EE4001/IM2001 Software Engineering
Tutorial 2 and Sample Answer

1) From the definitions of basic concepts, interpret the ER diagram shown in Figure 1 precisely.

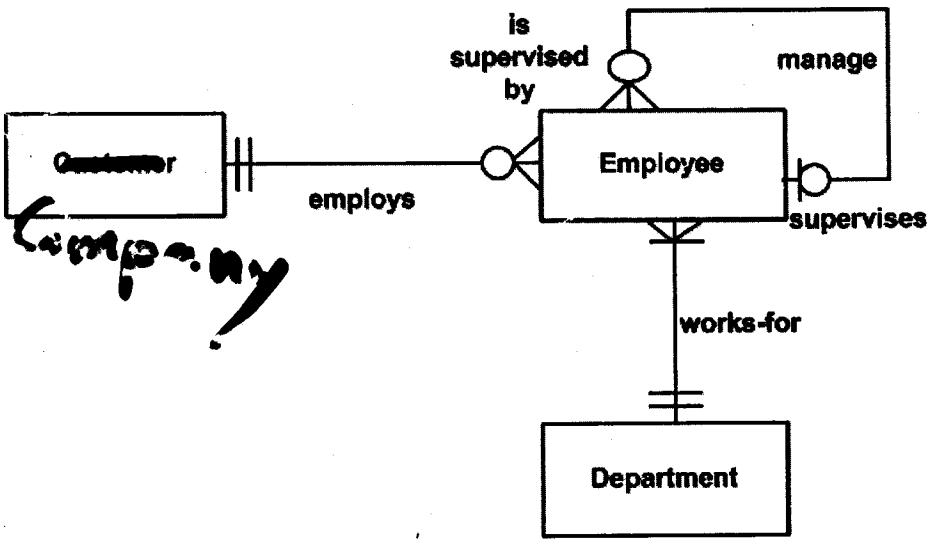


Figure 1. An ER diagram

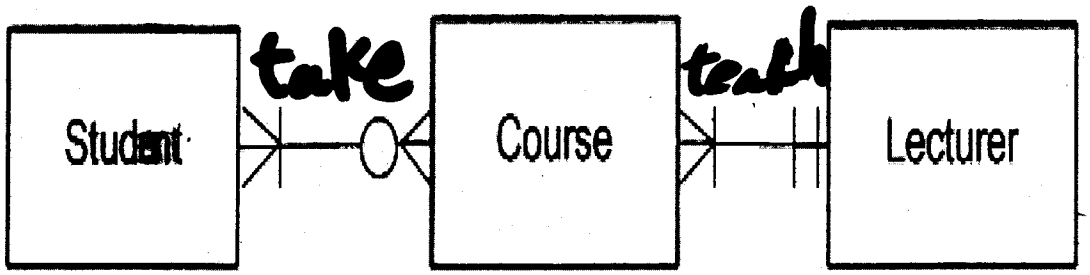
Q1 Answer:

i) Each company employs zero to many employees
ii) Each employee is employed by one company.
iii) An employee is supervised by at most one employee.
iv) An employee may supervise more than one employee.
v) Each employee works for one department.
vi) Each department has zero to many employees work for it.

2) Draw an entity-relationship diagram to model the following information:

