

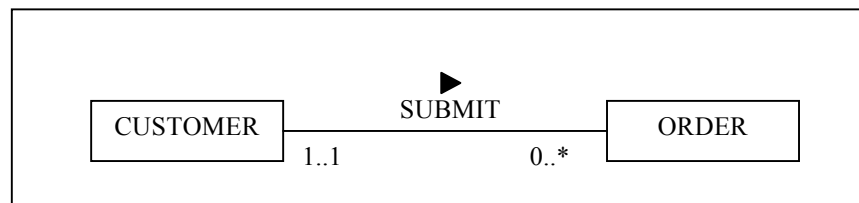
**SECTION A. OBJECTIVE****(20 MARKS)**

1. The following relation (Table 1) is not normalized because

Table 1				
MatrixNo	Name	Courses Taken		
		CourseNo	Department	Semester
4568	Adura	CS101	C.S.	1
		EE545	E.E.	2
		Phy325	Physics	1
4894	Emelia	Phy101	Physics	1
		Chem202	Chemistry	2
		Math103	Math.	1
		CS101	C.S.	1
4954	Alawi	CS101	C.S.	1

- A. It is difficult to store due to non-uniform size of the attributes.
- B. MatrixNo 4568 has three course lines whereas MatrixNo 4954 has only one course line.
- C. The composite attribute (CS101, C.S., 1) is repeated.
- D. There exist non-atomic values in a single cell.
2. The following steps are logical database design for the relational model. Arrange the steps in correct order:
- i. Check integrity constraints.
- ii. Derive relations for logical data model.
- iii. Validate relations against user transactions.
- iv. Validate relations using normalization.
- A. iv, i, iii, ii
- B. i, ii, iii, iv
- C. ii, iv, iii, i
- D. ii, iii, iv, i
3. The number (or range) of possible occurrences of an entity type that may relate to a single occurrence of an associated entity type through a particular relationship is known as \_\_\_\_\_.
- A. Participation
- B. Cardinality
- C. Relationship
- D. Multiplicity

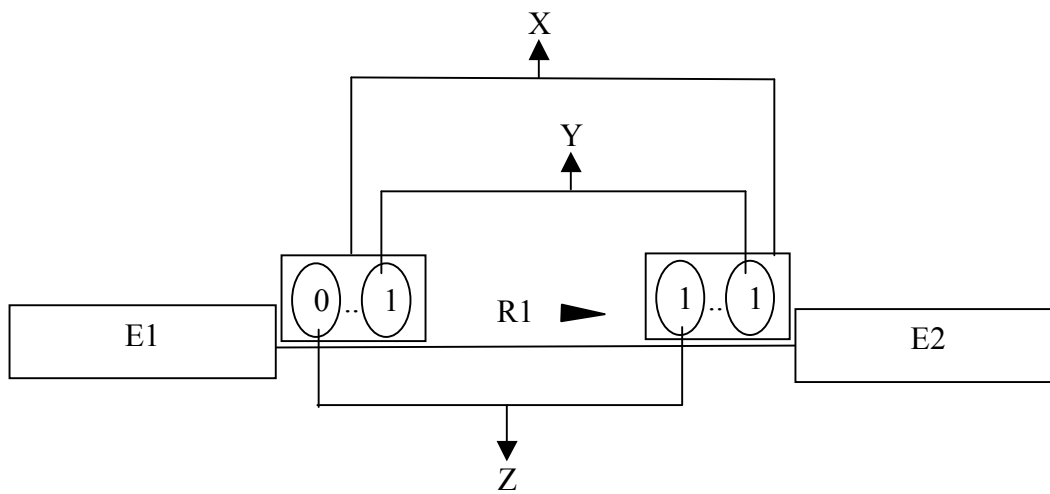
4. Which of the following is NOT the property of database relations?
- A. Values for an attribute can be of different domain.
  - B. Duplicate tuples are not allowed.
  - C. The order of tuples in a relation has no significance.
  - D. The name of relations must be unique.
5. Which of the following is NOT true about view?
- A. A view is exactly the same as a base relation.
  - B. View acts as a security mechanism which hides parts of database from certain users.
  - C. All updates to the base relations are immediately reflected in all views that refer to the base relations.
  - D. Updates through views are allowed if the query involves a single base relation and contains a candidate key of base relations.
6. Which of the statement is NOT TRUE about the representation of the ERD in Figure 1?



