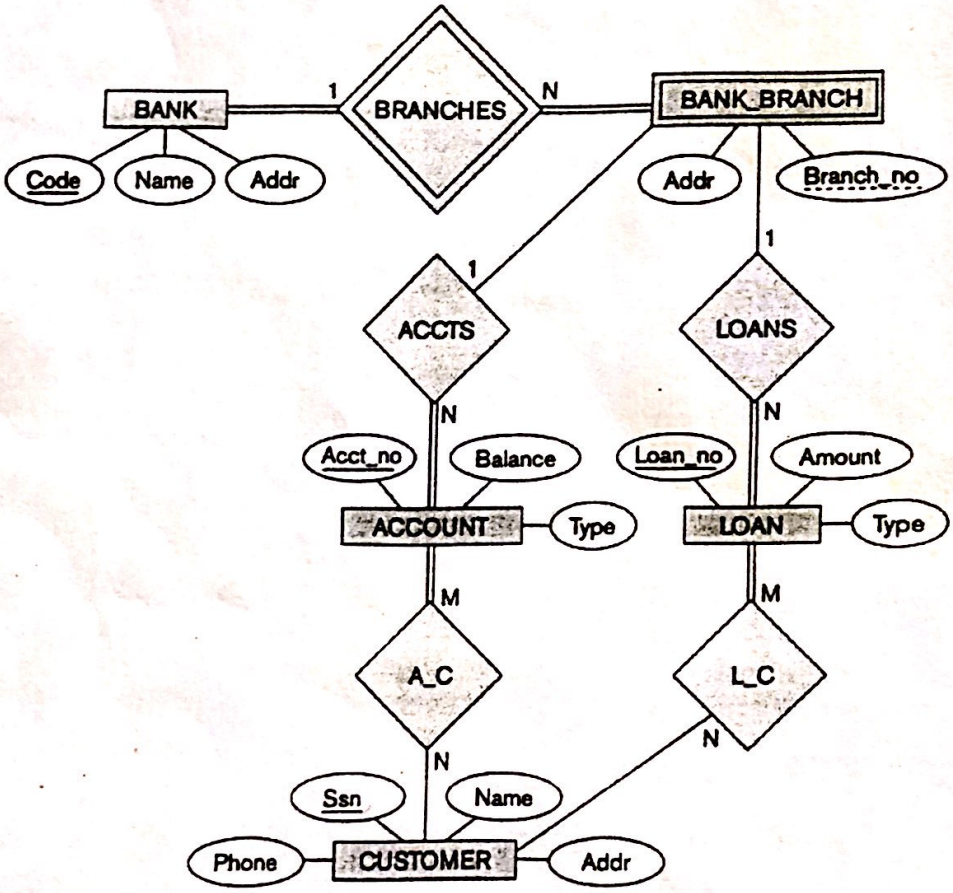
Question 1 [13 Marks]

Consider the ER diagram shown in Figure below for part of a BANK database and answer the following questions. Each bank can have multiple branches, and each branch can have multiple accounts and loans.



1. Please answer the following questions for the weak entity.

a. What constraints do the partial key and the identifying relationship of the weak entity type specify in this diagram? [1 Mark]

01

It specifies that each Bank_Branch is related with the BANK by the identifying relationship. The combination of Branch_no (i.e the partial key) and Bank code (key attribute) are unique.