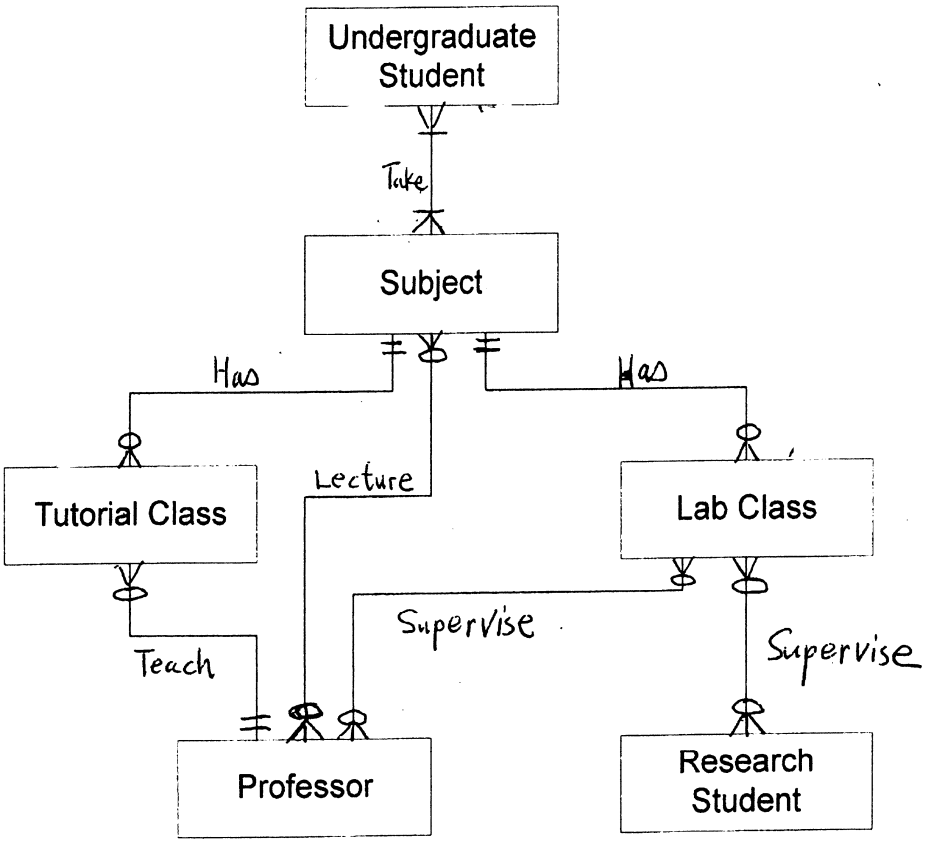
A student may take many courses possibly none. Each course is enrolled with many students and taught by one lecturer. Each lecturer teaches at least one course.

Q2 Answer:



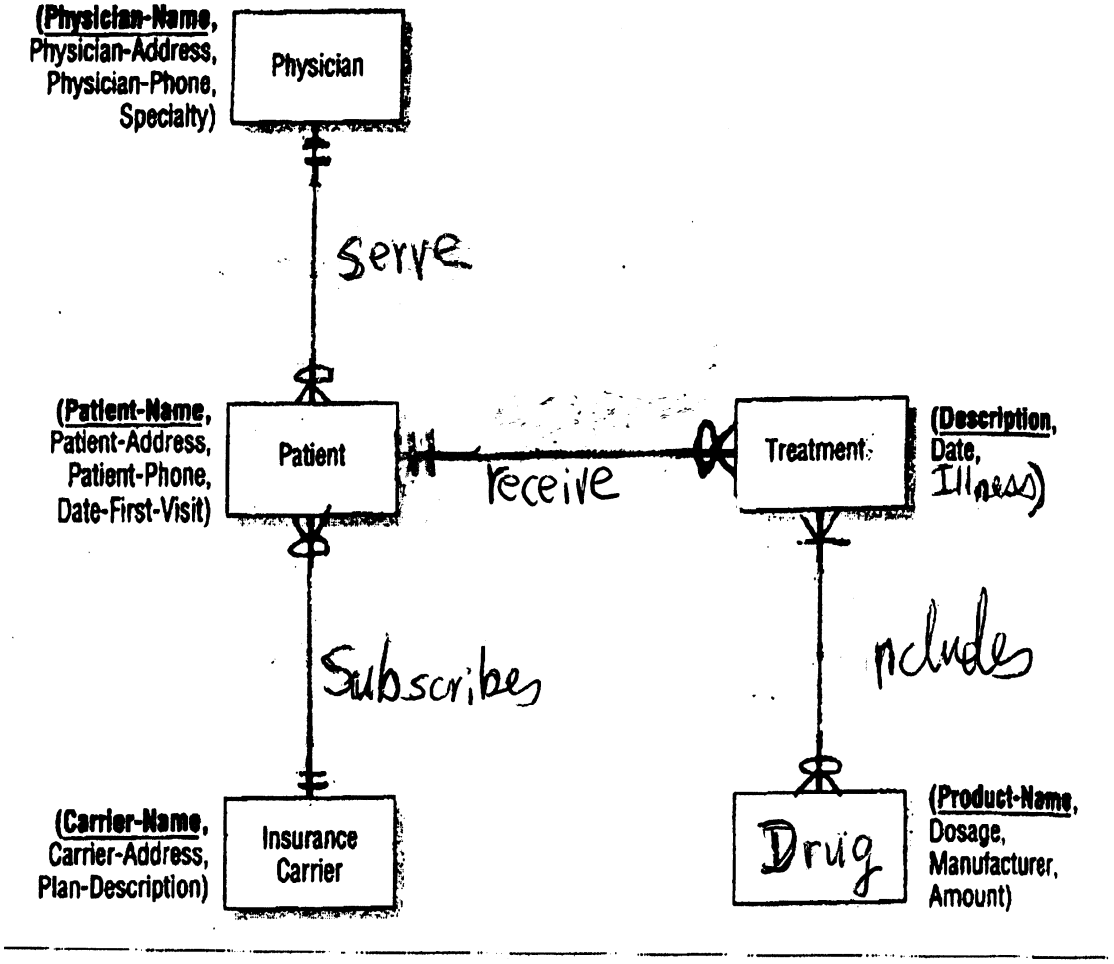
3) In a university, each undergraduate student must take at least one subject. A subject may have some tutorial and/or lab classes. Except those subjects are purely for lab work, a subject is lectured by some professors. Each tutorial class is taught by one professor. A professor may lecture multiple subjects concurrently. He/she may also teach some tutorial classes and/or supervise some lab classes concurrently. Each lab class is supervised by some professors and/or research students. Professors who are holding senior management positions may not involve in these teaching activities. Draw an entity-relationship diagram to model the information described. You may make reasonable assumption and state them clearly if needed.

