

SECTION A

Attempt ALL questions from Section A. This section is worth 30 marks.

Subsection A.1 -TRUE/FALSE

Nominate whether each of the following statements is true or false by writing either T (for True) or F (for False) on the answer sheet at the end of this paper.

Each question is worth 1 mark.

Question 1

True or False? A business rule defines, or constrains, an aspect of an organisation.

[1 mark]

Question 2

True or False? The best way to optimize performance of SQL queries is to always create indexes for all the columns of all the tables

[1 mark]

Question 3

True or False? De-normalization of database tables yields better performance over the normalization process.

[1 mark]

Question 4

True or False? To access multiple rows generated by a SQL statement, we utilize *cursors*.

[1 mark]

Question 5

True or False? All initialization parameters can be modified while database is running.

[1 mark]

Subsection A.2 - FILL IN THE BLANKS

Complete the sentences below by writing your answer on the answer sheet at the end of the exam paper- using words or phrases.

DO NOT WRITE YOUR ANSWERS IN THIS EXAM PAPER.

The length of the lines in the sentences is constant and does not necessarily indicate the length of the answer to be supplied.

Each question is worth 2 marks

Question 6

A _____ is a minimal subset of attributes in a relation which uniquely identifies each tuple in the relation.

[2 marks]

Question 7

Two types of database administration tools are data dictionary and _____ tools.

[2 marks]

Question 8

To tune a SQL query, one needs to study an _____ plan considered by Oracle database for executing the query.

[2 marks]

Question 9

_____ are special instructions for the optimizer that are embedded inside the SQL command text.

[2 marks]

Question 10

The _____ command is used to give privileges to a user on different database objects to allow different operations such as insert, select etc.

[2 marks]

continued...

Subsection A.3 - MULTIPLE CHOICE QUESTIONS

Choose one answer from the given choices for each question and write your choice on the answer sheet at the end of the exam paper.

DO NOT WRITE YOUR ANSWERS IN THIS EXAM PAPER.

Each question is worth 3 marks

Question 11

The entity relationship diagrams represent the _____ view of the database.

- a. condensed
- b. physical
- c. logical
- d. conceptual

[3 marks]

Question 12

In the _____ model, the basic logical structure is represented as a tree.

- a. hierarchical
- b. network
- c. relational
- d. entity relationship

[3 marks]

Question 13

Data redundancy produces:

- a. slower lookups
- b. robust design
- c. efficient storage use
- d. data integrity problems

[3 marks]

Question 14

Which of the following variable name will result in an error.

- a. Last_name
- b. andn
- c. begin
- d. 34sdfsfksfldkjsjdfijsdkjflsfdkjsjflsjdfslsjsldjsljslksdf

[3 marks]

Question 15

Which of the following is an object privilege?

- a. Create session
- b. Drop user
- c. Insert any table
- d. update

[3 marks]

continued...

SECTION B - SHORT ANSWER

Attempt ALL questions from Section B. This section is worth 50 marks.

Write your answers in your answer book.

Each question is worth 5 marks.

Question 16

Explain and contrast two differences and two similarities between the DBA (Database Administrator) and DA (Data Administrator).

[5 marks]

Question 17

Describe the four logical database structures in Oracle?

[5 marks]

Question 18

Provide an equivalent (standard) Relational Algebra expression for the following SQL query.

```
SELECT R.A  
FROM R,P  
WHERE R.B=P.C;
```

[5 marks]

Question 19

Consider the following query on Table and answer the following questions:

```
SELECT EMP_ID, EMP_FNAME, EMP_AREACODE  
FROM EMPLOYEE  
WHERE EMP_FNAME = 'XYZ' AND (EMP_Sal)/100 > '100'
```

- Please identify what can cause prospective performance issues in the above query?
- Suggest one way by which we can overcome these issues.

[5 marks]

Question 20

The DBMS processes queries in three phases. What are those phases? Identify in which phase does query optimization take place? Briefly describe the general process of query optimization.

[5 marks]

continued...

Question 21

Identify 4 syntax errors in the following PL/SQL code.

```
DECLARE
    CURSOR c1 is
        SELECT ename, empno, sal FROM emp ORDER BY sal
DESC;
    my_ename VARCHAR2(10;
    my_empno  NUMBER(4);
    my_sal    NUMBER(7,2);
BEGIN
    FOR i IN 1..5 LOOP
        FETCH c1 INTO my_ename, my_empno, my_sal;
        EXIT WHEN c1%NOTFOUND;

        my_sal=0+my_sal;
        INSERT INTO temp VALUES (my_sal, my_empno,
my_name);
        COMMIT
    END LOOP;
    CLOSE c1;
END;
```

[5 marks]

Question 22

What are three types of PL/SQL blocks?

[5 marks]

Question 23

SQL injection can be a serious problem for a database based application.

Please answer the following:

- Give two ways SQL injections can be harmful to the database.
- Give two examples of an SQL injection attack that can be used to exploit the following query used in your database application.

```
select count(*) from users
where username='$username'and password= '$password';
```

[5 marks]

Question 24

List one (1) advantage and one (1) disadvantage of a distributed database

[5 marks]

continued...

