
price – cluster ~~index~~ index (likely to search rooms below or above certain price)

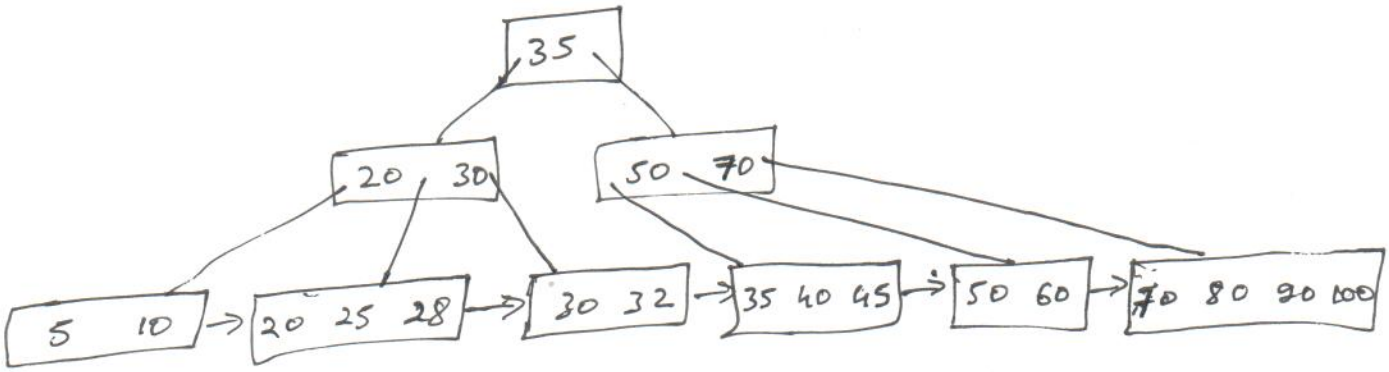
**Booking**

hotelNo – secondary index
roomNo – secondary index (∵ use on joins)
guestNo – secondary index
dateFrom – secondary index (∵ search hotels with check in ~~or~~ check out date)
dateTo – secondary index

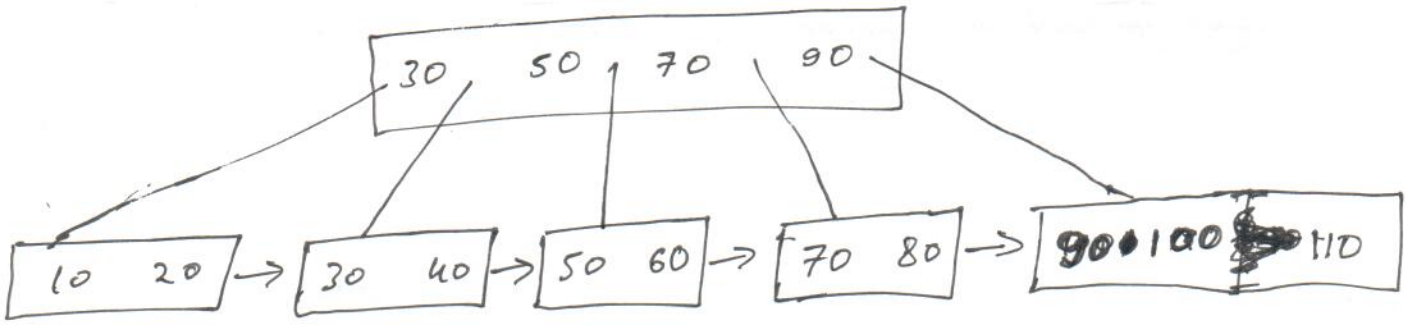
**Guest**

guestNo – secondary index (∵ use on joins)
guestName – no index
guestAddress – no index

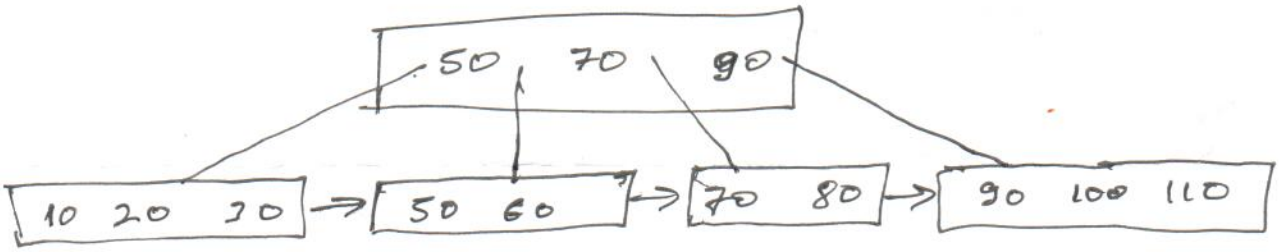
4- a- insert 32




b. insert 110




c. delete 40




d. delete 75