Q3 Answer:



4) A physician serves many patients who subscribe to their own insurance carrier. Each patient is always served by the same physician and is subscribed to one insurance carrier. Clearly, many patients may subscribe to the same insurance carrier. The physician needs to keep information about all the treatments that a patient has received so far. A treatment may include taking of multiple drugs. Many treatments may include the same drug. All the drugs kept in the clinic have been included in some treatments before. Draw an entity-relationship diagram to model the information described. Please make assumption on the attributes of each entity type and include them in the diagram. You may make other assumptions and state them clearly if needed.

Q4 Answer:



5) Identity the most suitable concept from the four basic concepts, process, external entity, data flow and data store, in Data Flow Diagramming (DFD) technique to model each following item separately:

a) All employee particulars kept in a company.
b) Compute monthly commission.
c) Total monthly sales reported by a salesman.
d) A user type, payroll clerk.

Q5 Answer:

a) All employee particulars kept in a company.
Ans: Data store.

b) Compute monthly commission.
Ans: Process.

c) Total monthly sales reported by a salesman.
Ans: Data flow.

d) A user type, payroll clerk.
Ans: External entity.

6) Figure 2 is a data flow diagram. Draw a data flow diagram to model each following process in Figure 2:

(i) Process 1: It has three sub-processes; four internal data flows, L, M, N and O; and a data store DSA that is local to the process.
(ii) Process 2: It has three sub-processes and two internal data flows, I and P. It does not have any data store that is local to the process.
(iii) Process 3: It has three sub-processes; four internal data flows, F, G, R and S; and a data store DSB that is local to the process.