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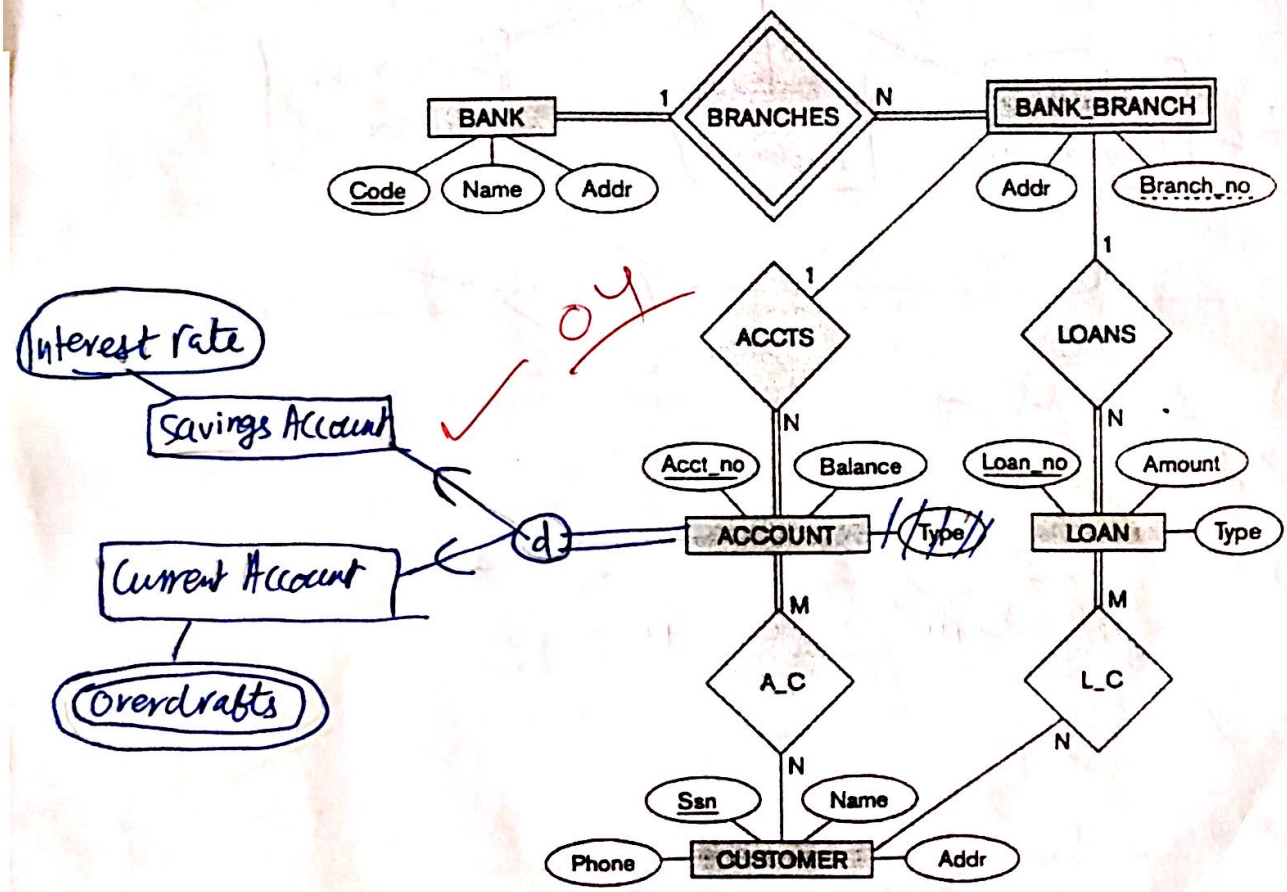
b. Can we make weak entity an attribute of the identifying entity? Justify your answer. [2 marks]

This cannot be done, because the relationships of ~~Brand~~ Branch (Accounts an Loans) are specifically for the Bank Branch and not the whole BANK.

