Universiti Malaysia PAHANG

Engineering • Technology • Creativity

FACULTY OF COMPUTER SYSTEMS & SOFTWARE ENGINEERING

FINAL EXAMINATION

COURSE	:	**DATABASE SYSTEMS**
COURSE CODE	:	**DCI2033**
LECTURER	:	**ROZLINA BINTI MOHAMED**
DATE	:	**11 NOVEMBER 2010**
DURATION	:	**3 HOURS**
SESSION/SEMESTER	:	**SESSION 2010/2011 SEMESTER I**
PROGRAMME CODE	:	**DCS**

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of **TWO (2)** sections. Answer **ALL** questions.
2. Write your answers in the answer booklet provided.
3. Answer EACH question on a new page.
4. All calculations and assumptions must be clearly shown.

EXAMINATION REQUIREMENTS

None

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of **NINETEEN (19)** printed pages including the front page.

SECTION A [40 Marks]

1. *"DBMS must enable user to store, update (add, delete, edit) and retrieve data in the database."*

   The above mentioned statement is describing the function of Database Management Systems (DBMS). Which DBMS function does it describe?

   A. Storing, updating and retrieving data
   B. Transaction support
   C. Concurrency control
   D. Data communication support

2. There are **FIVE (5)** basic components of DBMS. Which component is responsible to control access on the same data by several users at the same time?

   A. Transaction manager
   B. Security manager
   C. Data dictionary manager
   D. Storage manager

3. Choose the correct description of **conceptual level** in the ANSI-SPARC architecture.

   A. Users' view of the database that describes the area of database relevant to each user.
   B. Describes the area of a database which is related to specific users containing several different users' views.
   C. The physical representation of the database that describes *how* the data is stored in the database.
   D. The middle layer of the ANSI-SPARC that describes *what* data is stored in the database and the relationship among the data.

4. Choose the **MOST** appropriate term used to describe data dictionary for the statement below,

   "*For every user access, changes made to the database will automatically reflect the data dictionary.*"

   A. Active data dictionary
   B. Passive data dictionary
   C. Private data dictionary
   D. Public data dictionary

5. Data model is a conceptual tool used to describe data, data relationship, data constraints and semantics. Data models can be divided either as object-based or record-based. Choose the record-based data model.

   i. Entity relationship model
   ii. Hierarchical data model
   iii. Network data model
   iv. Relational data model