Question 25

In following Trigger code, clearly identify by line numbers those a) statements that define the timing of trigger firing, b) statements that define the event causing the trigger.

```
Line 1      CREATE OR REPLACE TRIGGER dis_sal_changes
Line 2      BEFORE
Line 3      INSERT OR UPDATE
Line 4      ON customers
Line 5      FOR EACH ROW
Line 6      WHEN (:NEW.ID > 0)
Line 7      DECLARE
Line 8      sal_diff number;
Line 9      BEGIN
Line 10     sal_diff := :NEW.salary - :OLD.salary;
Line 11     dbms_output.put_line(:OLD.salary);
Line 12     dbms_output.put_line(:NEW.salary);
Line 13     dbms_output.put_line(sal_diff);
Line 14     END;
```

[5 marks]

continued...

SECTION C

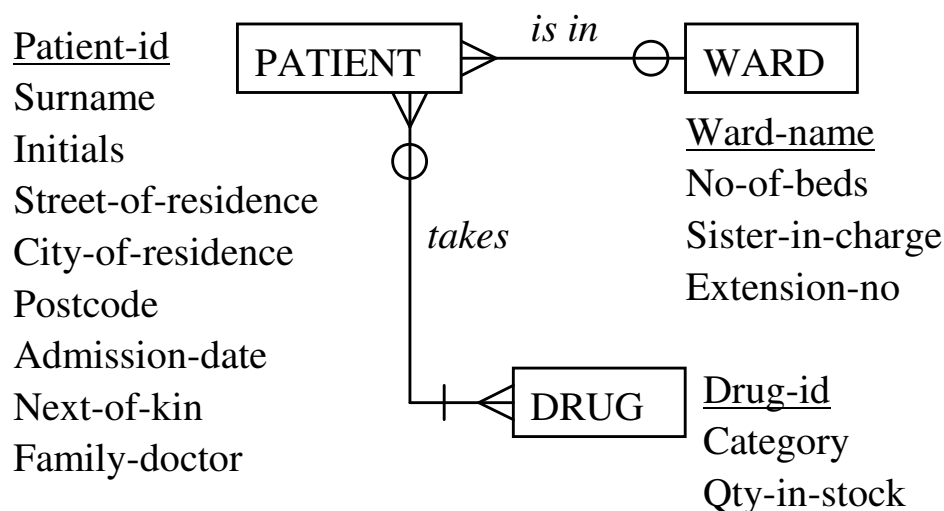
Write your answers in your answer book.

Answer ALL the questions in this section. This section is worth 40 marks.

Each question is worth 20 marks.

Question 26

Undertake the specified tasks in relation to following Entity-Relationship Model

**Task 1**

Briefly describe the business rules indicated by the relationships given in the ER model above.

[5 marks]

Task 2

Convert the ER diagram to a relational schema using the conversion algorithm from this unit. Show all of the steps in the algorithm

ER To Relational Conversion Algorithm

Step 1: Each entity becomes a relation

Step 2: Each many-to-many relationship becomes a relation

Step 3: Each one-to-many relationship is represented by a foreign key

Step 4: Write out the final relational schema

[15 marks]

continued...

Question 27**SQL Statements**

Consider a simplified Twitter like system with the following specifications:

- Users post 'tweets', which are short pieces of text
- They may tag their tweets with zero or more tags of their own choice. For example, a user tweeting about the Gators may decide to use the tag 'Gators'.
- A user may follow zero or more other users, which means that their 'tweets' are visible to this user when he/she logs in.

Consider the following database schema (primary keys are underlined):

- *Person* (pname, city, address) – Assuming pname is unique
- *Follows* (pname1, pname2) – Person pname1 follows person pname2
- *Tweets* (tid, ttitle, ttext) – Tweet with tid has title ttitle and text ttext
- *PersonTweets* (pname, tid, ts) – Person pname posted tweet tid at timestamp ts
- *TweetTag* (tid, tagname) – Tweet tid had tagname in its list of tags

Express the following queries in **SQL Select statement**.

- Find the persons who are followed by 'XYZ' user.
[3 marks]
- Find the number of times a tweet is tagged.
[3 marks]
- Find all the tags that XYZ user used in his tweets.
[4 marks]
- Find the tweet with maximum number of tags.
[4 marks]
- Find all the followers of XYZ user who are not following anyone except XYZ user
[6 marks]

This is the end of the exam paper

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KIT712 Data Management Technology

Answer sheet for Section A.1

Your selection must be written as a CAPITAL letter in the box provided for each question. Write T for True. Write F for False

True or False?
Question 1
Question 2
Question 3
Question 4
Question 5

Answer sheet for Section A.2

Your word or phrase must be written clearly in the box provided for each question.

Question 6	
Question 7	
Question 8	
Question 9	
Question 10	

Answer sheet for Section A.3

Your choice index must be written clearly in the box provided for each question.

Question 11	
Question 12	
Question 13	
Question 14	
Question 15	