

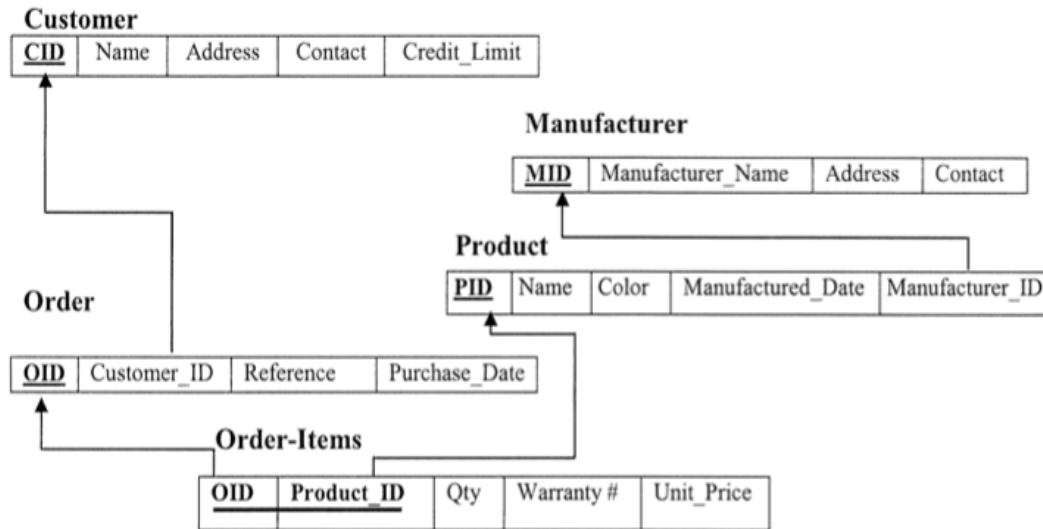


Database (630323) Second Exam (Solutions)

Student Name: - .....

ID: - .....

**Question 1:** The following relational schema represent an electrical machines store data base. Answer the following questions depending on the schema bellow.



A) Write a relational algebra expressions for the following tasks

1- Select customers' names who purchase a product manufactured in 2010.

1 point

$$\begin{aligned}
 R1 &\leftarrow \pi_{PID}(\sigma_{Manufactured\_date=2010}(Product)) \\
 R2 &\leftarrow (Order\_Item \bowtie_{product\_ID=PID} R1) \\
 R3 &\leftarrow (Order \bowtie_{OID=OID} R2) \\
 Result &\leftarrow \pi_{Name}(Customer \bowtie_{CID=Customer\_ID} R3)
 \end{aligned}$$

2- Select the OID and the sum of Qty purchased by that order (use aggregate function).

1point

$$Result \leftarrow_{OID} \mathcal{F}_{sum\ Qty}(Order\_items)$$

3- Select MID whose addresses in Amman but do not manufacture a yellow products.

1point

$$\begin{aligned}
 R1 &\leftarrow \pi_{MID}(\sigma_{Address=Amman}(Manufacturer)) \\
 R2 &\leftarrow \pi_{Manufacturer\_ID}(\sigma_{color=yellow}(Product)) \\
 Result &\leftarrow (R1 - R2)
 \end{aligned}$$

4- Select the CID of customers that their addresses in 'Aqaba, or purchased a product in 2014. 1point

$$\begin{aligned}
 R1 &\leftarrow \pi_{CID}(\sigma_{Address=Aqaba}(Customer)) \\
 R2 &\leftarrow \pi_{Customer\_ID}(\sigma_{Purchase\_Date=2014}(Order)) \\
 Result &\leftarrow (R1 \cup R2)
 \end{aligned}$$

B) Write a relational calculus expressions for the following tasks

1- Select customers' names and addresses who bought a products in 2016. 1point

$\{C.Name, C.Address \mid Customer(C) \text{ and } (\exists O)(Order(O) \text{ and } O.Customer\_ID=C.CID \text{ and } O.Purchase\_Date=2016)\}$