**Figure 1**

- A. In SUBMIT relationship, CUSTOMER holds a mandatory participation while ORDER holds an optional participation.
- B. The SUBMIT relationship is a one-to-many relationship.
- C. A customer can have more than one order or doesn't have any order at all.
- D. An order submitted always belongs to one customer only.

7. Which of the statements below are TRUE?
- (i) Physical data independence refers to immunity of conceptual schema to changes in the internal schema; while logical data independence refers to immunity of external schemas to changes in conceptual schema.
  - (ii) The conceptual schema is related to the internal schema through a conceptual/ internal mapping; while the external schema is related to the conceptual schema through an external/ conceptual mapping.
  - (iii) There are three types of schemas in the database: Multiple external schemas, Conceptual schema, and Internal schema.
- A. (i) and (ii)
  - B. (i) and (iii)
  - C. (ii) and (iii)
  - D. (i), (ii), and (iii)
8. In the ANSI-SPARC Three-Level Architecture, the conceptual level:
- A. Describes that part of database that is relevant to a particular user
  - B. Covers the data structure and file organizations used to store data on storage device
  - C. Describes what data is stored in database and relationships among the data
  - D. Implementation of the database to archive optimal runtime performance & storage space utilization
9. The following are the different types of attributes, EXCEPT:
- A. Secondary attributes
  - B. Single-valued attributes
  - C. Derived attributes
  - D. Multi-valued attributes



**Figure 2**

10. Based on Figure 2, which answer is **TRUE** for X, Y, and Z.
- A. X is an entity; Y is a relationship; Z is attribute.
  - B. X is a participation; Y is a cardinality; Z is multiplicity constraint.
  - C. X is a multiplicity constraint; Y is a cardinality; Z is a participation.
  - D. None of the above.

## SECTION B – STRUCTURE

### QUESTION 1

(20 MARKS)

- (a) Figure 3 shows a conceptual data model for Developer-Project. Convert the model into logical data model.

(10 marks)

