

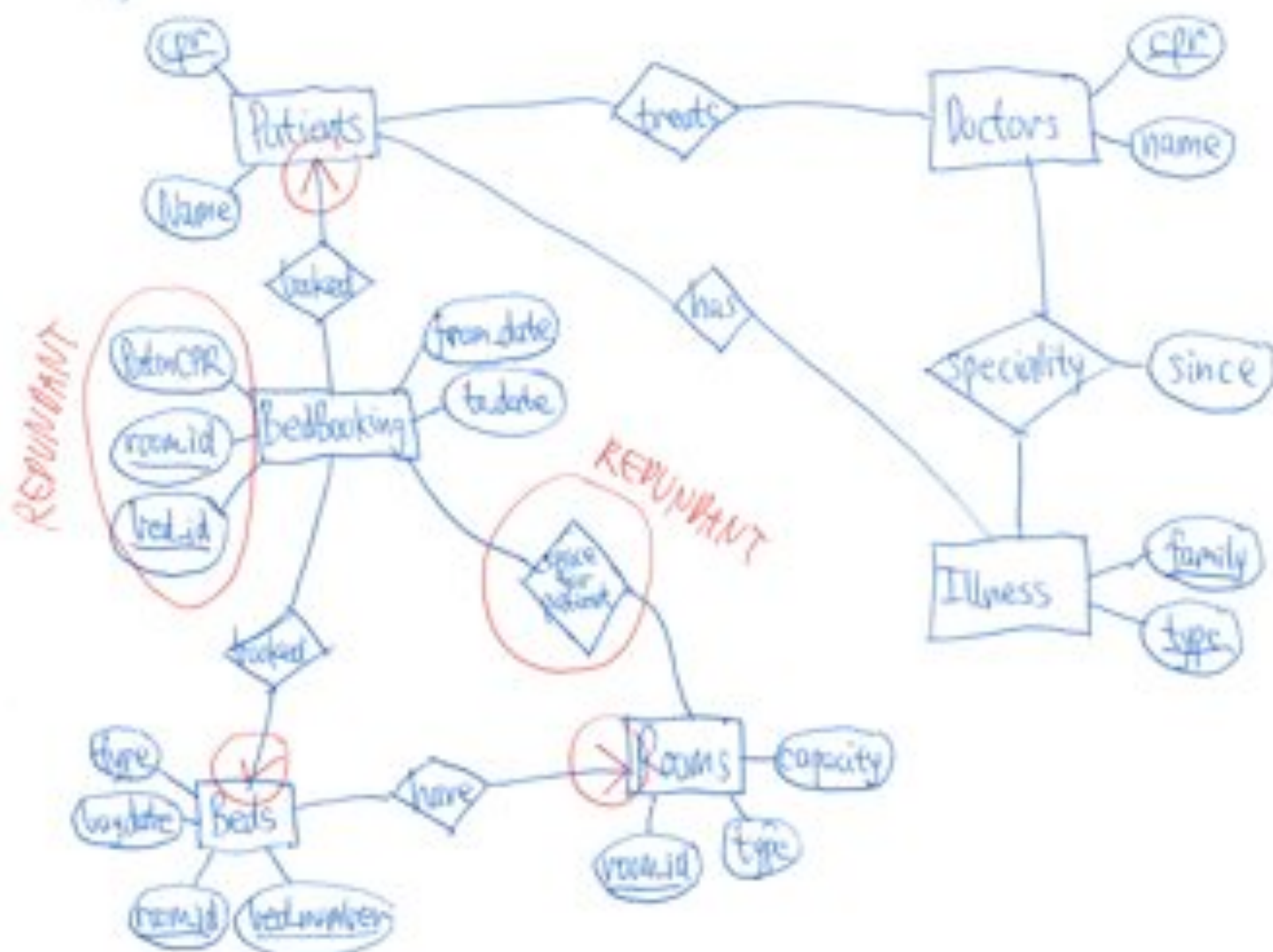
EXAMPLE EXAM ANSWER 1

INTRODUCTION TO DATABASES EXAM, JANUARY 2005

NB! THE ANSWERS COME FROM THE ACTUAL EXAM AND HAVE MISTAKES!