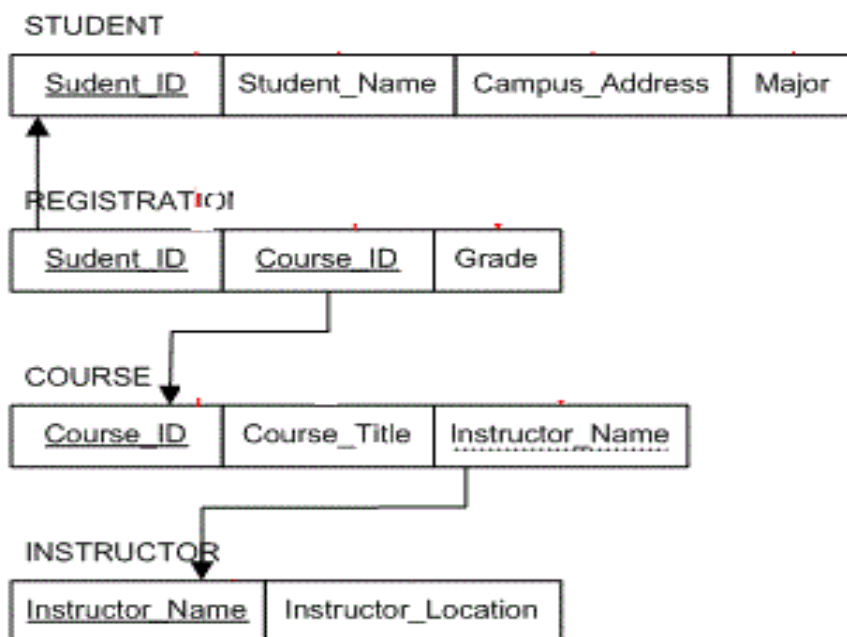
2- Select PID of product that unit price is more than 100 and manufactured date is 2012. 1 point

$\{P.PID \mid Product(P) \text{ and } P.Manufactured\_Date=2012 \text{ and } (\exists O)(Order\_Items(O) \text{ and } O.Product\_ID=P.PID \text{ and } O.Unit\_Price>100)\}$

3- Select the Manufacturer names that have a products with unit price more than 200 1 points

$\{M.Name \mid Manufacturer(M) \text{ and } (\exists P)(\exists O)(Product(P) \text{ and } Order\_Item(O) \text{ and } M.MID=P.Manufactrer\_ID \text{ and } P.PID=O.Product\_ID \text{ and } O.Unit\_Price>200)\}$

**Question 2:** The following relational schema represents a simple university department registration system,



Write SQL statements that perform the followings:

1- Select student ID and name whose major is 'computer engineering' 2 point

```

SELECT Student_ID, Student_Name
FROM STUDENT
WHERE Major='computer engineering'
  
```

2- Select students names who got a grade 80 or higher in any course. 2 point

```

SELECT Student_Name
FROM STUDENT, REGISTRATION
WHERE STUDENT.Student_ID=REGISTRATION.Student_ID AND
REGISTRATION.Grade>=80
  
```

- 3- Select course ID and Course title registered by student 'sami' 2 points

```
SELECT Course_ID, Course_Title
FROM COURSE , REGISTRATION , STUDENT
WHERE COURSE.Course_ID=REGISTRATION.Course_ID AND
REGISTRATION.Student_ID=STUDENT.STUDENT_ID AND
Student_Name='sami'
```

- 4- Select students' names and ID with their instructor name for 'databases' course. 2 points

```
SELECT Student_Name , Student_ID , Instructor_Name
FROM STUDENT , REGISTRATUION , COURSE
WHERE STUDENT.Student_ID=REGISTRATION.Student_ID AND
REGISTRATION.Course_ID=COURSE.Course_ID
```

- 5- Select the Course ID and Course Title for courses whose instructor 'ali' 2 points

```
SELECT Course_ID , Course_Title
FROM COURSE
WHERE Instructor_Name='ali'
```

- 6- Create course relation using appropriate data types and . 3 points

```
CREATE TABLE COURSE
( Course_ID          INT,
  Course_Title       VARCHAR(20)          NOT NULL,
  Instructor_Name     VARCHAR(30),
  PRIMARY KEY        (Course_ID , Instructor_Name),
  FOREIGN KEY (Instructor_Name) REFERENCES INSTRUCTOR ON DELETE SET
  NULL ON UPDATE CASCADE
)
```

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*Good Luck*

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