   A. i, ii, iii
   B. i, ii, iv
   C. i, iii, iv
   D. ii, iii, iv

6. What data model is shown in Figure 1?

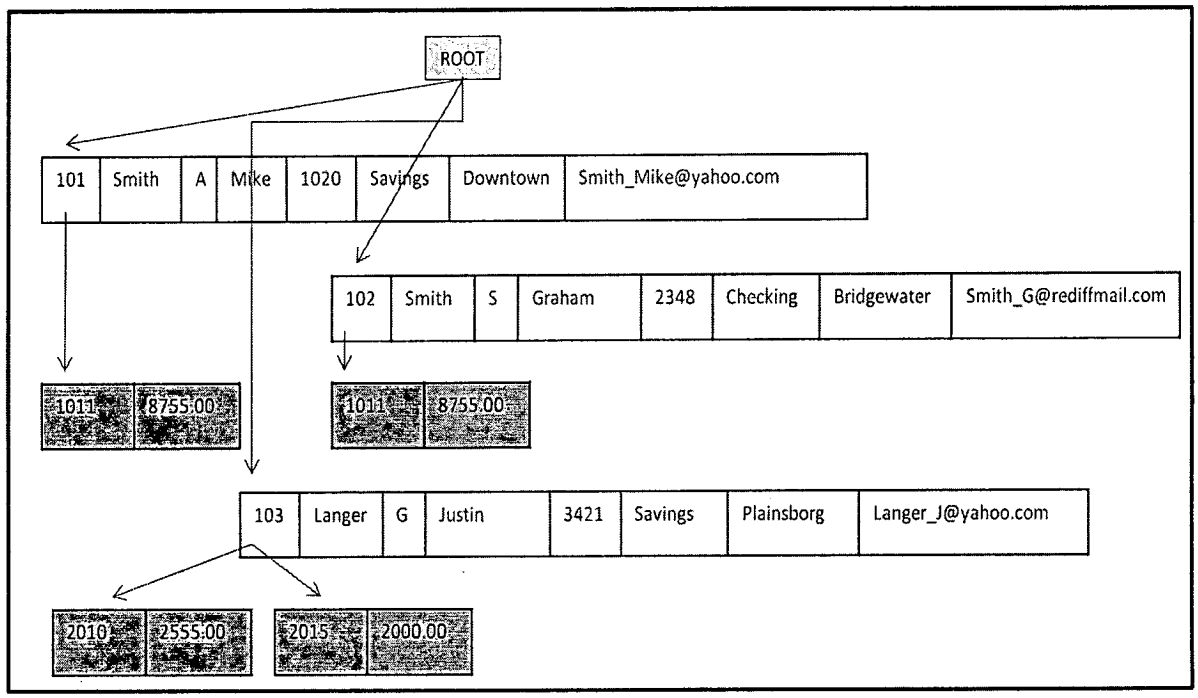


Figure 1. Data model

A. Entity relationship model
B. Hierarchical data model
C. Network data model
D. Relational data model

7. Which statement is **NOT TRUE** regarding the purpose of normalization?

A. A process of regrouping attributes into specific relations to obtain a set of relations that align with the needs of the organization.
B. A technique for producing a set of relations that fit with the enterprise data requirements.
C. A process that will ensure a good database schema that can be represented as accurate table structure.
D. A process of identifying and decomposing the functional dependencies.

Instruction: Question 8 is referred to Table 1.

Table 1. DentistPatient relation

Staf Number	dentistName	patient Number	Patient Name	appointmentDateTime	surgery Number
S1011	SYAFIQ	P100	DEVA	12-SEP-10 10:00	S15
S1011	SYAFIQ	P105	SYAFIQA	12-SEP-10 12:00	S15
S1024	NAZMI	P108	AISHAH	12-SEP-10 10:00	S10
S1024	NAZMI	P108	AISHAH	14-SEP-10 14:00	S10
S1032	NAZARIAH	P105	SYAFIQA	14-SEP-10 16:00	S15
S1032	NAZARIAH	P110	ALIF	15-SEP-10 18:00	S13

8. What is the highest normal form of DentistPatient relation as shown in Table 1?

   A. Unnormalized form
   B. First normal form
   C. Second normal form
   D. Third normal form

9. Consider the statements given below:

```
SQL> CREATE ROLE R1;
Role created
SQL> GRANT INSERT ON EMP TO R1;
Grant succeeded
SQL> GRANT UPDATE ON EMP TO R1;
Grant succeeded
SQL> GRANT DELETE ON EMP TO R1;
Grant succeeded
SQL> GRANT R1 TO SCOTT;
Grant succeeded
SQL> GRANT R1 TO BLAKE;
Grant succeeded
```

If you want to revoke only INSERT and DELETE on EMP from SCOTT, how will you achieve this task?

A.
```
REVOKE INSERT ON EMP FROM SCOTT;
REVOKE DELETE ON EMP FROM SCOTT;
```

B.
```
REVOKE R1 FROM SCOTT;
```

C.
```
REVOKE INSERT ON EMP FROM R1;
REVOKE DELETE ON EMP FROM R1;
```

D.
```
REVOKE R1 FROM SCOTT;
GRANT UPDATE ON EMP TO SCOTT;
```

10. You have created a table named Employee. The structure of the table is given below:

```
Emp_Code VARCHAR2(28),
Emp_Name VARCHAR2(28),
Salary NUMBER(6)
```

Then, you write the following SQL statement to view the details of an employee whose salary is greater than the average salary of all employees:

```
SELECT Emp_Code, Emp_Name FROM Employee
WHERE salary > AVG(salary);
```

However, you do not get the desired result. Which of the following should you use to accomplish the task?