PROBLEM 1

b)



5 P

PROBLEM 1

- A) Patients (cpr, name)
Doctors (cpr, name)
Beds (room, number, type)
Illness (family, type) REDUNDANT (?) ÷ 1 P
Treats (patient-cpr, doctor-cpr)
Occup (cpr, room, number)
Has (cpr, family, type)
Speciality (since, cpr, family, type)

WE CAN POSSIBLY COMBINE ~~BEDS~~^{BEDS} & OCCUP, EG.

Beds (room, number, type, cpr) 9 P

PROBLEM 2

- A) IN THIS CASE THE REPETITION IS AT TYPE ATTRIBUTE IN BEDS BECAUSE WE SEE ALL THE BEDS BOUGHT AT SAME DATE HAVE SAME TYPE. (REDUNDANCY) ✓

UPDATE ANOMALY: IF WE CHANGE THE room_id IN THE ROOMS RELATION WE HAVE TO UPDATE IT IN BOTH BEDS AND BedBookings RELATIONS. ✗ 2 P

PROBLEM 2

- b) Beds: WE DON'T HAVE ANY AVOIDABLE FD BECAUSE WE FIND KEY ELEMENTS ON THE LEFT HAND SIDE.

Rooms: _____ || _____ %

BedBookings: HERE WE FIND TWO AVOIDABLE FDS:

- (i) patient_cpr \rightarrow from_date
(ii) patient_cpr \rightarrow to_date
- 3 P } CORRECT ASSUMING THAT patient_cpr IS A KEY (BUT THEN NOT AVOIDABLE)

- c) BCNF DECOMPOSITION:

AFFECTS ONLY BedBookings (FD patient_cpr \rightarrow from_date, to_date)

BedBookings 1 (patient_cpr, from_date, to_date)

BedBookings 2 (patient_cpr, room_id, bed_number) 5 P
CORRECT RELATIVE TO B)

PROBLEM 3

- a) YOU MUST BE ALLOWED TO ADD A BED WITHOUT DEFINING end-date. YOU ALSO NEED TO BE ABLE TO SEE THAT A BED IS BOOKED FROM A CERTAIN DATE, EVEN IF YOU HAVEN'T SPECIFIED WHEN A PATIENT IS DISCHARGED (to_date). IMPL.

- 1+2: SET TRANSACTION READ WRITE ISOLATION LEVEL READ COMMITTED } GUESSING?
3: SERIALIZABLE.

KNOWS ISOLATION LEVELS: 1 P

③

PROBLEM 4

A) SELECT SUM(capacity) ~~FROM~~ AS Total_Capacity
FROM Rooms
WHERE type='T'; ✓ 6 P

B) SELECT type, SUM(room-id)
FROM Rooms
WHERE buy-date < '1990'
GROUP BY type; % 0 P

C) THE QUERY HAS TWO PARTS:

(i) THE SUBQUERY RETURNS room-id AND bed-numbers
FROM THE Beds TABLE WHICH HAS type SET TO 'air'.

(ii) IN THE MAIN QUERY, THE room-id AND bed-number
IN THE BedBookings RELATION IS SET TO NULL IF THE
room-id AND bed-number EQUAL ANY OF THOSE RETURNED
BY THE SUBQUERY. OK, NOT VERY CONCISE. 5 P

D) UPDATE Rooms SET capacity = (SELECT ~~SUM~~^{COUNT}(bed-number)
FROM Beds
GROUP BY room-id)
WHERE rooms.room-id = beds.~~room-id~~ room-id; 3 P

E) a) $\Pi_{\text{SUM}(\text{capacity})} (\sigma_{\text{type}='T'}(\text{Rooms}))$ ✓

b) $\Pi_{\text{type}, \text{SUM}(\text{room-ids})} (\sigma_{\text{buy-date} < '1990'}(\text{Rooms}))$
GROUP BY type ??

