

Question 1 [25 Marks]

Consider you are making a UNIVERSITY database. The requirements of the database are as follows:

- The university is organized into colleges (COLLEGE), and each college has a unique name (CName), an office (COffice) and phone (CPhone), and a particular faculty member who is dean of the college. Each college administers a number of academic departments (DEPT). Each department has a unique name (DName), a unique code number (DCode), an office (DOffice) and phone (DPhone), and a particular faculty member who chairs the department. We keep track of the start date (CStartDate) when that faculty member began chairing the department.
- A department offers a number of courses (COURSE), each of which has a unique course name (CoName), a unique code number (CCode), a course level, a course credit hour (Credits), and a course description (CDesc). The database also keeps track of instructors (INSTRUCTOR); and each instructor has a unique identifier (Id), name (IName), office (IOffice), phone (IPhone), and rank (Rank); in addition, each instructor works for one primary academic department. The database will keep student data (STUDENT), and stores each student's name (SName), composed of first name (FName), middle name (MName), last name (LName), student id (Sid, unique for every student), address (Addr), phone (Phone), major code (Major), date of birth (DoB) and age. A student is assigned to one primary academic department. It is required to keep track of the student's grades in each section the student has completed.) relation
- Courses are offered as sections (SECTION). Each section is related to a single course and a single instructor and has a unique section identifier (SecId). A section also has a section number (SecNo), semester (Sem), year (Year), classroom (CRoom: this is coded as a combination of building code (Bldg) and room number (RoomNo) within the building). The database keeps track of the students in each section (and the grade is recorded when available) relation.

Question 1-a [3 Marks]: List down the entities in your Database

Entities :

- ① COLLEGE
- ② DEPT
- ③ COURSE
- ④ INSTRUCTOR
- ⑤ STUDENT
- ⑥ SECTION

3

Question 1-b [7 Marks]: For each of the entities list down its attributes and type of attributes.

① **COLLEGE**

- * C-Name (unique) → Key attribute.
- * COffice → composite attribute (considering location, floor).
- * CPhone → Multi valued attribute (considering multi phone)

② **DEPT**

- * DName (unique) → Key Attribute
- * Dcode (unique) → Single value
- * DPhone → single value
- * CStart Date → Descriptive Attribute of relation

③ **COURSE**

- * CoName (unique) → Single value.
- * CCode (unique) → Key attribute.
- * Level → Single valued
- * CREDITS → Single valued
- * CDesc → Composite attribute (level, textbook, references).

④ **INSTRUCTOR**

- * ID (unique) → Key Attribute.
- * IName → single value att
- * Ioffice → Composite att (floor, address etc)
- * IPhone → Multivalued att (multiple numbers)
- * Rank → single value.