A. The MINUS operator
B. The UNION operator
C. The INTERSECT operator
D. A sub query

11. The database contains two tables named `Employee` and `Employee_type`. You want to retrieve employee names from both the tables by performing a full outer join. Which of the following SQL queries will generate an error message?
Each correct answer represents a complete solution. Choose all that apply.

i.
```
SELECT e.name, et.name
FROM employee e, employee_type et
WHERE e.emp_id (+) = et.emp_id (+);
```

ii.
```
SELECT e.name, et.name
FROM employee e, employee_type et
WHERE e.emp_id (+) IN (1,2,3,4);
```

iii.
```
SELECT e.name, et.name
FROM employee e, employee_type et
WHERE e.emp_id (+) = et.emp_id (+)
OR e.emp_id = 2;
```

iv.
```
SELECT e.name, et.name
FROM employee e, employee_type et
WHERE e.emp_id = et.emp_id (+)
ORDER BY e.emp_name;
```

v.
```
SELECT e.name, et.name
FROM employee e, employee_type et
WHERE e.emp_id (+) = et.emp_id
ORDER BY e.emp_name;
```

A. i, ii, iii
B. i, ii, iv
C. i, iii, iv
D. i, ii, v

12. You can use Oracle XE Application Express wizards to

i. see your disk usage
ii. create tables,
iii. create indexes,
iv. create database objects.

A. ii, iii
B. i, ii, iii
C. ii, iii, iv
D. i, ii, iii, iv

Instruction: Question 13 and 14 will be based on Figure 2 and Table 2.

