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? Two tables are union compatible if they have same number of columns.

[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? In a conceptual model of a database, we do not include any implementation details such as a database management system to be utilised.

[1 mark]

Question 4

True or False? Only some initialization parameters can be modified while the database is running.

[1 mark]

Question 5

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

[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

Two types of database administration tools are Data Dictionary and_____ tools.

[2 marks]

Question 7

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]

Question 8

In the cloud computing era, the _____role of the database administrator is largely unchanged.

[2 marks]

Question 9

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

[2 marks]

Question 10

The _____ keys are used to define the relationship between two different tables.

[2 marks]

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 relational model represents the _____view of the database.
- a. condensed
- b. physical
- c. logical
- d. conceptual

[3 marks]

Question 12
Which of the following declaration of variables in PL/SQL is not correct syntactically?.
- a. Last_name Varchar(80);
- b. Andn Integer;
- c. begin1 number Employee.ID%type.
- d. end varchar(80);

[3 marks]

Question 13
In database design, which of the following steps is not included?
- a. Collection of Business Rules
- b. Selection of Database Management System
- c. Design of Conceptual model
- d. Implementation of Database Management System

[3 marks]

Question 14
Which of the following is an object privilege?
- a. Create session
- b. Drop user
- c. Insert any table
- d. update

[3 marks]

Question 15
Data redundancy produces:
- a. slower lookups
- b. robust design
- c. efficient storage use
- d. data integrity problems

[3 marks]

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

Define the meaning of confidentiality, integrity and availability in the context of database security.

[5 marks]

Question 17

In Oracle, what is the key difference between Roles and Profiles for user management?

[5 marks]

Question 18

Describe the functionality of System Global Area (SGA) and Program Global Area (PGA) of an Oracle instance. Please also give ONE(1) specific difference between these two.

[5 marks]

Question 19

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

```
SELECT EMP_ID, EMP_FNAME, EMP_AREACODE
FROM EMPLOYEE
WHERE  EMP_SEX = 'F' AND (EMP_Sal)*100 > '100'
```

a. Please identify at least THREE (3) prospective performance issues in the above query?
b. Suggest at least TWO (2) ways by which we can overcome these issues.

[5 marks]

Question 20

Briefly describe the general process of query optimization. What are TWO (2) goals of the Oracle's query optimizer? Please also give a definition of these two goals.

[5 marks]

Question 21

Describe TWO (2) types of privileges that can be defined in an Oracle 11g database?

[5 marks]

Question 22

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

```
CREATE TRIGGER check_salary
BEFORE INSERT on EMPLOYEES
FOR ROW
DECLARE
  v_min number(8,2) := 1000.0;
  v_max constant number(8,2) := 500000.0
BEGIN
  Select c_max into v_max
     from JOBS where jobid=:new.jobid;
  IF :new.salary > v_max OR
     :new.salary < v_min
  THEN
     Delete from EMPLOYEES where empid=:new.empid;
   RAISE_APPLICATION_ERROR(-20000,
      'New salary is too small or large');
   END IF;
END;
```

[5 marks]

Question 23

List TWO (2) advantages and TWO (2) disadvantages of a distributed database.

[5 marks]

Question 24

SQL injection can be a serious problem for a database based application. Please answer the following:
   a. Give TWO (2) ways SQL injections can be harmful to the database.
   b. Give TWO (2) 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 25

Give at least ONE(1) difference and ONE(1) similarity between three types of PL/SQL blocks i.e. Anonymous, Procedures, and Functions.

[5 marks]

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

ER DIAGRAM

Draw an Entity-Relationship (ER) diagram model for the following business rules (Mylo Quiz System). Use the ER conventions for this unit. (These conventions are a simple version of crows feet ER modelling conventions).

MYLO QUIZ SYSTEM

There can be several quizzes that can be designed within Mylo. Each quiz contains its identifier, start date, end date, set of questions, total marks, number of attempts allowed and type of quiz. Each question contains its description, its answer, its type, marks associated with it and its difficulty level. Each student may attempt many quizzes and each quiz can be attempted multiple times by the same student. Each attempt consists of studentid, date, and total marks. For each attempt, the student's answer for each question, and whether it is correct or not is also recorded.

[20 marks]

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

We would like to extract some information from the database using Relational algebra and SQL statements.

Task 1

For each of the following questions write a **Relational Algebra expression.**
    a. Find all the tweets with title 'Advertisement'.

[2 marks]

    b. Find all the persons who posted a tweet with tag name 'ABC'.

[3 marks]

    c. Find all pairs of people (pname) who have atleast one follower in common.

[5 marks]

Task 2

For each of the following questions, write a **SQL Select statement**:

    a. Find all the different, distinct tag names ever used.

[2 marks]

    b. Find all the people from Hobart who have written a tweet with tag name 'UTAS'.

[3 marks]

    c. Find all the followers of XYZ user who are not following anyone except XYZ user.

[5 marks]

This is the end of the exam paper.

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	