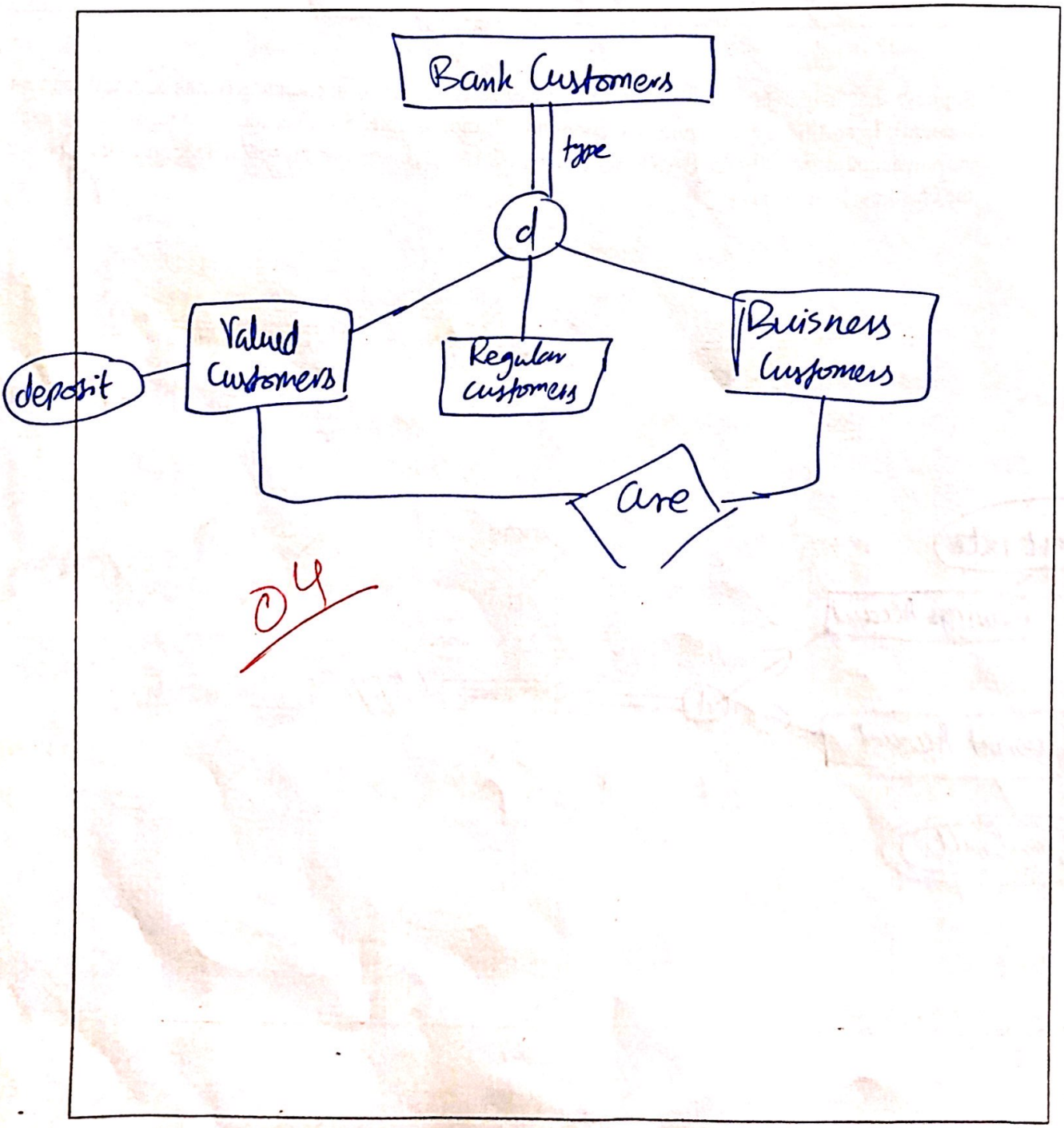
✓ 02

2. Suppose that it is necessary to keep track of different types of accounts (savings account, current account). In addition, each savings account has an interest rate, and overdrafts are recorded for each current account. Modify the BANK schema below using generalization/specialization to incorporate the changes. [4 marks]



✓ 04

3. Bank customers are identified by their customer-id values. There are three types of customers, namely, valued-customers with a deposit of one million dollars or more, regular-customers with a deposit of less than one million dollars, or business customers. We also keep track of business-customers who are valued-customers and privileged for valued business-customers. Hint: Disjoint and total constraints to be used. Hint: Draw only the modified part of the BANK schema. [6 marks]