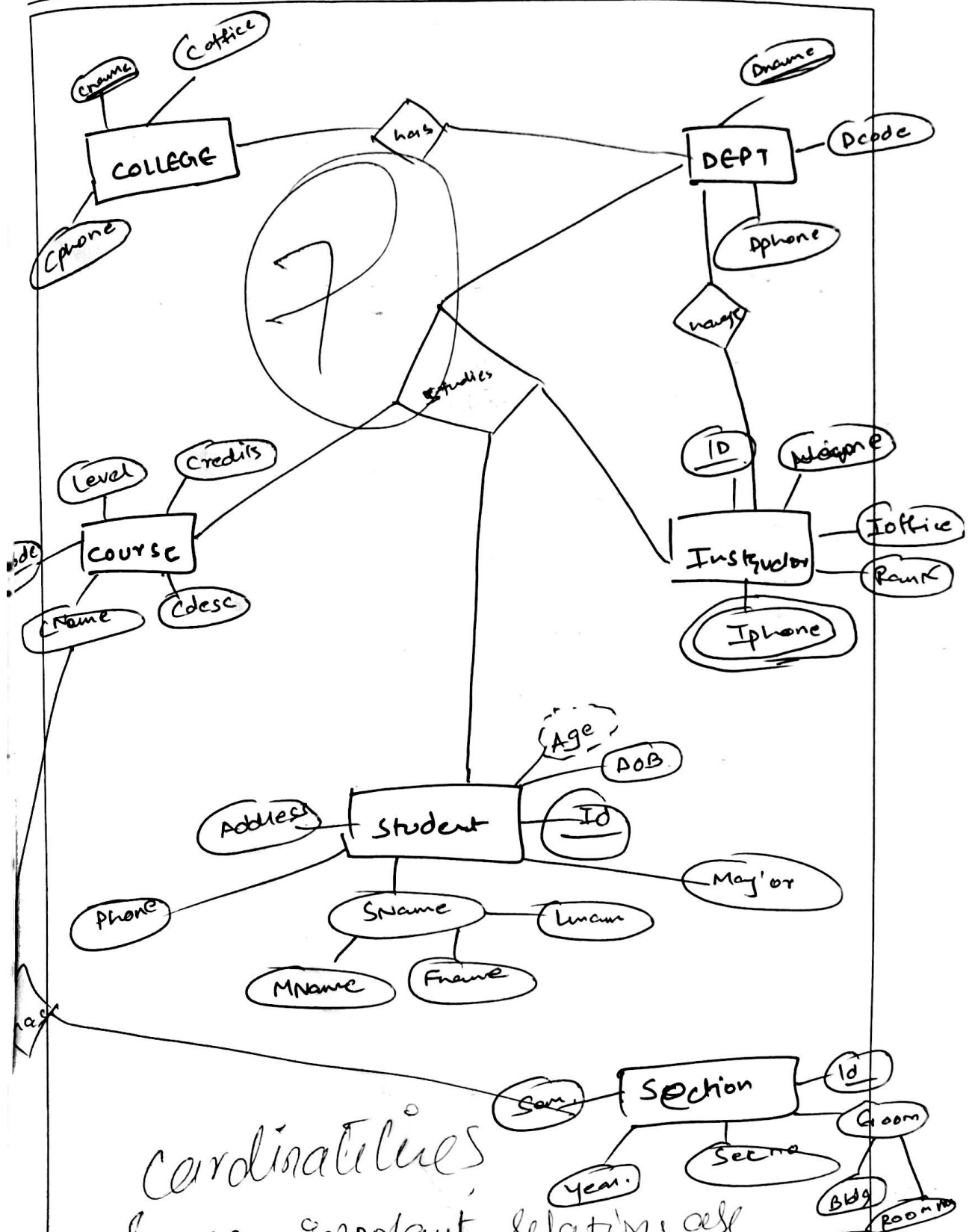
⑤ **STUDENT**

- * SNAME → composite.
 - ↳ MName
 - ↳ FName
 - ↳ LName.
- * ID → Key
- * Addres → single.
- * phone → single
- * Major code → single.
- * DOB → single
- * Age → Derived

⑥ **SECTION**

- * SecID → Key
- * SecNo → style
- * Sem → derived
- * Year → single.
- * Croom → composite (Block, room no.)


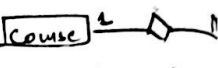

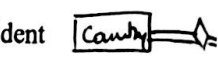
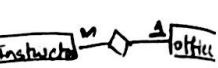

Question 1-c [15 Marks]: Design the ER model for your application illustrating entities, attributes, relationships, and cardinalities of relationships (1:1, 1:M, etc.)



cardinalities
Some important relations are
missing.

Question 2 [25 Marks] Short Questions

Question 2-a: (3 Mark) For the following binary relationships, suggest cardinality ratios based on common-sense meaning of the entity types. Clearly state any assumptions you make.

Entity 1	Cardinality Ratio	Entity 2
One person owns one CNIC card. 1. Person	one to one	CNIC_card 
One course has many Textbooks. 2. Course	one to Many	Text Book 
One Doctor checks many patients. 3. Doctor	one to Many	Patient 
One country has one current President. 4. Country	one to one	Current_President 
Many Instructors work at One office. 5. Instructor	Many to One	Office 
Many cars owned by One owner. 6. Car	Many to One	Owner 

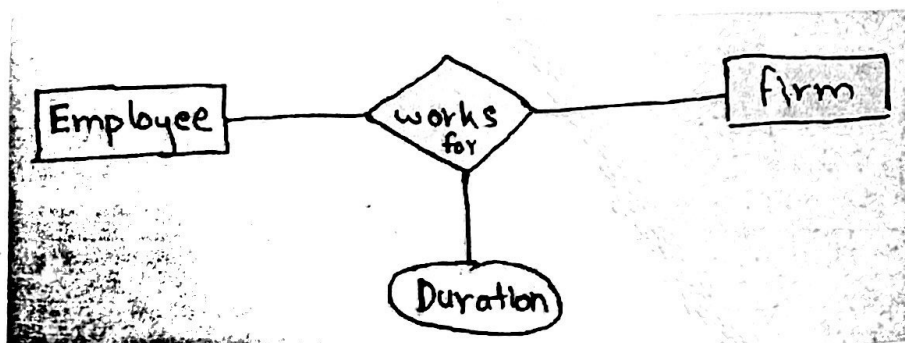
Question 2-b: (1 Mark) _____ level of Data abstraction describes what data is stored in the database and their relationships among data