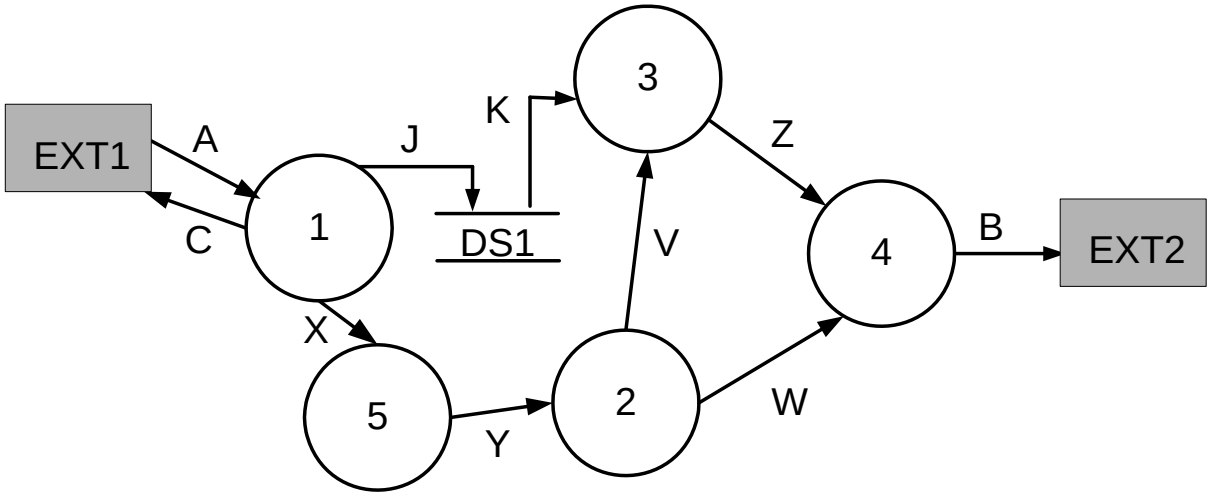
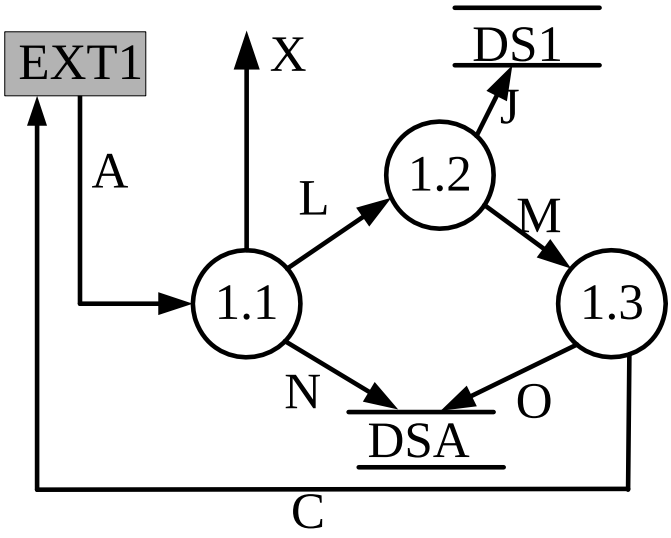
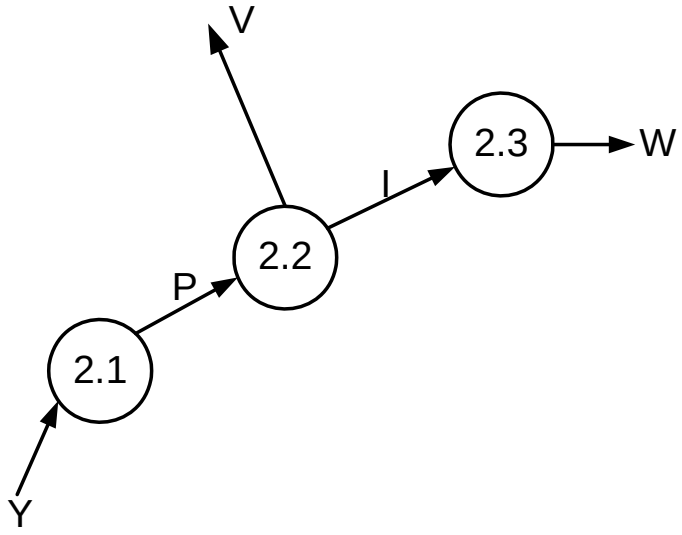


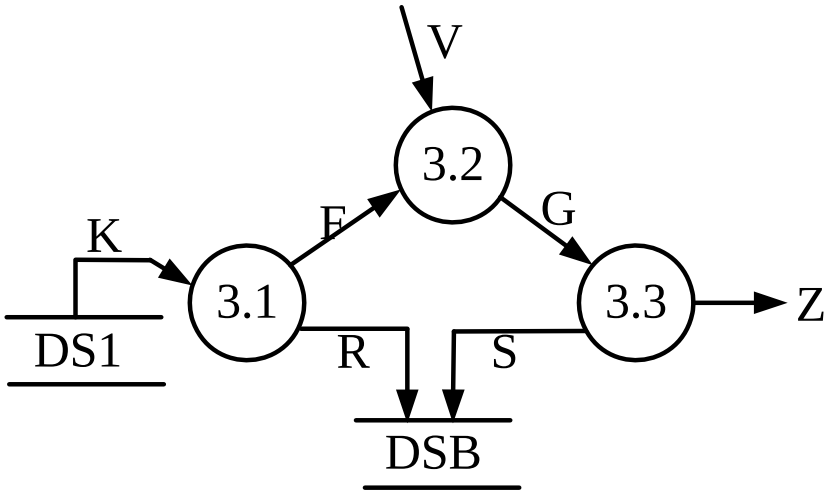
Figure 2. A data flow diagram

Q6 Answer

There is no unique answer to this question. The following answer is just one of many correct answers.






V
3.2
F
G
K
3.1
3.3
Z
DS1
R
S
DSB