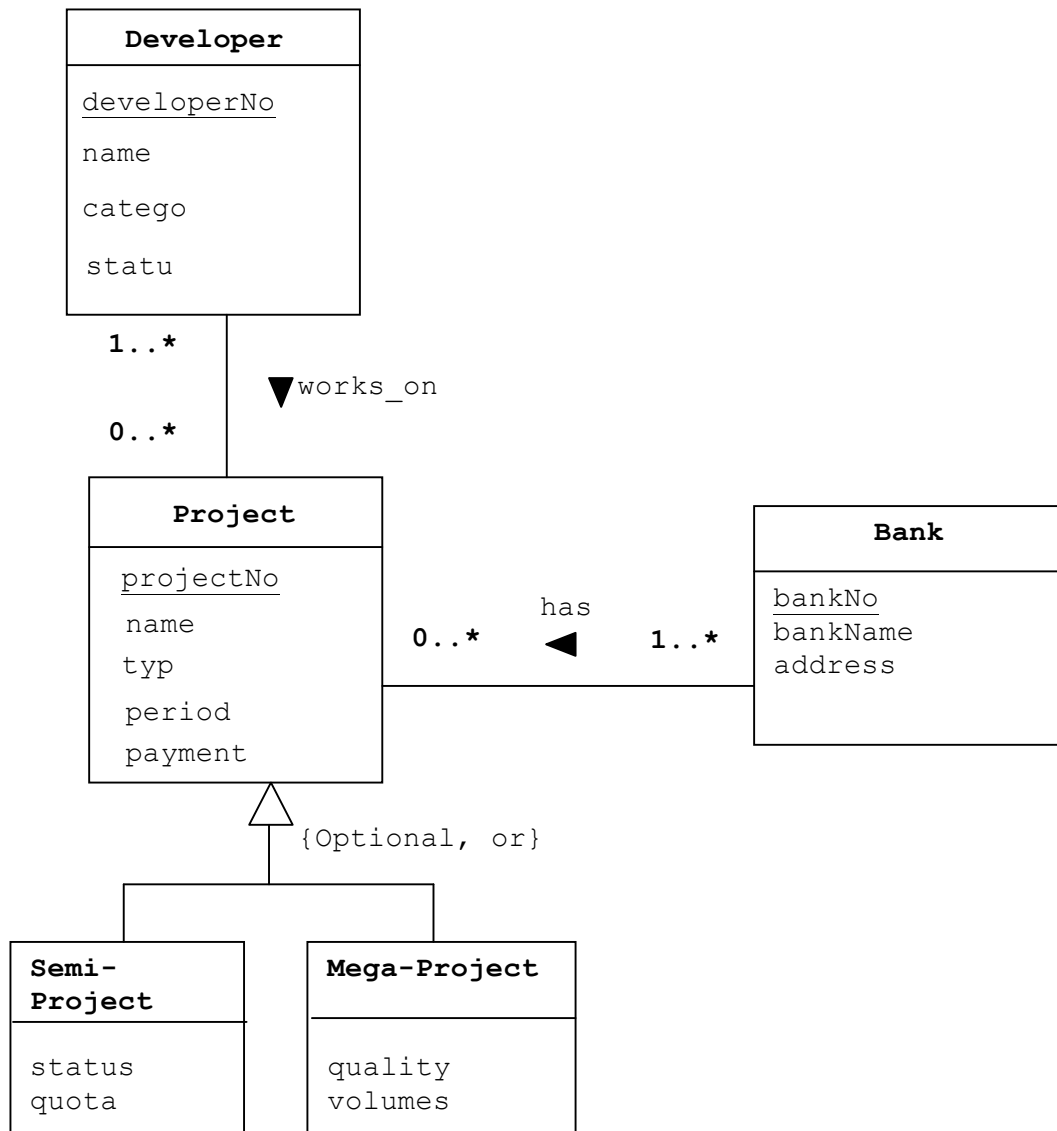


Figure 3. Conceptual Data Model Developer-Project

- (b) Based on your answer in Question 1(b), produce the relational schemas.

(10 marks)

**QUESTION 2****(20 MARKS)**

Table 2 contains invoice data for the PV Furniture Company. Questions 2(a) – 2(e) refer to the table.

**Table 2. Invoice Data PV Furniture Company**

CustID	CName	CAddr	ProdID	ProdDesc	ProdFin	UnitPrice	OrdQty
2	Value Furniture	Plano, TX	7	Dine Table	Natural Ash	800	2
			5	Writer Desk	Cherry	325	2
			4	Ent'mt Ctr	Natural Maple	650	1
6	Furniture Gallery	Bouler, CO	11	4Dr Dresser	Oak	500	4
			4	Ent'mt Ctr	Natural Maple	650	3

- (a) Table 2 is not in First Normal Form (1NF). Why? Transform Table 2 into a 1NF table. (3 marks)
- (b) List all functional dependencies from the 1NF table produced in Question 2(a). (3 marks)
- (c) Write the 1NF relation schema for the 1NF table produced in Question 2(b). Identify the Primary Key for the 1NF relation. (2 marks)
- (d) Is the relation produced in Question 1(c) is in Second Normal Form (2NF)? Justify your answer. If the relation is not in 2NF, transform the relation into 2NF relation(s). (6 marks)
- (e) Is/Are the relation(s) produced in Question 2(d) in Third Normal Form (3NF)? Justify your answer. For every relation not in 3NF, convert the relation into 3NF relation(s). (6 marks)

**QUESTION 3****(20 MARKS)**

Figure 4 shows instances for three (3) relations, Patient, Treatment, and Doctor.