- a) Physical Level
- ☒ b) Logical Level
- c) External Level
- d) None of the above

Question 2-c: (1 Mark) A _____ attribute is made up of more than one simple attribute

- a) Single Valued
- ☒ b) Composite
- c) Derived
- d) Multi-valued

Question 2-d: (1 Mark) In the following example, What is the type of "Duration" attribute



a) Composite

b) Derived

c) Single

d) Descriptive



Question 2-e: (1 Mark) The ability to query data, as well as insert, delete, and alter tuples, is offered by

a) TCL (Transaction Control Language)

b) DCL (Data Control Language)

c) DDL (Data Definition Language)

d) DML (Data Manipulation Language)



Question 2-f: (2+2+2 Marks) Write down any three errors in the given database design. Also, write the possible solution if exist.

Results Messages

OrderNo	SaleDate	ProductID	ProductDescription	ProductTags	UnitPrice	TotalSalePrice	CustomerName
12E4CC83-F92E-424E-B8CA-19D5F1990958	20150801010310	627209	NULL	DIY, Garden	344.44	1597.50	Tomas Mcpherson
12E4CC83-F92E-424E-B8CA-19D5F1990958	20150801010310	697151	Frerobefentor	Tools	117.67	1597.50	Tomas Mcpherson
12E4CC83-F92E-424E-B8CA-19D5F1990958	20150801010310	184618	Perapenentor	Clearance	259.25	1597.50	Tomas Mcpherson
12E4CC83-F92E-424E-B8CA-19D5F1990958	20150801010310	628409	Fraturepex	NULL	238.69	1597.50	Tomas Mcpherson
12E4CC83-F92E-424E-B8CA-19D5F1990958	20150801010310	789507	Competan	NULL	246.82	1597.50	Tomas Mcpherson
12E4CC83-F92E-424E-B8CA-19D5F1990958	20150801010310	742838	Bevenepar	NULL	390.63	1597.50	Tomas Mcpherson
D9458013-B0B4-487E-AE61-43EE7322E621	20160414174727	451637	Perapenentor	NULL	381.29	749.38	Eljah Norman
D9458013-B0B4-487E-AE61-43EE7322E621	20160414174727	978856	Pepebover	Tools	220.43	749.38	Eljah Norman
D9458013-B0B4-487E-AE61-43EE7322E621	20160414174727	476508	Endpickdel	NULL	23.43	749.38	Eljah Norman
D9458013-B0B4-487E-AE61-43EE7322E621	20160414174727	806360	Qwzapplazz	Tools, Garden, DIY	124.23	749.38	Eljah Norman
EAA538E4-9ED2-47F6-84D6-3102486406C2	20151030074415	813683	Surbenover	NULL	163.43	359.03	Lamar Woodward
F4A538E4-9ED2-47F6-84D6-3102486406C2	20151030074415	828296	Tandhen	Tools Clearance	194.61	359.03	Lamar Woodward

ERRORS

- ① The column OrderNo has duplicate data values and it cannot be made a primary key.
- ② The column SalesDate is not of correct Data Type. SQL now has a datatype defined as Date which store date Time format.

③ There is data redundancy in Customer Name column.

④ There is data redundancy in Product Description column.

Solution.

① Create Table customer.
This table can have data redundancy but we link it with another table.

Customer.	
Name	Order No.
Tomas	~~~~~
Tomas	~~~~~
Eljah	~~~~~
Eljah	~~~~~

② Create another table Products-Description

Id	
cust-id	Name
001	Tomas
002	Eljah

where cust.
is primary key

③ These tables can be all linked for

"Minimized Data Redundancy"

Products-Description.	
Id	Description
001	Pasepanetor
002	Bevenapan
003	///

Question 2-g: (2 Marks) A table has two primary keys. Is it true? give an appropriate reason.

Yes, A table has two primary keys. If one is not distinct then we can look into another key.

In above scenario, we can make product Id & order no. the primary keys.

Question 2-h: (1+1+1+1 Mark) Write down the type of data in each scenario.