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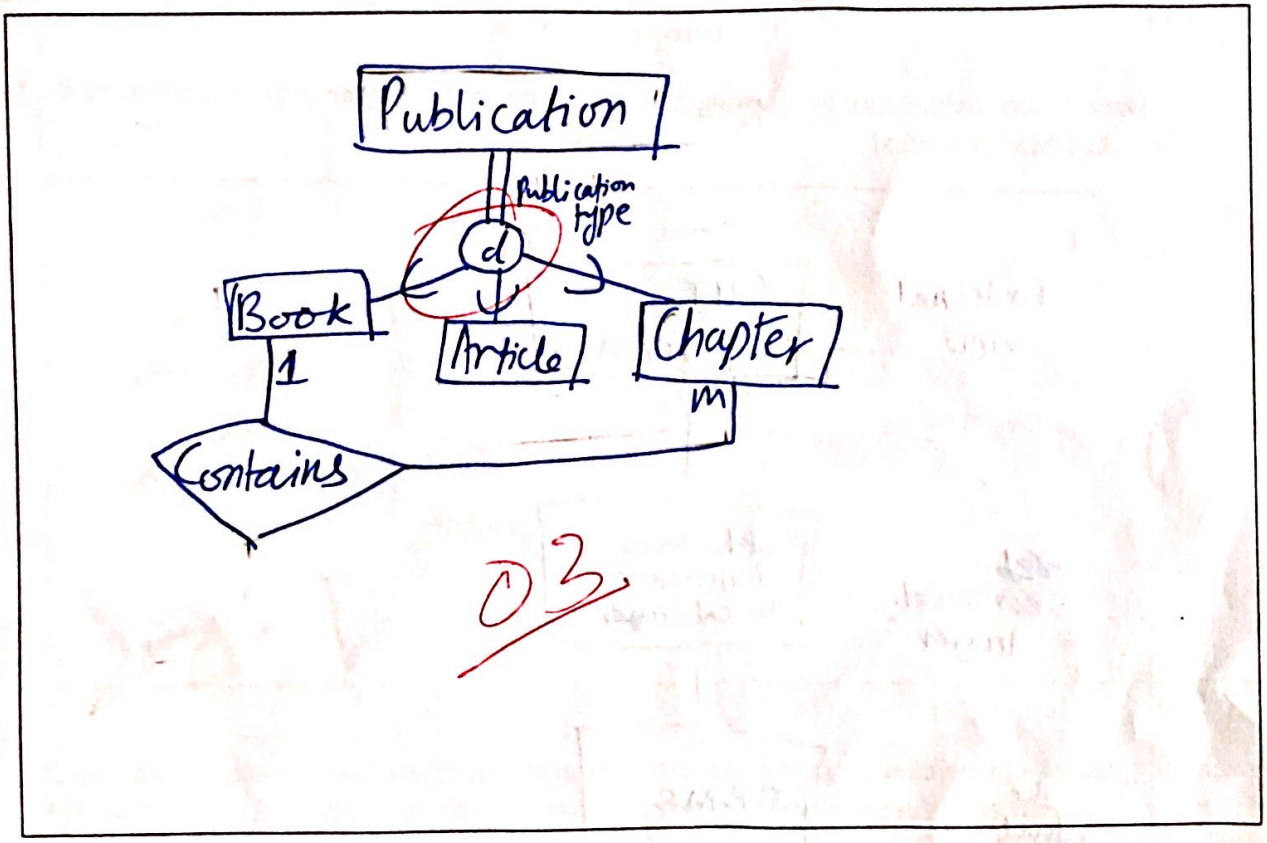
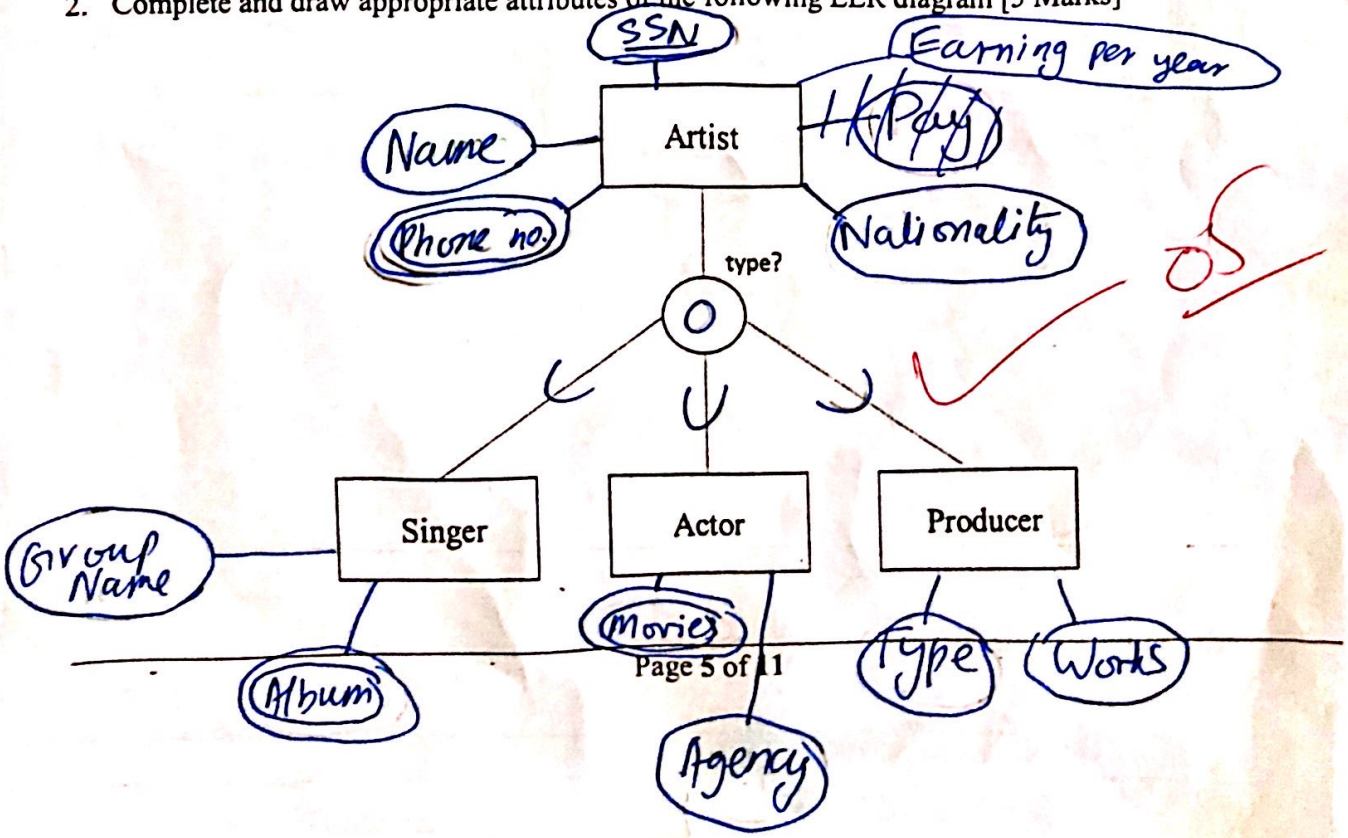
Question 2 [11 Marks]

