Q1) Suppose that a DW for DB-University consits of four dimensions Student, course, semester, instructor & two measures count & avg grade. At the lowest conceptual level (eg for a given student, course, semester & instructor combination), the avg-grade measure stores the actual course grade of the student. At higher conceptual levels, avg-grade stores the average grade for the given combination

a) Draw a snowflake schema diagram for the data warehouse

b) Starting with the base cuboid [student, course, semester, instructor] what specific OLAP operations (eg roll up from semester to year) Should you perform in order to list the average grade of CS courses for each DB-University students

a)

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┌─────────────┐   ┌──────────────┐                              ┌──────────────┐
│ Area        │   │ Student      │                              │ Instructor   │
├─────────────┤   ├──────────────┤                              ├──────────────┤
│ area_id   ◄─┼───┤ studentid    │                         ┌──► │ in_id        │
│ city        │   │ name         │                         │    │ department   │
│ state       │   │ univesity    │                         │    │ subject      │
│ Country     │   │ depaitment   │                         │    └──────────────┘
└─────────────┘   │ area_id      │                         │
                  └──────────────┘    ┌──────────────┐     │
                                      │ Univesity    │     │
                                      ├──────────────┤     │
                                      │ student_id   │     │
                                      │ instructor_id├─────┘
┌─────────────┐                       │ course_id    │
│ Course      │                       │ semestor_id  │
├─────────────┤                       │ Count        │
│ course_id ◄─┼───────────────────────┤ avg_grade    │
│ name        │                       └──────────────┘
│ depaitment  │
└─────────────┘

┌─────────────┐
│ Semester    │
├─────────────┤
│ sem_id    ◄─┼───────────────
│ number      │
│ year        │
└─────────────┘
```
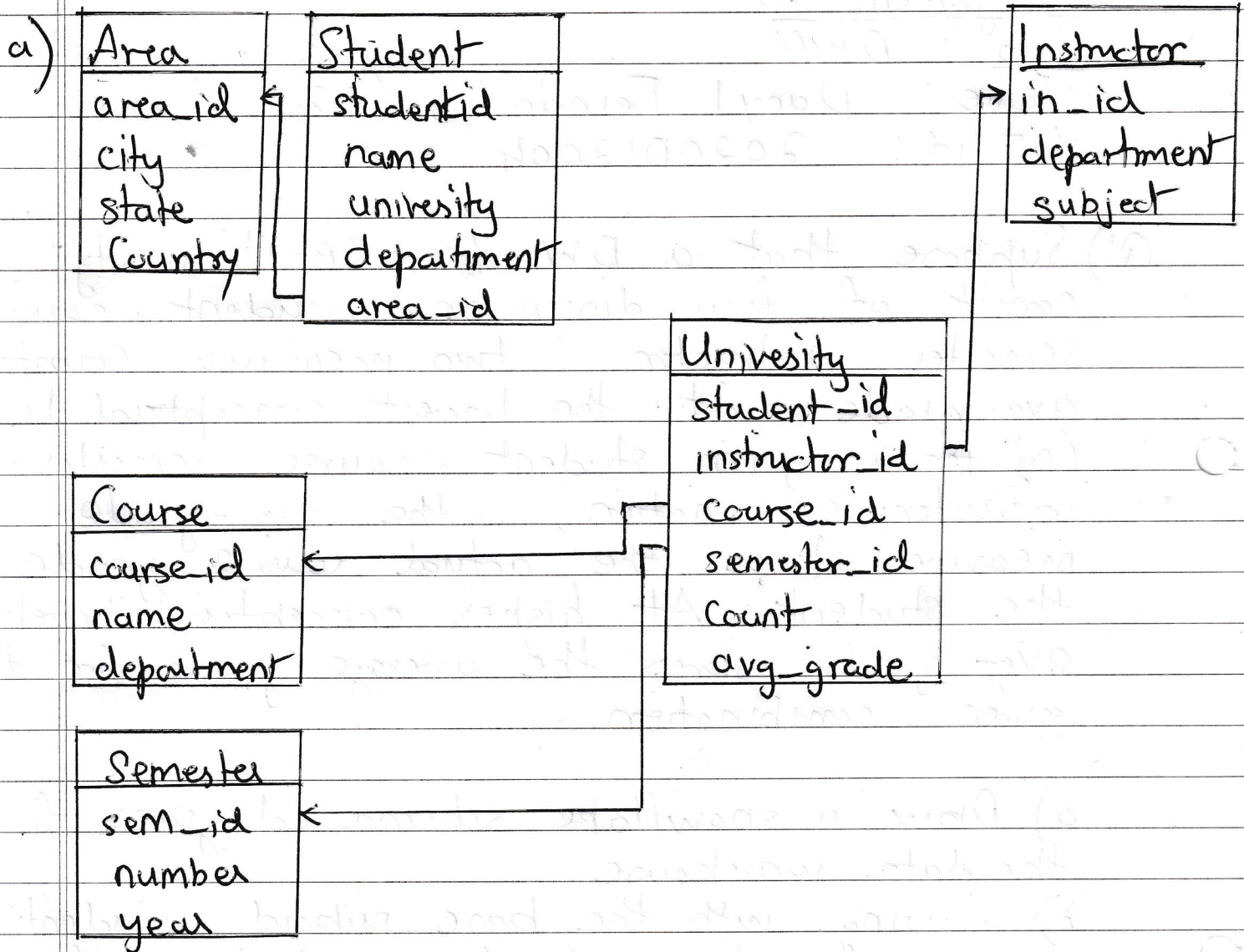
b) Operations to perform:

i) Rollup on course from course_id to depaitment

ii) Rollup on student from student_id to univesity

iii) Dice operation on course depaitment = CS & univesity = DB-Univesity

iv) Drill down on student from univesity to student_id