Winter ’2015
CSE 205/206 [Database Management Systems]
Mid-Semester Examination

Time: 90 Minutes Max Points: 80

IMPORTANT NOTE:
1. Write answers neat and clean. May be you can first work in rough area and write final version as answer. Answers that are difficult to read may simply be ignored.

1. Convert following SQL statements into Relational Algebra -

[2+3+5+5]

```
SELECT r1.a2, r2.b2 FROM r1, r2
WHERE r1.a3 = r2.b1

SELECT r1.* FROM r1 JOIN r2 ON ( r1.a5 = r2.b2 )
WHERE r1.a1 > 1000;


SELECT * FROM r1 where r1.a3 NOT IN ( SELECT b1 FROM r2 );


SELECT r1.a3, count ( r1.a2 ) FROM r1
   WHERE r1.a1 > 1000
   GROUP BY r1.a3
   HAVING count( r1.a2 ) > 3;
```

2. Suppose following schema has been designed for storing information of Hall of Residence at an institute like IIITV. Considering this set of relations, write down queries given below in Relational Algebra. All queries carry equal weightage.

[45]

STUDENT(id, name, email, prog_code, batch)
-- Batch is like 2009, 2010, or so
-- Prog_code is like ‘01’ for B.Tech(CS), or so

CoursesTaken(stud_id, course_no, sem, acad_yr, grade)
-- attribute sem value is one of three – Autumn, Winter, and Summer
-- attribute acad-year is start year of the academic year

Result(stud_id, sem, acad_yr, SPI)
-- Here attribute SPI is Semester Performance Index of “the student” for “the semester”.

ROOM(rno, wing, floor)
-- the relation stores details of rooms
-- floors are represented by numbers 0 (Ground), 1(First), and 2 (Second); values for wings is single letter and drawn letters ‘A’ through ‘K’.

ALLOT(sid, rno)
-- This relation records all allotments; students (sid) not having entry in this relation means - they are not residing in the HoR
-- rno (FK) refers to Room relation, and can not be null.

HMC(wing, floor, sid)
-- **sid** is student id of floor representative of Hostel Management Committee (HMC), and can not be null.

i. List ID, Name of students residing in wing ‘C’ first floor.

ii. List room nos' along with ID and Name of resident that are singly occupied in wing 'C' first floor

iii. Give wing-floor wise count of fully vacant rooms in HoR

iv. Give prog-batch wise count of residents in wing 'C' first floor.

v. List ID, Name of B.Tech. (CS) students (prog code '01') who are not residing in HoR

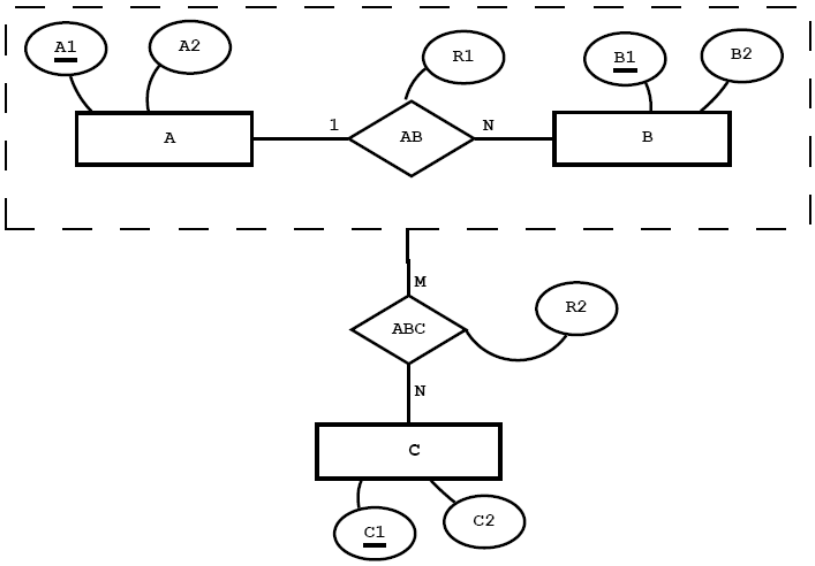
vi. List HMC representatives (Wing, Floor, ID and Name) for all floors (should output null if there is no representation for a floor)

vii. List wing-floors that do not have HMC representative.

viii. List ID, Name, and CPI of all students of B.Tech.(CS) 2008 (prog code '01') batch having SPI >= 6.0 in every semester, he/she has studied.

ix. List ID, Name of students of B.Tech.(CS) 2008 (prog code '01') , who are living in 'E' second floor and taken CS304, and have passed with 'AA' or 'AB' grade.

3. Consider following Entity Relationship Diagram:



10+10=20

a. Discovery and find out minimal set of Functional Dependencies from semantics of ERD.

b. Map it to equivalent Relational Schema indicating FK and PK and other constraints.