1. A publication can be either a book, an article or a chapter. A book can contain multiple chapters. Draw an EER diagram. Hint: Use cardinality constraints where required. [6 marks]



03

2. Complete and draw appropriate attributes of the following EER diagram [5 Marks]



05

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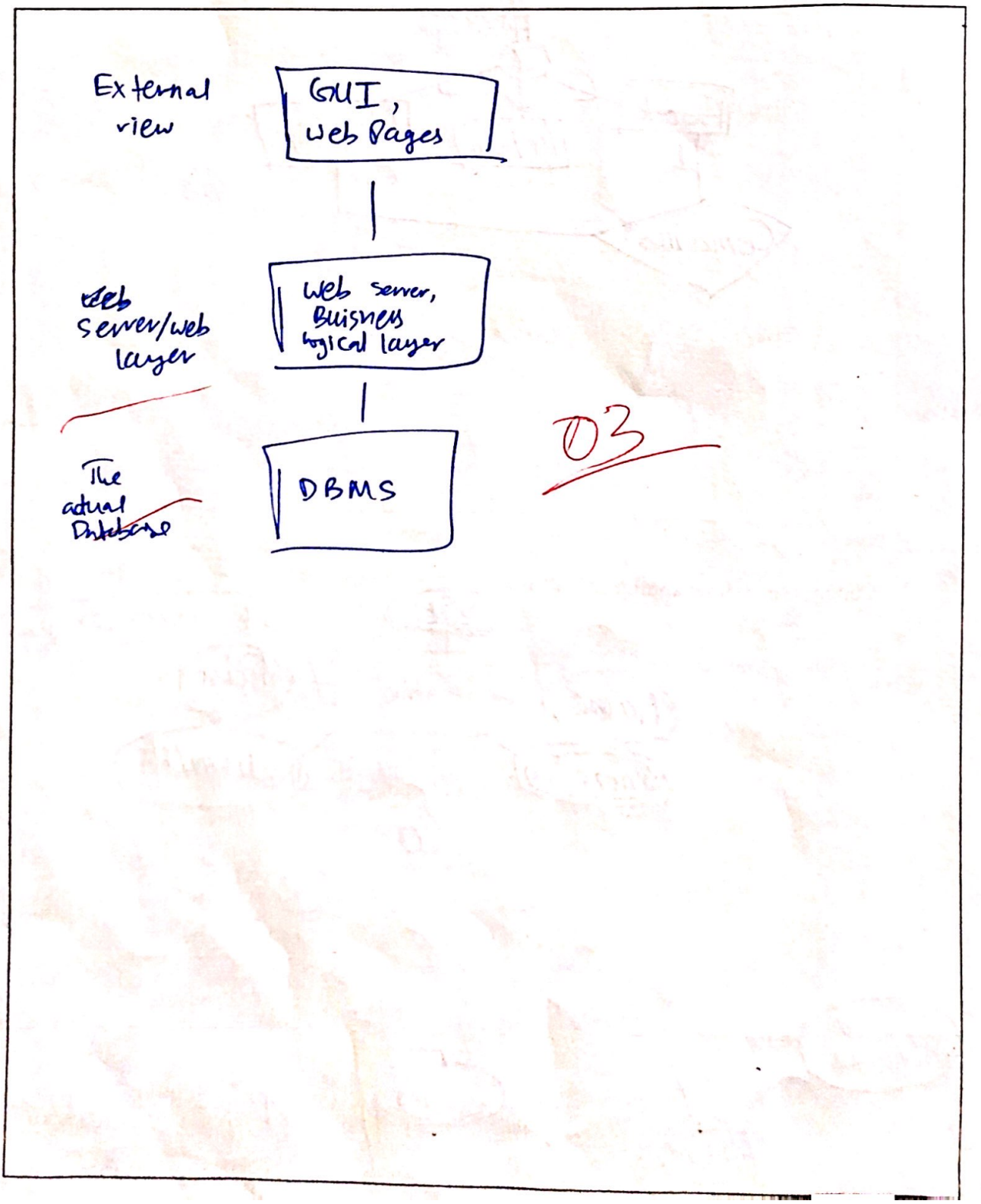
Question 3 [19 Marks]

