Exam Date & Time: 29-Apr-2019 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES IV SEMESTER B.Sc.(APPLIED SCIENCES) IN ENGINEERING END SEMESTER EXAMINATION-APRIL/MAY 2019

DATABASE MANAGEMENT SYSTEMS [ICS 242]

Marks: 100

Duration: 180 mins.

Answer 5 out of 8 questions.

1)	A)	List five ways in which the type declaration system of a language such as Java or C++ differs from the data definition language used in a database.	(10)
	в)	List six major steps that you would take in setting up a database for a particular enterprise.	(6)
	C)	What must a user guarantee with respect to a transaction and database consistency? What should a DBMS guarantee with respect to concurrent execution of several transactions and database consistency?	(4)
2)	A)	Explain the following terms briefly with an example. a. Attribute b. Domain c. Entity d. Relationship e. Entity set f. Relationship set	(6)
	В)	Briefly explain the superkey, candidate key and primary key with an example.	(9)
	C)	What is a foreign key constraint? Why are such constraints important? What is referential integrity?	(5)
3)		 Answer each of the following questions briefly. The questions are based on the following relational schema: Emp(eid: integer, ename: string, age: integer, salary: real) Works(eid: integer, did: integer, pcttime: integer) Dept(did: integer, dname: string, budget: real, managerid: integer) a. Give an example of a foreign key constraint that involves the Dept relation. What are the options for enforcing this constraint when a user attempts to delete a Dept tuple? b. Write the SQL statements required to create the preceding relations, including appropriate versions of all primary and foreign key integrity constraints. c. Define the Dept relation in SQL so that every department is guaranteed to have a manager. d. Write an SQL statement to add John Doe as an employee with eid = 101, age = 32 and 	(20)

- e. Write an SQL statement to give every employee a 10 percent raise.
- ⁴⁾ What is view? Explain the types of view with an example. ⁽⁸⁾

.

- A) B)
- Briefly answer the following questions based on relational schema of Q. 3: ⁽¹²⁾ a. Suppose you have a view SeniorEmp defined as follows:

CREATE VIEW SeniorEmp (sname, sage, salary)

AS SELECT E.ename, E.age, E.salary FROM Emp E WHERE E.age > 50 Explain what the system will do to process the following query:

> SELECT S.sname FROM SeniorEmp S

WHERE S.salary > 100,000

b. Give an example of a view on Emp that could be automatically updated by updating Emp.

c. Give an example of a view on Emp that would be impossible to update (automatically) and explain why your example presents the update problem that it does.

- A company database needs to store information about employees (8) (identified by ssn, with salary and phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company. Draw an ER diagram that captures this information.
 - B) Consider an ER diagram for a Notown database. You have decided to recommend that Notown use a relational database system to store company data. Show the SQL statements for creating relations corresponding to the entity sets and relationship sets in your design. Identify any constraints in the ER diagram that you are unable to capture in the SQL statements and briefly explain why you could not express them.



Suppose you are given a relation R with four attributes ABCD. For each of ⁽²⁰⁾ the following sets of FDs, assuming those are the only dependencies that hold for R, do the following:

(a) Identify the candidate key(s) for R.

(b) Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF).(c) If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.

i. $C \rightarrow D, C \rightarrow A, B \rightarrow C$ ii. $B \rightarrow C, D \rightarrow A$ iii. ABC $\rightarrow D, D \rightarrow A$ iv. $A \rightarrow B, BC \rightarrow D, A \rightarrow C$ v. $AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B$

What is a transaction? In what ways is it different from an ordinary program ⁽⁸⁾ (in a language such as C)? Briefly explain the ACID properties?

A)

7)

6)

B) Consider the following precedence graph. Is the corresponding schedule ⁽²⁾ conflict serializable? Explain your answer.



- 5.1
- The lost update anomaly is said to occur if a transaction Tj reads a data (10) item, then another transaction Tk writes the data item (possibly based on a previous read), after which Tj writes the data item. The update performed by Tk has been lost, since the update done by Tj ignored the value written by Tk.

a. Give an example of a schedule showing the lost update anomaly.

b. Give an example schedule to show that the lost update anomaly is possible with the read committed isolation level.

c. Explain why the lost update anomaly is not possible with the repeatable read isolation level.

Briefly explain an example of actions logged during normal operation, and ⁽⁸⁾ actions performed during failure recovery.

- ^{B)} Briefly explain the Sequential file organization with example. ⁽⁵⁾
- C) Construct a B+-tree for the following set of key values:

(2, 3, 5, 7, 11, 17, 19, 23, 29, 31)

Assume that the tree is initially empty and values are added in ascending order. Construct B+-trees for the cases where the number of pointers that will fit in one node is as follows:

- a. Four
- b. Six
- c. Eight

-----End-----

A)

C)

(7)