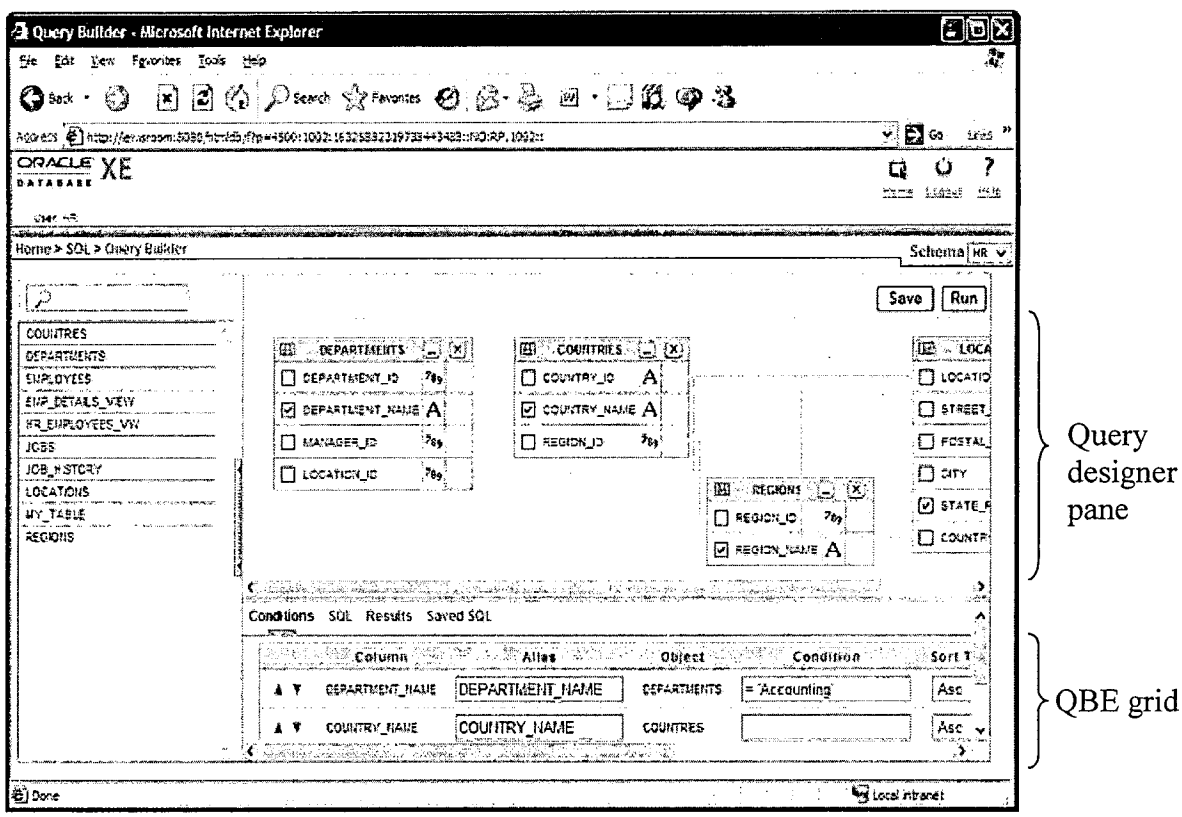


Figure 2. Oracle XE Query Builder

Table 2: Attributes for tables shown in Figure 3.

Table	Attribute
DEPARTMENTS	DEPARTMENT_ID MANAGER_ID LOCATION_ID
COUNTRIES	COUNTRY_ID COUNTRY_NAME REGION_ID
REGIONS	REGION_ID REGION_NAME
LOCATIONS	LOCATION_ID STREET_ADDRESS POSTAL_ADDRESS CITY STATE_PROVINCE COUNTRY_ID

13. Which SQL statement will be generated from Application Express Query Builder wizard shown in Figure 2?

A.
```
SELECT DEPARTMENTS. DEPARTMENT_NAME,
COUNTRIES.COUNTRY_NAME,
REGIONS.REGION_NAME,
LOCATIONS.STATE_PROVINCE
FROM DEPARTMENTS, COUNTRIES, REGIONS, LOCATIONS
WHERE DEPARTMENTS.LOCATION_ID = LOCATIONS.LOCATION_ID
AND COUNTRIES.REGION_ID = REGIONS.REGION_ID
AND LOCATIONS.COUNTRY_ID = COUNTRY.COUNTRY_ID
AND DEPARTMENT.DEPARTMENT_NAME = "Accounting"
```

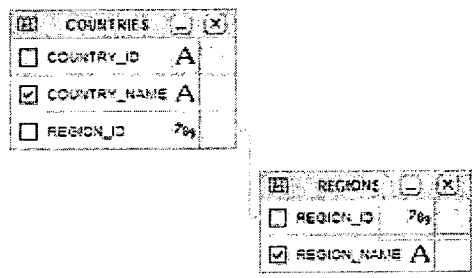
B.
```
SELECT DEPARTMENTS. DEPARTMENT_NAME,
COUNTRIES.COUNTRY_NAME,
REGIONS.REGION_NAME,
LOCATIONS.STATE_PROVINCE
FROM DEPARTMENTS, COUNTRIES, REGIONS, LOCATIONS
WHERE DEPARTMENTS.LOCATION_ID = LOCATIONS.LOCATION_ID
AND COUNTRIES.REGION_ID = REGIONS.REGION_ID
AND LOCATIONS.COUNTRY_ID = COUNTRY.COUNTRY_ID
AND DEPARTMENT.DEPARTMENT_NAME = "Accounting"
```

C.
```
SELECT "DEPARTMENTS". "DEPARTMENT_NAME" AS "DEPARTMENT_NAME",
"COUNTRIES"."COUNTRY_NAME" AS "COUNTRY_NAME",
"REGIONS"."REGION_NAME" AS "REGION_NAME",
"LOCATIONS"."STATE_PROVINCE" AS "STATE_PROVINCE"
FROM "DEPARTMENTS" "DEPARTMENTS",
"COUNTRIES" "COUNTRIES",
"REGIONS" "REGIONS",
"LOCATIONS" "LOCATIONS"
WHERE "DEPARTMENTS"."LOCATION_ID" = "LOCATIONS"."LOCATION_ID"
AND "COUNTRIES"."REGION_ID" = "REGIONS"."REGION_ID"
AND "LOCATIONS"."COUNTRY_ID" = "COUNTRY"."COUNTRY_ID"
```

