POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (REVISED) (PGDCA-NEW)

Term-End Examination

December, 2022

MCS-207 : DATABASE MANAGEMENT SYSTEMS

Time : 3 hours *Maximum Marks : 100*

(Weightage : 70%)

Note : *Question no.* ***1*** *is* ***compulsory*** *and carries 40 marks. Attempt any* ***three*** *questions from the questions no. 2 to 5.*

1. (a) A bank maintains the following information about its customers :

- A unique customer identifier
- Name of the customer
- Account numbers of the customer (a customer can open many accounts)
- Balance in each account with the bank
- The phone number and address of the customer
- The withdrawals or deposits made in different accounts.

Perform the following tasks for the description given above :

(i) List all the entities. *2*

(ii) List the attributes of the entities. *2*

(iii) Identify relationships between/among the entities. *2*

(iv) Draw E-R diagram. *2*

(v) Convert E-R diagram to relations. *2*

(vi) List all the constraints, including primary and foreign keys. *2*

(b) Consider the following relations :

Student (id, name, phone, p_code)

Programme (p_code, title, duration, credits)

p_code is programme code.

Write the SQL commands for the following queries on the two relations given above : *4×2=8*

(i) List the id and name of all the students of Programme, whose p_code is "MCA".

(ii) Find the programmes which have more than 80 credits.

(iii) Find the number of students in each programme.

(iv) List id, name, p_code, title of all the students of the programme whose p_code is "CIT".

(c) Explain the following terms in the context of DBMS, with the help of an example for each : *10*

(i) Transaction

(ii) Locking

(iii) Checkpoint

(iv) Recovery

(v) Query cost

(d) Differentiate between the following : *8*

(i) Relational database management systems and Object oriented database management systems

(ii) Data Mining and Data Warehousing

(e) What is an update anomaly ? Explain with the help of an example. *2*

2. (a) Explain the concept of data independence, with the help of an example. *4*

(b) Explain the concept of super key, candidate key and primary key in a relational database system, with the help of an example. *6*

(c) Explain the concept of generalization and specialization in the context of E-R model, with the help of an example. *5*

(d) What are primary index and secondary index ? Which of them is more advantageous ? Explain with the help of an example for each. *5*

3. (a) Given the following relational schema :
Student (student_id, name, coursecode, coursename, marks)
with the following constraints :

- The student_id is unique for each student.
- Coursecode is unique for each course.
- A student can take many courses.
- The marks of a student in a particular course are recorded in marks attribute.

Perform the following tasks for the description given above :

(i) List all the functional dependencies, in the relation. *4*

(ii) What are the anomalies in the relation above ? Explain. *6*

(iii) Normalize the relation into 2NF and then 3NF. *5*

(b) Explain the term multi-valued dependency, with the help of an example. *5*

4. (a) Explain ACID properties of a transaction with the help of an example. *6*

(b) Explain the log-based recovery technique, with the help of an example. *8*

(c) What is a natural join operation ? Explain any one algorithm that can be used to implement join operation in a RDBMS. *6*

5. (a) Explain the following in the context of object oriented and object relational database management systems : *2+2+4=8*

(i) Complex data types

(ii) Type inheritance

(iii) Object definition language

(b) Explain the concept of multi-dimensional data in data warehouse, with the help of an example. *6*

(c) Explain the concept of classification and clustering in the context of data mining. *6*