

2011 Mock Term Answers

1. (a) In a relational database, define the term *foreign key*.

- A foreign key is a referential constraint between two tables. The foreign key identifies a column or set of columns in one (referencing table) that refers to a set of columns in another (referenced) table.

(b) Identify the foreign keys in the relation WORKS_ON of CompanyDB

- ESSN and PNO

(c) Specify how the concept of *referential integrity* is related to that of *foreign key*.

- If a relation R1, references another relation R2 on attribute x, then every value of x appearing in R1 must also appear in R2.

(d) Specify the SQL statement that would define the WORKS_ON table, and maintains referential integrity.

- CREATE TABLE WORKS_ON
(ESSN int NOT NULL,
PNO int NOT NULL,
HOURS decimal NOT NULL,
FOREIGN KEY (ESSN) REFERENCES Employee(SSN));

[12 Marks]

2. (a) What is the direct result of issuing a *CREATE TABLE* statement?

- It adds a table descriptor to the system catalogue.

(b) What is the direct result of issuing a *GRANT SELECT ...* statement?

- The GRANT command gives permissions on tables/databases to SELECTED database users.

(c) Specify how a user might be allowed to read data from the EMPLOYEE table and modify the Salary values.

- GRANT SELECT ON Employee TO user
- GRANT UPDATE(Salary) ON Employee TO user

(d) How does the DBMS subsequently ensure that user permissions are not violated?

- Identifies the user and checks if the user has the relevant permissions

[12 Marks]

3. What is the result of executing the following statement? Explain in plain English.

```
SELECT Fname, Lname, Address, Dname  
FROM EMPLOYEE, DEPARTMENT  
WHERE DNO = DNUMBER
```

```

AND SSN NOT IN
  ( SELECT ESSN
    FROM WORKS_ON
    WHERE PNO IN
      ( SELECT PNUMBER
        FROM PROJECT
        WHERE PNAME IN ('Computerization', 'Reorganization') ) )

```

- SELECT first name, last name, address and department name
FROM the EMPLOYEE table and the DEPARTMENT table
WHERE the employee did not work on the project 'Computerization
Reorganization'

[10 Marks]

4. Construct a query in SQL that would find all employees – SSN and name – who are aged 55 and over (e.g. for offers of voluntary retirement).

- SELECT SSN, CONCAT (Fname, Lname) AS "Name"
FROM employee
WHERE BDATE >= DATE_SUBTRACT(CURDATE(), INTERVAL 55 YEARS)

[10 Marks]

5. (a) Under what circumstances can a multi-table query be evaluated using a *subquery*?

- If all the resulting columns come from one of the query tables.

(b) Why can the following query not be answered with a simple single-table query? Specify a query in SQL that solves the problem.

Find the name of employees earning more than Alicia Zelaya.

- We are asked to query two different values of salary in the employee.
- SELECT CONCAT(Fname, Lname) AS 'Name'
FROM employee
WHERE salary >
 (SELECT salary
 FROM employee
 WHERE Fname = 'Alicia');

[10 Marks]

EMPLOYEE	FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5	
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5	
Alicia	J	Zelaya	999887777	1968-07-19	3321 Castle, Spring, TX	F	25000	987654321	4	
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4	
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5	
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5	
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4	
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	null	1	

DEPT_LOCATIONS	DNUMBER	DLOCATION
	1	Houston
	4	Stafford
	5	Bellaire
	5	Sugarland
	5	Houston

DEPARTMENT	DNAME	DNUMBER	MGRSSN	MGRSTARTDATE
	Research	5	333445555	1988-05-22
	Administration	4	987654321	1995-01-01
	Headquarters	1	888665555	1981-06-19

WORKS_ON	ESSN	PNO	HOURS
	123456789	1	32.5
	123456789	2	7.5
	666884444	3	40.0
	453453453	1	20.0
	453453453	2	20.0
	333445555	2	10.0
	333445555	3	10.0
	333445555	10	10.0
	333445555	20	10.0
	999887777	30	30.0
	999887777	10	10.0
	987987987	10	35.0
	987987987	30	5.0
	987654321	30	20.0
	987654321	20	15.0
	888665555	20	null

PROJECT	PNAME	PNUMBER	PLOCATION	DNUM
	ProductX	1	Bellaire	5
	ProductY	2	Sugarland	5
	ProductZ	3	Houston	5
	Computerization	10	Stafford	4
	Reorganization	20	Houston	1
	Newbenefits	30	Stafford	4

DEPENDENT	ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP
	333445555	Alice	F	1986-04-05	DAUGHTER
	333445555	Theodore	M	1983-10-25	SON
	333445555	Joy	F	1958-05-03	SPOUSE
	987654321	Abner	M	1942-02-28	SPOUSE
	123456789	Michael	M	1988-01-04	SON
	123456789	Alice	F	1988-12-30	DAUGHTER
	123456789	Elizabeth	F	1967-05-05	SPOUSE