1) ATM

~~Semistructured~~

(some part is structured while some has comments feedback, etc)

2) Facebook

~~Unstructured~~

3) Customer Reviews

~~Semi-structured~~

(because it has stars which can be structured)

4) Phonebook

~~Structured~~

(considering only numbers)

5) Email

~~Unstructured~~

3

Question 2-i: (1 Mark) Weak entity set is represented as

a) Underline

b) Double line

c) Double diamond

(d) Double rectangle

1

Question 2-j: (1 Mark) If two entities have many to many relationships mostly it results in how many tables.

Three

1

Question 2-k: (1 Mark) Which one is an example of a single-valued attribute?

a) Reference

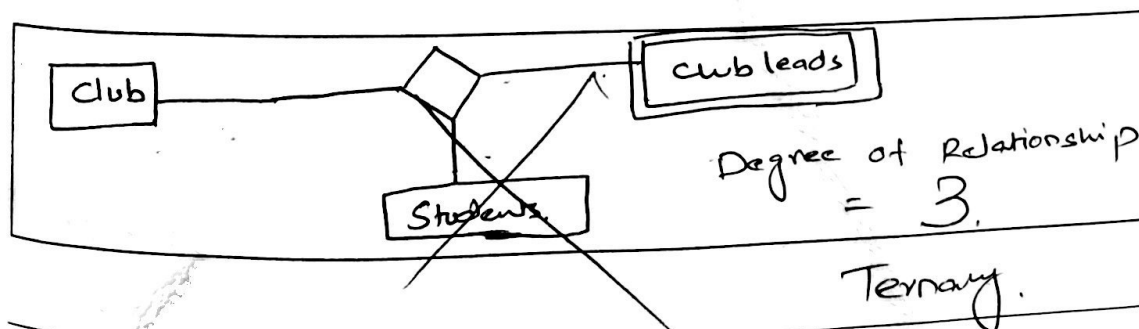
b) Address

c) SUBJECT_TAKEN

(d) Register_number

1

Question 2-m: (2 Marks) Suppose in a classroom, we have many students who belong to a particular club-like a dance club, basketball club, etc., and some of them are club leads. So, a particular group of students is managed by their respective club lead. Here, the group is formed from students and also, and the club leads are chosen from students. What will be the degree of relationship in the above scenario?

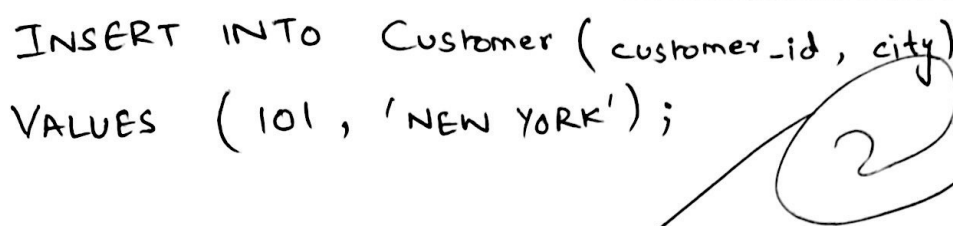


Question 3 [10 Marks] SQL

Consider the following Customer table

customer_id	cust_name	city	grade	salesman_id
3002	Nick Rimando	New York	100	5001
3007	Brad Davis	New York	200	5001
3005	Graham Zusi	California	200	5002
3008	Julian Green	London	300	5002
3004	Fabian Johnson	Paris	300	5006
3009	Geoff Cameron	Berlin	100	5003
3003	Jozy Altidor	Moscow	200	5007

SQL Commands	SQL Query
Create the above table. Consider "customer_id" as the primary key	<pre>CREATE Customer (customer_id int, cust_name varchar(50), city varchar(50), grade int, Salesman_id int, PRIMARY KEY (customer_id));</pre>
Show the name of the customers whose city starts with 'L' and ends with 'N'.	<pre>SELECT cust_name FROM customer WHERE city LIKE 'L%.N';</pre>
Shows the Name and City of the customer whose Grade is between 100 and 200	<pre>SELECT cust_name, city FROM customer WHERE grade BETWEEN 100 AND 200 ;</pre> <p><u>ALTERNATE</u> grade >= 100 AND grade <= 200.</p>

Insert a record only for customer_id and city	<pre>INSERT INTO Customer (customer_id, city) VALUES (101, 'NEW YORK');</pre> 
Update the city of the "3002" customer to "London".	<pre>UPDATE Customer SET city = 'London' WHERE customer_id = 3002;</pre> 