EC3119 DATABASE

TEST MARKING SCHEME

SECTION A (20 Marks)

Answer only One (1) Question
Question 1

a) Describe the limitation of early file-based system. (5 Marks)
Answer
Limitation of file Based system
- Separation and isolation of data
- Duplication of data
- Data dependence
- Incompatible file formats
- Fixed queries of application program

(Each point = 1 marks)

b) List out the **five (5)** advantages of database system. (5 Marks)
Answer
Advantages of Database System (any five only)
- Control of data redundancy
- Data consistency
- More information from the same amount of data
- Sharing of data
- Improved data integrity
- Improved security
- Enforcement of standards
- Economy of scale
- Balance conflicting requirements
- Improved data accessibility and responsiveness
- Increase productivity
- Improved maintenance through data independence
- Increased concurrency
- Improved backup and recovery services

(Each point = 1 marks)

c) Explain the use of cardinality in ER model. (6 Marks)

Answer
Cardinality
- The number of entity type, which is involved in a relationship. (2 m)
- One-to-One (1:1)　　(1m)
- One-to-Many (1:M)　　(1m)
- Many-to-Many (M:N)　　(2m)

d) Describe the entity integrity. (4 Marks)

Entity Integrity:
- Each instance of an entity must have a unique primary key value. (1m)
- No part of primary key may be null. (1m)
- Each entity will have a unique identity. (1m)
- Foreign key values can properly refer to primary key values. (1m)

Question 2
a) Describe database security. Discuss the roles of the data administrator and database administrator.

(4+4=8 Marks)

Answer
Database security
- Mechanisms that protect the database against intentional or accidental threats. (2m)
- Focus on hardware, software, people and data. (2m)

Roles
- Data administrator: management and control of corporate data (2m)
- Database administrator: management and control of physical realization of a database system. (2m)

b) Why we need normalization? Explain the difference between functional dependency and transitive dependency.

(6+6 Marks)

Answer
Normalization:
- Accurate representation of the data, relationships and constraints. (2m)
- To group attributes into relations. (1m)
- To minimize data redundancy. (1m)
- To reduce file storage space required by base relations. (1m)
- To manage update anomalies. (1m)

Functional dependency:
- Describes relationship between attributes in a relation. (1m)
- If each value of A in R is associated with exactly one value of B in R, B is functionally dependent on A. (2m)

Transitive Dependency:
- A → B and B→ C, then C is transitively dependent on A via B where A, B and C are attributes of a relation. (3m)

Question 3

a) Describe the conceptual database design. Discuss the differences between the primary key and the foreign key.

(4+4 Marks)

Answer
Conceptual database design

- The process of constructing a model of the data used in an organization independent of all physical considerations. (2m)
- Focus on ER model. (2m)

Difference
The primary key is the candidate key that is selected to identify tuples uniquely within a relation (2m).
A foreign key is an attribute or set of attributes within one relation that matches the candidate key of some (possibly the same) relation (2m).

b) Why database planning needed? Explain the process of logical design and physical design.
(4+8 Marks)

<u>Answer</u>
Database Planning: (any four 1X4=4 m)
- To create the mission statement and mission objectives for the database system. (1m)
- To integrate the overall information system strategy of the organization. (1m)
- To provide the way of data collection methodology. (1m)
- To provide the specific format. (1m)
- To identity the necessary documentation. (1m)
- To provide the way of implementation. (1m)

Logical Design:
- Create table on the basis of ER diagram. (1m)
- Check table structure using normalization. (1m)
- Check that the tables support user transactions. (1m)
- Check integrity constraints. (1m)

Physical Design:
- Translate the logical database design for target DBMS. (1m)
- Choose file organizations and indexes. (1m)
- Design user views and security mechanism. (1m)
- Monitor and tune the operational system. (1m)

SECTION B (30 Marks)

Answer all the following questions.

The following tables form part of a database held in a relational DBMS.

Student   (Student_ID, Name, Address, Phone)
Subject   (Subject_ID, Subject_Name)
Test   (Test_ID, Test_Name, Full_Marks)
Mark   (Subject_ID, Test_ID, Student_ID, Obtain_Marks)

where

- Student contains student details and Student_ID is the primary key.
- Subject contains subject details and Subject_ID is the primary key.
- Test contains details of the marking scheme and the Test_ID is the primary key.
- Mark contains marks detail obtained by student and the primary key comprises Subject_ID, Test_ID, Student_ID.

Construct an SQL statement to answer the following queries.

a) List full details of all students.

(2 Marks)

SELECT *FROM Student;

b) Delete contains of Test table.

(2 Marks)

DELETE FROM Test;

c) Insert the following record into **Test** table.

Test_ID	Test_Name	Full_Marks
T1	Assignment I	10
T2	Assignment II	20
T3	Test	10

(6 Marks)

INSERT INTO Test VALUES ('T1','Assignment I',10);   (2m)
INSERT INTO Test VALUES ('T2','Assignment II',20);   (2m)
INSERT INTO Test VALUES ('T3','Test',10);   (2m)

d) List all Sudent_ID and Obtained_Marks who obtained more than **five (5)** marks **in** T1 test with Subject_ID equals **DB**, in descending order of Obtained_Marks.

(6 Marks)

SELECT Student_ID, Obtain_Marks FROM Mark WHERE Obtain_Marks > 5 and Test_ID='T1' and Subject_ID='**DB**' order by Obtain_Marks desc ;

e) How many students receive exactly **ten (10)** marks in **T1** test of Subject_ID **DB**?

(4 Marks)

3

SELECT COUNT(*) FROM Mark WHERE Test_ID='T1' and Subject_ID='DB' and
Obtain_Marks = 10 ;

f) List the name and phone number of student whose name starts from '**S**'?

(2 Marks)

SELECT Name, Phone FROM Student WHERE Name like 'S%'

g) Display the student_ID and total marks obtained by student in all the subject in the order
of obtained marks from highest to lowest.

(8 Marks)

SELECT Student_ID, SUM(Obtain_Marks) as TotalMarks FROM Mark GROUP BY
Student_ID order by Total_Marks DESC;