1. Draw 3-tiers architecture by showing names of components for the implementation or deployment of RDBMS? [6 Marks]



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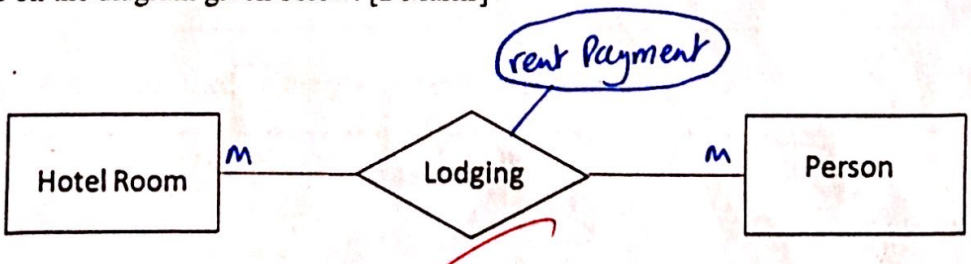
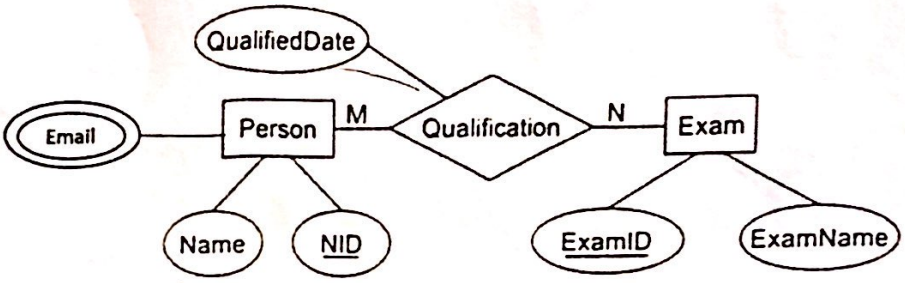
2. What are the concurrent access anomalies in File systems? Please provide an example (preferably not the one discussed in class) [5 Marks]

3. Consider the entities 'hotel room', and 'person' with a many to many relationship 'lodging' as shown below. If we wish to store information about the rent payment to be made by person(s) occupying different hotel rooms, then this information should appear as an attribute of which entity? Draw the attribute on the diagram given below. [2 Marks]



02

4. Draw a relational model of the given ERD. [6 Marks]



Question 4 [22 Marks]

1. Consider the database instance of "Student Club" given below. Student club is designed only for batch 20 and batch 21 students. Students may participate in 0 or more activities. Each activity has specific registration charges associated with it and must have at least 1 student participant. The database is created to keep track of the activities performed by the students.