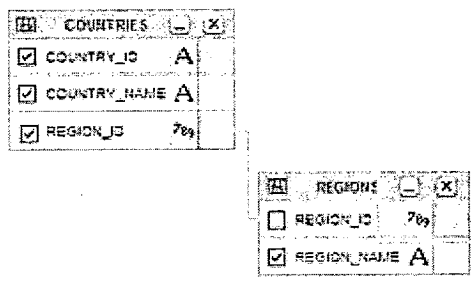
D.
```
SELECT "DEPARTMENTS". "DEPARTMENT_NAME" AS "DEPARTMENT_NAME",
"COUNTRIES"."COUNTRY_NAME" AS "COUNTRY_NAME",
"REGIONS"."REGION_NAME" AS "REGION_NAME",
"LOCATIONS"."STATE_PROVINCE" AS "STATE_PROVINCE"
FROM "DEPARTMENTS" "DEPARTMENTS",
"COUNTRIES" "COUNTRIES",
"REGIONS" "REGIONS",
"LOCATIONS" "LOCATIONS"
WHERE "DEPARTMENTS"."LOCATION_ID" = "LOCATIONS"."LOCATION_ID"
AND "COUNTRIES"."REGION_ID" = "REGIONS"."REGION_ID"
AND "LOCATIONS"."COUNTRY_ID" = "COUNTRY"."COUNTRY_ID"
AND "DEPARTMENT"."DEPARTMENT_NAME" = "Accounting"
```

14. Which illustration is the most suitable for query design pane in order to list all COUNTRY_NAMES by REGION_NAME?

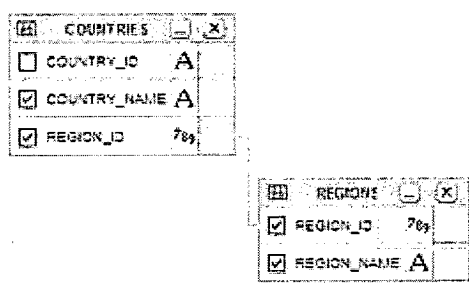
A.



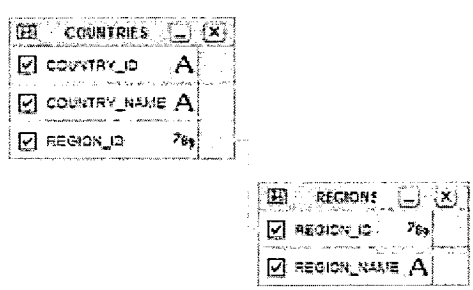
B.



C.



D.



15. What are the characteristics of Distributed Database Management Systems (DDBMS)?

i. Collection of logically related shared data that has been split into number of fragments.
ii. Fragments are allocated to sites and linked by a communication network
iii. Data at each site is under control of a DBMS
iv. DBMS at each site can handle local applications autonomously

A. i, ii, iii
B. i, ii, iv
C. i, iii, iv
D. i, ii, iii, iv

16. Heterogeneous DDBMS may required data from another site that may have:

i. Same hardware and same DBMS products.
ii. Different hardware but same DBMS products.
iii. Same hardware but different DBMS products.
iv. Different hardware and same DBMS products.

A. i, ii
B. ii, iv
C. iii, iv
D. ii, iii, iv

17. Which statement is **NOT TRUE** regarding Multidatabase system (MDBS)

A. Logically integrate a number of independent DDBMSs.
B. Allow user to access and share data without requiring full database schema integration.
C. Each DDBMSs site maintains complete autonomy.
D. Require all database schema on each DDBMS to be integrated.

18. What are the differences between OODM and Entity-Relationship Diagram (ERD)?

i. OODM object includes **behavior** but not in ERD entity.
ii. OODB and ERD have the same **associations** but different **inheritance**.
iii. OODM has **encapsulation** but not in ERD.
iv. OODM has **instance** but not in ERD.
v. OODM has **attribute** but not in ERD

A. i, ii, iii
B. i, ii, iv
C. i, ii, v
D. ii, iv, v

19. Refer to object-oriented class diagram in Figure 3. Which relational schema mapped the object-oriented class diagram given?