3+0 P

PROBLEM 5

- A) FACTS: ABOUT VEHICLES ARE PASSED OR NOT ✓ UNCLEAR
MEASURES: SPEED ✓, TYPE ✓, TIME ✓, DAY OF WEEK ✓, WEATHER ✓.
DIMENSIONS: THE INFORMATION IS STORED IN DIFFERENT TABLES LIKE VEHICLE TABLE WHICH STORES INFORMATION LIKE SPEED, TYPE, TIME, DAY OF WEEK. THE OTHER INFORMATION LIKE WEATHER CONDITIONS IS STORED IN ANOTHER TABLE WEATHER FOR ALL TIMES, ALL DAYS OF WEEK AND THEIR WEATHER. THE INFORMATION IS COLLECTED FROM THE TWO FACT TABLES LIKE VEHICLES AND WEATHER TO GET RESULTS.
SOME UNDERSTANDING. 2 P

- B) THE STAR SCHEMA CAN BE LIKE:



1 P
(IN VIEW OF A)

ORGAVE 6

A) DOC HAS THE FOLLOWING PRIVILEGES ON BedBookings:

- CAN SEE THE DATA (SELECT)
- CAN UPDATE from_date AND to_date AND MAY GIVE OTHERS THE PRIVILEGE TO DO THIS.

(- CAN NOT DELETE TUPLES, SINCE adm DOES NOT HAVE THE RIGHT TO PASS ON THIS PRIVILEGE) ✓ 5P

B) DOC NOW HAS THE FOLLOWING PRIVILEGES:

- CAN UPDATE 'to_date' AND PASS ON THIS PRIVILEGE. ✓ 2P

3P

C) CREATE VIEW BedInfo AS

```
SELECT room-id, bed-number, from_date, to_date  
FROM BedBookings  
WHERE (patient_cpr % 2 = 0);
```

GRANT SELECT ON ~~BedBookings~~
BedInfo TO public;

2P

COULD BE THOUGHTLESS, OR
A SERIOUS MISUNDERSTANDING

TOTAL: 52 POINTS

GRADE: 6

EXAMPLE EXAM ANSWER 2

RASHUS PAGE

INTRODUCTION TO DATABASES EXAM, JANUARY 2005

NB! THE ANSWERS COME FROM THE ACTUAL EXAM AND HAVE MISTAKES!

PROBLEM 1

- A) SINCE THERE IS A 1-1 RELATIONSHIP BETWEEN Patients AND Beds I HAVE CHOSEN TO COMBINE THEM INTO ONE RELATION (POSSIBLY WITH TYPES INSTEAD WITH NULLS):

Patients (pcpr, name, room, number, type)

DOES NOT FOLLOW GOW METHOD, = 2P

THE REST OF THE CONVERSION IS:

Doctors (dcpr, name)

Treats (pcpr, dcpr)

Illnesses (family, type)

Speciality (dcpr, family, type, since)

