Total No. of Printed Pages:02

T.E.(Information Technology) Semester-V (Revised Course 2016-17)
EXAMINATION FEBRUARY 2021
Database Management Systems

[Duration : Two Hours] **[Total Marks : 60]**

Instruction:
1. Answer THREE FULL QUESTIONS with ONE QUESTION FROM EACH PART.
2. Make suitable assumptions if required

Part- A

Q.1 a) What are multivalued attributes? How can they be handled within database design? **4**

b) i) Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Details of customers and cars are maintained by the insurance company. Each car has associated with it zero to any number of recorded accidents. Clearly specify cardinality and participation constraints. Make suitable assumptions if necessary **5**

ii) Convert the above ER diagram into relational model **4**

c) How does SQL allow implementation of the entity and referential integrity constraint? Illustrate with an example. **7**

Q.2 a) Draw and explain database system architecture **5**

b) Consider the following relation schema.
Student (rollno, name ,department , age)
Book (isbn, title, authors, publisher)
Borrows (rollno, isbn, date)
Write relational algebra statements for the following

i) Find the names of students who have borrowed one or more books published by "TMH" **2**

ii) Find the rollno of students who have never borrowed a book written by "Galvin" **3**

iii) Find the average age of students who have borrowed books written by "PS Gill" **3**

c) Why would you choose a database system instead of simply storing data in operating system files? When would it make sense not to use a database system **7**

Q.3 a) What is a view? how is a view defined in SQL? Why are views used? provide an example of a view that cannot be updated and explain why it cannot be updated **8**

b) Consider the following relation schema: **8**
employee (<u>person-name</u>, street , city)
works (<u>person-name</u> , company –name , salary)
company (<u>company –name</u> , city
manages (<u>person – name</u> , manager-name)

Write sql queries for the following

i) Find the names and cities of residence of all employees who work for first Bank Corporation.

ii) Give all employees of first Bank corporation a 10 percent salary raise
iii) Find the names of all employees in this database who live in the same city as the company for which they work
iv) Find the names of all employees who earn more than every employee of small Bank corporation

c) Differentiate between Tuple Relational Calculus and Domain Relational Calculus. **4**

Part- B

Q.4 a) What do you mean by Multivalued Dependency (MVD)? Briefly explain MVD's using an example relation and then normalize the relation in 4NF. **6**

b) What is a locking protocol? Describe the strict Two- phase Locking protocol **7**

c) What is Linear Hashing? How does it handle search, insert and delete? **7**

Q.5 a) What is normalization? What is the need for normalization? **6**

b) Consider the following relation **6**
Shipping (ShipName, shipType, VoyageID, Cargo, Port, Date)
The key is {ShipName, Date}
Suppose the following dependencies exist:
shipName - >ship Type
VoyagelD - > ShipName ,Cargo
ShipName, Date - > VoyageID, Port
Decompose the relation into 2 NF and 3NF

c) Describe how search, insert and delete operations work in B+ tree indexes? **8**

Q.6 a) Explain the Multiple granularity locking approach. how does it work ? **6**

b) Explain how insert and delete operations are handled in a static hash Index. Discuss how overflow pages are used , and their impact on performance **8**

c) Define the following terms **6**
i) Serializable schedule
ii) Recoverable schedule
iii) Strict schedule

Part- C

Q.7 a) Differentiate between left, right and full outer join with a suitable example. **6**

b) Explain in detail the different types of database users **5**

c) What do you understand by functional dependency in a relation? **2**

d) What is concurrency control? Explain the timestamp- based protocol **7**

Q.8 a) Differentiate between ISAM and B+ tree **6**

b) What is a trigger? Explain with an example. How is it different from an integrity constraint? What is the difference between row- level and statement –level triggers? **8**

c) What do you mean by lossless decomposition? Why is it desirable? **6**