A. MANAGER (staffNumber, name, position, gender, dateOfBirth, salary, bonus, officeTelNumber)
SALES_STAFF(staffNumber, name, position, gender, dateOfBirth, salary, commission, mobileTelNumber)

B. MANAGER (staffNumber, name, position, gender, dateOfBirth, salary, bonus, officeTelNumber, getMontlhySalary, getAge, addBonus)
SALES_STAFF(staffNumber, name, position, gender, dateOfBirth, salary, commission, mobileTelNumber, getMontlhySalary, getAge, addCommission)

C. MANAGER (getMontlhySalary, getAge, addBonus)
SALES_STAFF(getMontlhySalary, getAge, addCommission)

D. MANAGER (addBonus)
SALES_STAFF(addCommission)

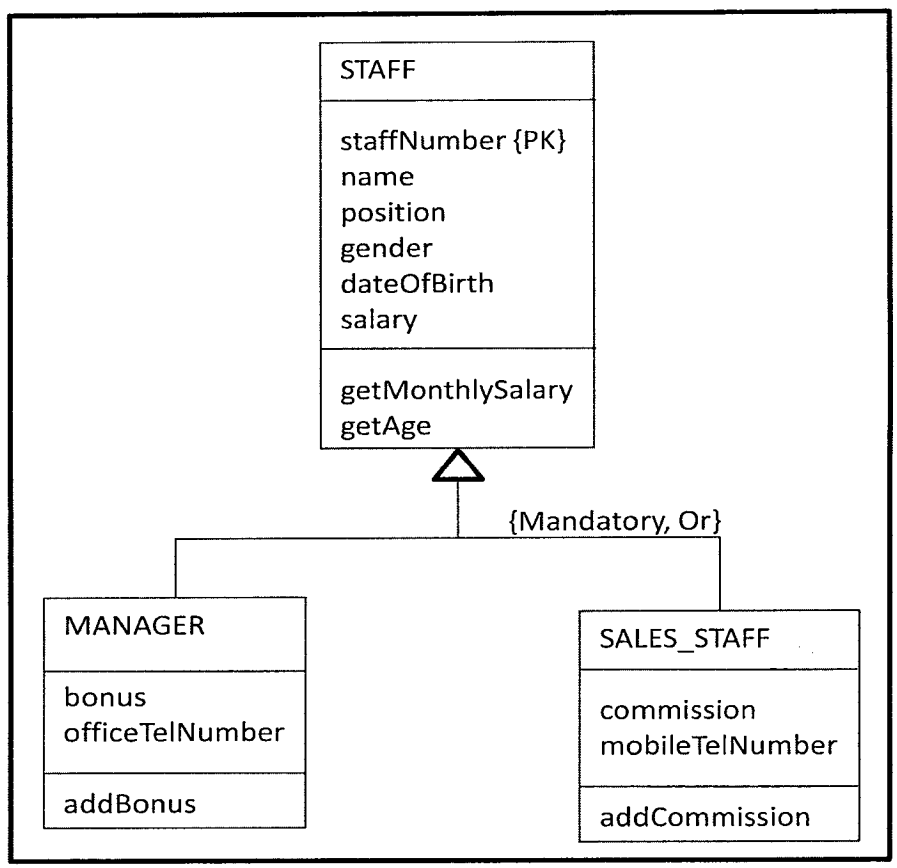


Figure 3. Object-oriented class diagram

20. Class instance in Figure 4 indicates the relationship between `Branch` and `PropertyForRent` objects. What is the multiplicity of their relationship?