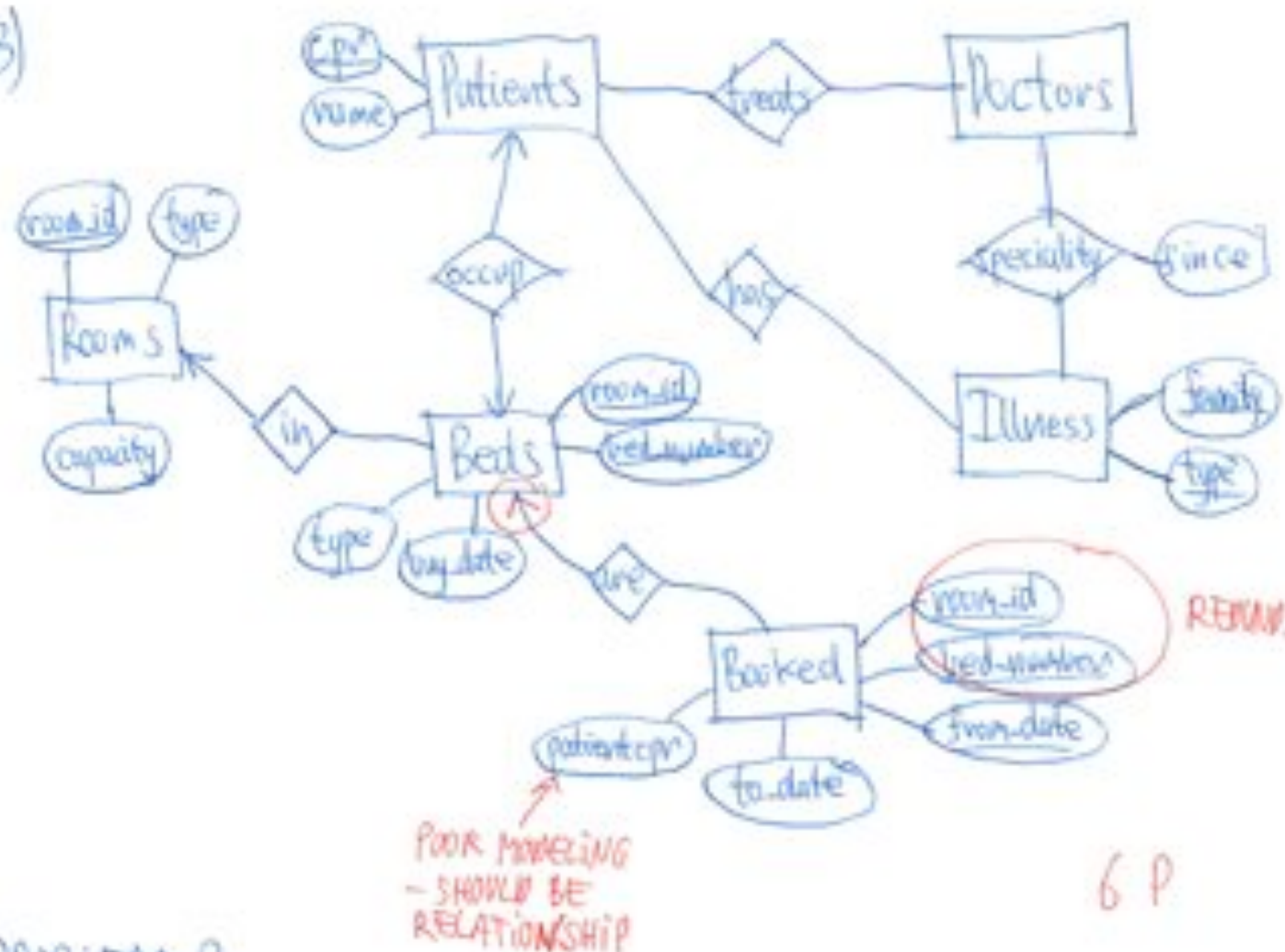
Has (pcpr, family, type)

REDUNDANT (?) = 1P

7P

PROBLEM 1

B)



PROBLEM 2

A) **REDUNDANCY:** TYPE IN BEDS WOULD BE THE SAME FOR MORE BEDS, BUT COULD BE DERIVED FROM buy_date.

UPDATE ANOMALY: WHEN UPDATING from_date THERE IS NO CONSTRAINT ON to_date, I.E. from_date COULD BE FALSELY A DATE GREATER THAN to_date. THE KEY ON BEDS IS ALSO A PROBLEM IF THE BED CHANGES ROOM.

