Part1 Concepts (30 marks, 1.5 each)

1. Mini World

Some part of the real world for which the database system is developed with its data stored in the database.

2. Data Model specifies how data is structured and operated.

3. Relational Data Model

All data is represented in terms of tuples (records), grouped into relations (files).

4. Database: A collection of related data stored on a computer.

5. Database Management System

Software to facilitate the creation and maintenance of a computerized database.

6. Database System the database and the applications developed for the users on top of DBMS

7. Database Schema: descrption of the data in the database.

8. Atomic Value: values that are not divisible.

9. Attribute: a column name of the relation indicating the meaning of the data items in that column.

10. Tuple: a row in the relation. Data elements in each tuple represent certain facts that correspond to a real-world entity or relationship.

11. Domain

A domain has three parts: a name, a data-type/format and a set of atomic values.

12. Relation

A relation consists of a schema and an instance that is a set of tuples.

13. Key: minimal set of attributes that uniquely identifies that tuples in the relation.

14. Primary Key: a chosen key (referring to the definition of key)

15. Foreign Key: an attribute that references a primary key of the same or different relation

16. DBA is responsible for acquiring software and hardware resources, controlling its use and monitoring efficiency of operations and authorizing access to the database, for coordinating and monitoring its use.

17. End User

Use the database in day to day basis and don't know how the DB is structured.

18. Entity Integrity Rule

No component of the primary key of a base relation is allowed to be null.

19. Logical Data Independence

The capacity to change the conceptual schema without having to change the external schemas and their associated application programs

20. Query Language (QL) specify database retrievals.

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Part2 (15 marks)

```
create table Dependent (
  entity char(10) primary key,
  dependent char(10),
  foreign key (dependent) references Dependent(entity));
```

Create statement 5 marks

```
insert into Dependent values ('E2', null);
insert into Dependent values ('E3', 'E2');
insert into Dependent values ('E1', 'E3');
update Dependent set dependent='E1' where entity='E2';
```

Insert statements 5 marks

```
SQL> create table Dependent (
  2    entity char(10) primary key,
  3    dependent char(10),
  4    foreign key (dependent) references Dependent(entity));

Table created.

SQL>
SQL> insert into Dependent values ('E2', null);

1 row created.

SQL> insert into Dependent values ('E3', 'E2');

1 row created.

SQL> insert into Dependent values ('E1', 'E3');

1 row created.

SQL> update Dependent set dependent='E1' where entity='E2';

1 row updated.
```

SQL statement and the corresponding screenshot 5 marks

```
SQL> select * from Dependent;

ENTITY     DEPENDENT
---------- ----------
E2         E1
E3         E2
E1         E3
```

Part 3 (35 marks)

4 marks / create table statement = 4 marks * 3 tables
1 marks / constraint = 1 marks * 8 constraints

```
CREATE TABLE Sailer
(S#           char (2)          PRIMARY KEY,
 Name        char (20)          NOT NULL,
 Age          number(2)         DEFAULT 99,
CHECK(NAME in ('Smith', 'Jones', 'Blake', 'Lastname', 'Adams')),
CHECK(Age between 1 and 99));

CREATE TABLE Boat
(B#           char (2)          PRIMARY KEY,
 Name          char (20)          UNIQUE,
 Color         char (10),
CHECK (NAME in ('Freedom', 'Paradise', 'Miracle', 'Splendor')),
CHECK (COLOR in ('Red', 'Green', 'Blue', 'Yellow')));

CREATE TABLE Reservation
(S#      char (2),
 B#      char (2),
 Day     varchar(20),
 PRIMARY KEY (S#, B#),
 FOREIGN KEY (S#) REFERENCES Sailer (S#) ON DELETE CASCADE,
 FOREIGN KEY (B#) REFERENCES Boat (B#) ON DELETE CASCADE);
```

```
SQL> CREATE TABLE Sailer
  2  (S#              char (2)            PRIMARY KEY,
  3   Name            char (20)           NOT NULL,
  4   Age             number(2) DEFAULT 99,
  5  CHECK(NAME in ('Smith', 'Jones', 'Blake', 'Lastname', 'Adams')),
  6  CHECK(Age between 1 and 99));

Table created.

SQL>
SQL> CREATE TABLE Boat
  2  (B#              char (2)             PRIMARY KEY,
  3   Name            char (20)            UNIQUE,
  4   Color           char (10),
  5  CHECK (NAME in ('Freedom', 'Paradise', 'Miracle', 'Splendor')),
  6  CHECK (COLOR in ('Red', 'Green', 'Blue', 'Yellow')));

Table created.

SQL>
SQL> CREATE TABLE Reservation
  2  (S#          char (2),
  3   B#          char (2),
  4   Day         varchar(20),
  5   PRIMARY KEY (S#, B#),
  6   FOREIGN KEY (S#) REFERENCES Sailer (S#) ON DELETE CASCADE,
  7   FOREIGN KEY (B#) REFERENCES Boat (B#) ON DELETE CASCADE);

Table created.
```

3 marks / insert statements for each table = 3 marks * 3 table

```
SQL> INSERT INTO Sailer VALUES ('S1', 'Smith', 20);

1 row created.

SQL> INSERT INTO Sailer VALUES ('S2', 'Jones', 30);

1 row created.

SQL> INSERT INTO Sailer VALUES ('S3', 'Blake', 25);

1 row created.

SQL> INSERT INTO Sailer VALUES ('S4', 'Lastname', 20);

1 row created.

SQL> INSERT INTO Sailer VALUES ('S5', 'Adams', 30);

1 row created.

SQL> INSERT INTO Boat VALUES ('B1', 'Freedom', 'Blue');

1 row created.

SQL> INSERT INTO Boat VALUES ('B2', 'Paradise', 'Green');

1 row created.

SQL> INSERT INTO Boat VALUES ('B3', 'Miracle', 'Red');

1 row created.

SQL> INSERT INTO Boat VALUES ('B4', 'Splendor', 'Yellow');

1 row created.
```

```
SQL> INSERT INTO RESERVATION VALUES ('S1', 'B1', '1-Jan-15');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S1', 'B2', '2-Jan-16');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S1', 'B3', '3-Feb-17');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S1', 'B4', '4-Feb-18');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S2', 'B1', '5-Mar-16');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S2', 'B2', '6-Mar-17');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S2', 'B3', '7-Apr-18');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S3', 'B1', '8-May-17');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S3', 'B2', '9-Jul-17');
1 row created.
SQL> INSERT INTO RESERVATION VALUES ('S4', 'B1', '10-Sep-17');
1 row created.
```

2 marks/SQL statement and screenshot of each table = 2 marks * 3 tables

```
SQL> select * from sailer;

S# NAME                          AGE
-- -------------------- ----------
S1 Smith                         20
S2 Jones                         30
S3 Blake                         25
S4 Lastname                      20
S5 Adams                         30

SQL> select * from boat;

B# NAME                 COLOR
-- -------------------- ----------
B1 Freedom              Blue
B2 Paradise             Green
B3 Miracle              Red
B4 Splendor             Yellow

SQL> select * from reservation;

S# B# DAY
-- -- --------------------
S1 B1 1-Jan-15
S1 B2 2-Jan-16
S1 B3 3-Feb-17
S1 B4 4-Feb-18
S2 B1 5-Mar-16
S2 B2 6-Mar-17
S2 B3 7-Apr-18
S3 B1 8-May-17
S3 B2 9-Jul-17
S4 B1 10-Sep-17

10 rows selected.
```