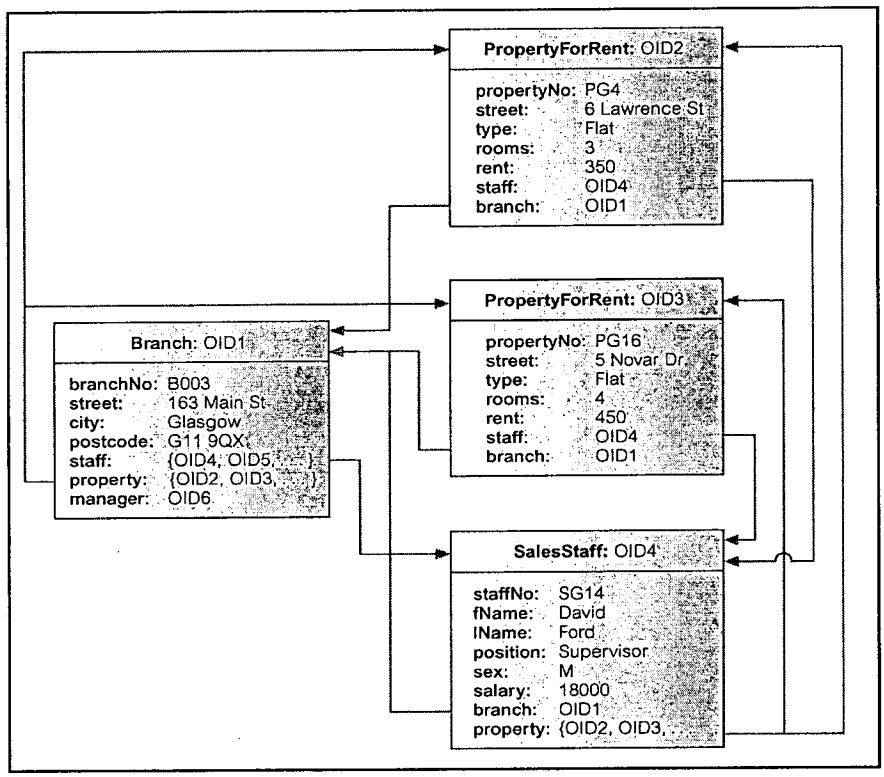


Figure 4. Class instances

A. 1: 1

B. 1: *

C. * : *

D. 0 : *

SECTION B **[60 Marks]**

QUESTION 1

Figure 5 shows the Patient Medication Form for the Kuantan Hospital.

Kuantan Hospital **Patient Medication Form**							
Patient Number: P10034							
Patient Name:		Naqib Najib		Ward Number:		11	
Bed Number:		84		Ward Name:		Orthopedic	
Drug Number	Name	Description	Dosage	Method of Admin	Units per Day	Start Date	Finish Date
10223	Morphine	Pain Killer	10mg/ml	Oral	50	24/03/10	24/04/11
110334	Tetracyclene	Antibiotic	0.5mg/ml	IV	10	24/03/10	17/04/10
10223	Morphine	Pain Killer	10mg/ml	Oral	10	25/01/11	02/05/12

Figure 5. The Kuantan Hospital Patient Medication Form

a) Identify the functional dependencies represented by the attributes shown in Figure 5. State any assumptions that you have made.

[10 Marks]

b) Describe and illustrate the process of normalizing the attributes shown in Figure 5 to produce a set of well-designed third normal form (3NF) relations. You may draw a Functional Dependency Diagram to assist your illustration.

[15 Marks]

c) Transform your drawing in (b) into a set of relation. Then, identify the primary and foreign keys in your 3NF relations. Explicitly indicate the primary and foreign keys that have been identified.

[5 Marks]

QUESTION 2

Answer the following questions using the instances of Kuantan Hospital Patient database as in Figure 6.