STUDENT

Student ID	Student Name	Department	Batch
S-123	John Smith	Social Sciences	21
S-124	Ema Blog	Law	20
S-125	Joey Mark	Computer Science	20
S-235	Raina John	Law	21

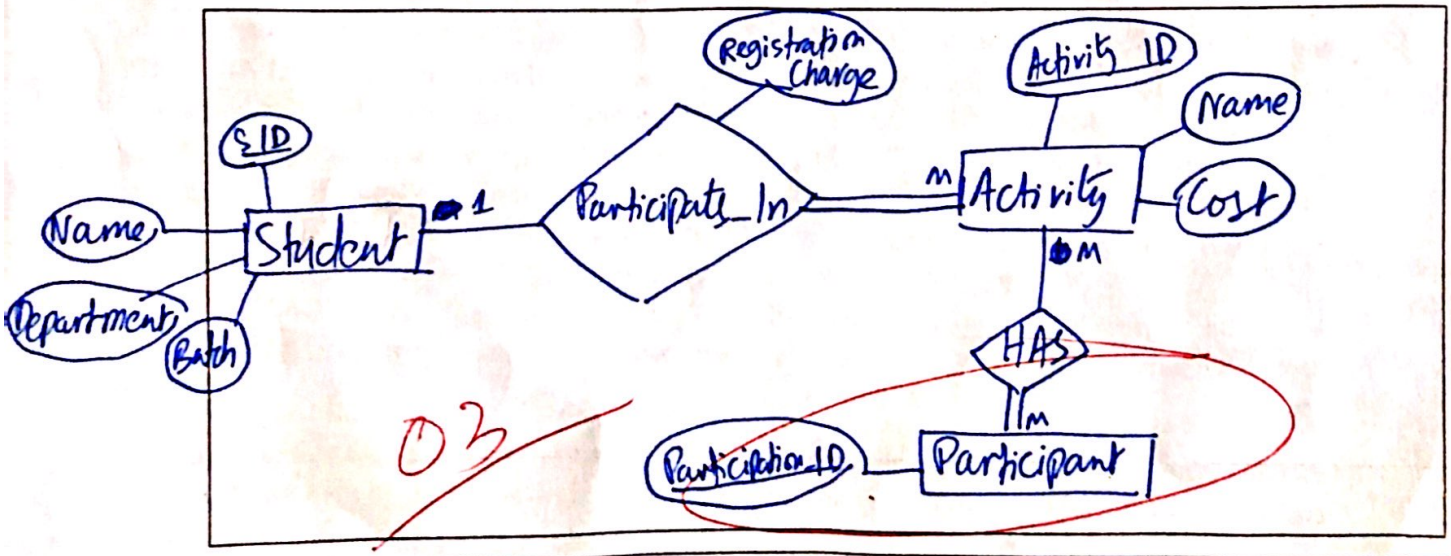
ACTIVITY

Activity ID	Activity Name	Activity Cost
A-1	Golf	$47
A-2	Swimming	$50
A-3	Squash	$40
A-4	Sailing	$36
A-5	Tennis	$47

PARTICIPANT

Participant_ID	Activity_ID
S-123	A-1
S-123	A-2
S-235	A-1
S-124	A-4
S-235	A-5

a. Draw an ER diagram based on the given scenario. [5 Marks]



b. What issue can arise if the following record is inserted in **Student** table. [2]