% 2P

PROBLEM 2

B) SINCE (room-id, bed-number) IS A KEY, bed-number DOES NOT DETERMINE room-id. AVOIDABLE FDS IN Beds:

buy-date \rightarrow type room-id \rightarrow type MISSING

IN Rooms NEITHER TYPE NOR CAPACITY NOR THE TWO TOGETHER CAN DETERMINE room-id OR EACH OTHER. HENCE THERE IS NO AVOIDABLE FD.

IN BedBookings THERE IS ALSO NO AVOIDABLE FD. 3P

C) Beds IS RECOMPOSED INTO:

Beds(room-id, bed-number, buy-date)

Type(buy-date, type) ✓ (RELATIVE TO B) 5P

PROBLEM 3

A) 1) HERE I WOULD CHOOSE ISOLATION LEVEL SERIALIZABLE TO AVOID THAT SEVERAL ATTEMPTS TO BOOK THE SAME BED. ✓

2) ISOLATION LEVEL READ COMMITTED - IT IS VERY UNLIKELY THAT TWO PEOPLE WILL DISCHARGE THE SAME PATIENT AT THE SAME TIME. ✓

3) READ COMMITTED HERE TOO. ARGUMENT MISSING (=2P)

8P

③

PROBLEM 4

- A) SELECT SUM(capacity) AS totalCapacity
FROM Rooms
WHERE type='t' ✓ 6P
- B) SELECT Rooms.room_id, Rooms.type
FROM Rooms, Beds
WHERE Rooms.room_id = Beds.room_id AND buy_date < '1990' ✓ 6P
- C) THE STATEMENT SETS room_id AND bed_number IN
BEDBOOKINGS TO NULL FOR ALL BEDS OF TYPE 'old'. ✓ 6P
- D) UPDATE Rooms
SET capacity = SELECT COUNT(Beds.room_id) AS numbeds
FROM Beds, ~~Rooms~~
WHERE Beds.room_id = Rooms.room_id 4P
- E) $\Pi_{\text{totalcapacity}} (\sigma_{\text{type}='t'} (\gamma_{\text{sum}(\text{capacity})} \rightarrow \text{totalcapacity}(\text{Rooms})))$ 2P
- $\Pi_{\text{Rooms.room_id, Rooms.type}} (\sigma_{\text{Rooms.room_id} = \text{Beds.room_id AND buy_date} < '1990'} (\text{Rooms} \bowtie \text{Beds}))$
NOT REL. ALGEBRA NOTATION 2P

PROBLEM 5

TUPLES OF THE FORM

A) FACTS: (SPEED, TYPE, DATE, WEATHER, REGISTRATION ID)



OK BASIC
UNDERSTANDING,
FUZZY ON
CONCEPTS
A+B) 5 P TOTAL

DIMENSIONS: ~~type~~

weatherID missing

B) FACT TABLE: traffic(trafficRegID, [✓]date, speed)

PROBLEM 6

A) DOC MAY SELECT ALL ATTRIBUTES OF BedBookings. ✓
DOC MAY UPDATE from-date AND to-date IN BedBookings, BUT
NO OTHER ATTRIBUTES. THIS PRIVILEGE CAN BE PASSED ON. ✓
DOC MAY DELETE TUPLES OF BedBookings. ✗ 3 P

B) DOC CANNOT SELECT FROM BedBookings.
DOC CAN NOW ONLY UPDATE to-date IN BedBookings. 3 P
DOC MAY DELETE TUPLES IN BedBookings. ✗ (RELATIVE TO A)

C) CREATE VIEW N-BEDBOOKINGS AS
SELECT room-id, bed-number, from-date, to-date
FROM BedBookings
WHERE (patientopr % 2 = 0)

GRANT SELECT ON N-BEDBOOKINGS TO public. ✓ 5 P

TOTAL POINTS: 7.5

GRADE: 9

(5)