WARD

wardNumber	wardName	type	rooms	chargePerDay (RM)	staff Number
P11	Pediatric 1	Standard	20	10	S1
P12	Pediatric 2	Luxury	10	20	S2
011	Orthopedic 1	Standard	20	10	S3

PATIENT

patNumber	patName	patAddress	patTelNumber
PAT1	Imelia	12, Jalan Penang	013-333333
PAT2	Syuhadah	13, Jalan Pahang	012-555555
PAT3	Syafiqa	14, Jalan Kuantan	010-666666

STAFF

staffNumber	staffName	staffAddress	staffTelNumber	salary (RM)
S1	Daud	Penang	014-444444	3000
S2	Ibrahim	Pahang	016-898989	1200
S3	Zalfarina	Terengganu	012-121212	1800

REGISTRATION

patNumber	wardNumber	startDate	finishDate
PAT1	P11	12-June-2010	15-June-2010
PAT2	P11	13-June- 2010	20-June-2010
PAT1	P11	20-June-2010	30-June-2010
PAT3	P12	13-June- 2010	20-June-2010

Figure 7. Instance of the Kuantan Hospital patient database

a) Create a **REGISTRATION** table using SQL with the following features:
   i) Patient number and ward number are the primary keys for REGISTRATION table.
   ii) Patient number is the foreign key that relate to the PATIENT table.
   iii) Ward number is the foreign key that relate to the WARD table.
   iv) Use **date** as the data type for start and finish dates.
   v) Use any appropriate data type for other field.

[5 Marks]

b) Update REGISTRATION table by adding ONE (1) column named as **'totalCharge'** with **Number** data type.

[2 Marks]

c) Write the SQL statements for the following data manipulation queries?

   i) Count the number of wards?

[2 Marks]

   ii) Construct a list of wards' name where there is no registered patient.

[3 Marks]

   iii) Construct a list of all staff whose salary is greater than the salary of every staff in-charge of 'Orthopedic 1'.

[3 Marks]

   iv) Count the number of registration for each ward.

[3 Marks]

   v) Update staffs with 5% increase of salary.

[2 Marks]

d) Draw the illustration of **query designer pane** and **QBE grid** according to the Oracle XE Query Builder skeleton shown in Figure 8 for the QBE queries below. Answer for the following questions **MUST** have the same format

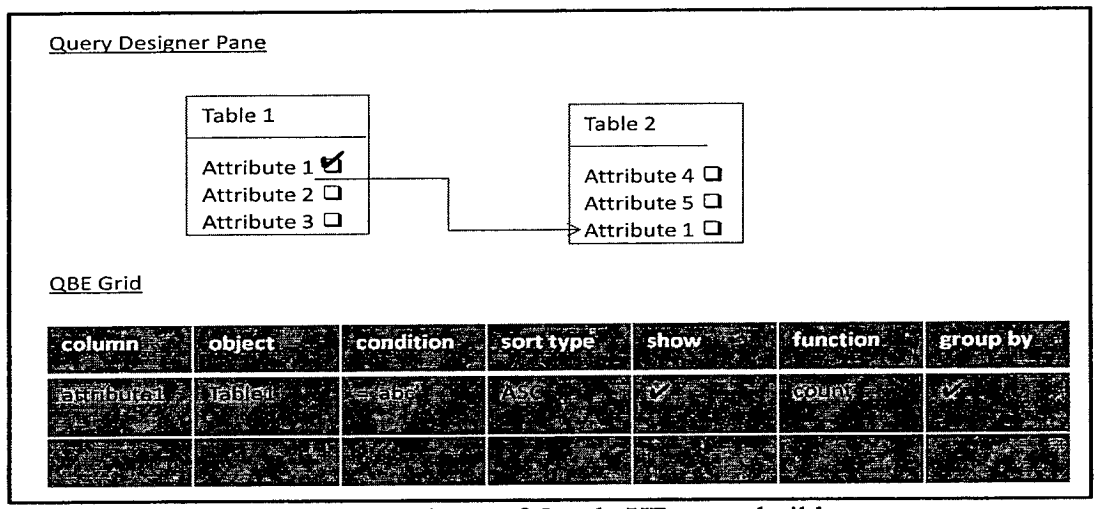


Figure 8. Skeleton of Oracle XE query builder

i) Count the number of registration of each ward.

[3 Marks]

ii) List the details of registered patient without any duplicates.

[3 Marks]

iii) Briefly describe the process of **creating a tabular form** on existing application. This process is a part of building an application using the Application Builder component of Oracle Database 10g Express Edition

[4 Marks]

END OF QUESTION PAPER