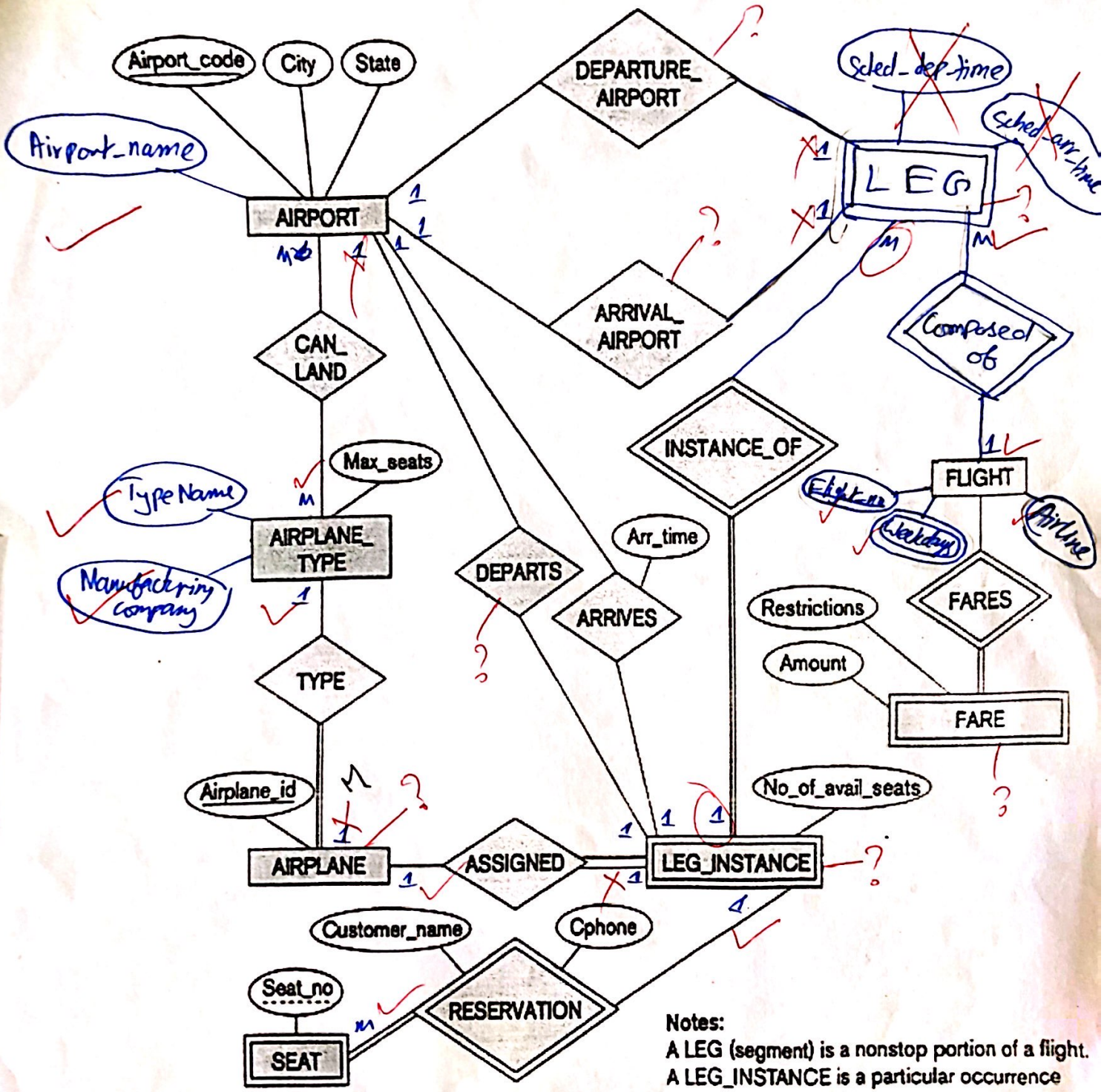
<"S-111", "John Smith", "Law", 19>

As there is a constraint on Student Table that only Batch 20 and 21 can be entered, so this ~~data entry~~ record insertion is Invalid.

02

2. Suppose you are required to develop a database application for Airline Reservation. The Airline database represents each AIRPORT, keeping its unique AirportCode, the AIRPORT Name, and the City and State in which the AIRPORT is located. Each airline FLIGHT has a unique number, the Airline for the FLIGHT, and the Weekdays on which the FLIGHT is scheduled (for example, every day of the week except Sunday can be coded as X7). A FLIGHT is composed of one or more FLIGHT LEGs (for example, flight number CO1223 from New York to Los Angeles may have two FLIGHT LEGs: leg 1 from New York to Houston and leg 2 from Houston to Los Angeles). Each FLIGHT LEG has a DEPARTURE AIRPORT and Scheduled Departure Time, and an ARRIVAL AIRPORT and Scheduled Arrival Time. A LEG INSTANCE is an instance of a FLIGHT LEG on a specific Date (for example, CO1223 leg 1 on July 30, 1989). The actual Departure and Arrival AIRPORTs and Times are recorded for each flight leg after the flight leg has been concluded. The Number of available seats and the AIRPLANE used in the LEG INSTANCE are also kept. The customer RESERVATIONs on each LEG INSTANCE include the Customer Name, Phone, and Seat Number(s) for each reservation.Information on AIRPLANEs and AIRPLANE TYPEs are also kept. For each AIRPLANE TYPE (for example, DC-10), the TypeName, manufacturing Company, and Maximum Number of Seats are kept. The AIRPORTs in which planes of this type CAN LAND are kept in the database. For each AIRPLANE, the AirplaneId, Total number of seats, and TYPE are kept.

Partially complete ER Model of the above mentioned scenario is given below. Identify missing entities, attributes and cardinalities and update them on the following Figure. [5+5+5 Marks]



Notes:
A LEG (segment) is a nonstop portion of a flight.
A LEG_INSTANCE is a particular occurrence