Patient(PID, PName, PGender, PDOB, Address, PTelNo)

PID	PName	PGender	PDOB	Address	PTelNo
P1	Ali	Male	01-01-1974	Tmn. Universiti, Skudai, Johor	07- 5211234
P2	Ani	Female	12-10-1970	Tmn. Pulai Perdana, Johor	07- 5217894
P3	Wahab	Male	03-08-1980	Tmn. Pulai Jaya, Johor	
P4	Yan	Male	08-06-1981	Tmn. Pulai Emas, Johor	

Treatment(PID, TreatDate, DID)

PID	TreatDate	DID
P1	23-01-2007	D11
P3	23-01-2007	D11
P1	25-06-2009	D33
P4	25-06-2009	D22

Doctor(DID, DName, DGender, DDOB, Address, DTelNo)

DID	DName	DGender	DDOB	Address	DTelNo
D11	Aminah	Female	11-11-1974	Tmn. Universiti, Skudai, Johor	07- 5214444
D22	Jenny	Female	12-16-1973	Tmn. Pulai Perdana, Johor	07- 5217878
D33	Hamid	Male	03-10-1974	Tmn. Pulai Jaya, Johor	07- 5214563

**Figure 4. Patient, Treatment And Doctor Relations**

Based on these relations, answer all questions in Question 3(a) – 3(d).

- (a) Write the SQL statement to create a table named Patient for the Patient relation. (5 marks)
- (b) Write the SQL statement to update the telephone number of a patient with ID number D33 to 019-7558088. (5 marks)
- (c) Write the SQL statement to list patient information (ID number, name and telephone number) with the doctor's information (ID number and name) for patients who receive treatment on 25 June 2009. (5 marks)

- (d) You want to list all doctors (doctor's ID number and doctor's name) who perform treatment to patients. You run the following SQL statement. What will be displayed when the SQL statement execute? If the statement is correct, show the result displayed. If the statement is incorrect, state what the possible error(s) to the SQL statement and write the correct SQL statement.

```
SELECT DID, DName
FROM DOCTOR D, TREATMENT T
WHERE DID = 'D22' and D.DID=T.DID;
```

(5 marks)



**QUESTION 4****(20 MARKS)**

Harris's Pet Store has requested you to design a database to store information on sales on animals and merchandises. The sales form is shown in Figure 5.

<b>SALES</b>									
Sales No:					Date :				
Customer ID: Name: Address: City, State, PostCode:					Employee ID: Name:				
<b>Animal Sale</b>									
ID	Name	Category	Breed	DoB	Gender	Registration	Color	ListPrice	SalePrice
-----									
-----									
-----									
-----									
Animal SubTotal: _____									
<b>Merchandise Sale</b>									
Item	Description	Category	ListPrice	SalePrice	QuantitySold	TotItemSalePrice			
-----									
-----									
-----									
-----									
-----									
Merchandise SubTotal: _____									
SubTotal: _____									
Tax: _____									
Total: _____									

**Figure 5: Sales Form for Harris Pet Store**

- (a) Identify all entities and attributes for each entity from the Sales Form in Figure 5. Provide your answer in the format given in Figure 6.

ENTITY	ATTRIBUTE
...	....
...	....

**Figure 6. Answer Format**

(5 marks)

- (b) Using your answers in Question 1 above, draw a complete conceptual Entity Relationship Model (ERM) to model the data in the Sales Form. Multiplicities and primary keys must be shown on your model.

(10 marks)

- (c) Derive all relations from the ERM produced in Question 2 above. For each relation derived, underline its primary key (PK) attribute(s).

(5 marks)