CBCS SCHEME

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17CS53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Database Management System

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define DBMS. Explain in detail the characteristics of database approach. How does it differ from traditional file system? **(10 Marks)**

b. What are the functions of Database Administrators (DBA)? **(04 Marks)**

c. Explain the Three – Schema Architecture, with a neat diagram. **(06 Marks)**

OR

2 a. Write an E – R diagram for a banking database. Assume your own entries (minimum 5 entities), attributes and relations. Also mention cardinality ratio. **(10 Marks)**

b. Explain with neat sketch, the different phases of database design. **(10 Marks)**

Module-2

3 a. Consider the following schema for a Company database :

EMPLOYEE (Name , <u>SSN</u> , Address , Sex , Salary, DNo)
DEPARTMENT (DName , <u>DNumber</u> , MGRSSN , MGRSTARTDATE)
PROJECT (PName, <u>PNumber</u>, PLocation, DNum)
WORKS-ON (<u>ESSN</u>, <u>PNo</u>, Hours)
DEPENDENT (<u>ESSN,</u> <u>DependentName</u>, Sex, BDate, Relationship)

Write the queries in relational algebra to

i) Retrieve the name and address of all employees who work for the 'Research' department.
ii) Find the names of employees who work on all projects controlled by department number 5.
iii) List all the projects on which employee 'Smith' is working.
iv) Retrieve the names of employees who have no dependents. **(10 Marks)**

b. What is a Relation? Explain the characteristics of relations. **(10 Marks)**

OR

4 a. Explain the syntax of SELECT statement. Write the SQL query for the following relational algebra expression

$\Pi_{\text{Bdate , Address}} (\sigma_{\text{FName = 'John' AND LName = 'Smith'}} (\text{EMPLOYEE}))$. **(06 Marks)**

b. With examples, explain aggregate function in SQL. **(10 Marks)**

c. Explain how the ALTER TABLE command can be used to add and drop constraints. **(04 Marks)**

Module-3

5 a. How is a view created and dropped? What are the problems associated with updation of views? **(10 Marks)**

b. Explain the following :

i) Embedded SQL ii) Database Stored Procedures. **(10 Marks)**

OR

6 a. Explain the various steps in JDBC process by giving examples for each step. **(10 Marks)**

b. What is a Trigger? Explain with an example, how a trigger is created. **(10 Marks)**

Module-4

7 a. What is a Functional Dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. **(10 Marks)**

b. What is the need of Normalization? Explain second normal form. Consider the relation EMP_PROJ = {SSN, PNumber, Hours, EName, PName, PLocation}
Assume {SSN, PNumber} as Primary key.
The dependencies are
{SSN, PNumber} $\rightarrow$ {Hours}
SSN $\rightarrow$ {EName}
PNumber $\rightarrow$ {PName , PLocation}
Normalize the above relation into 2NF. **(10 Marks)**

OR

8 a. Explain Multivalued dependency and fourth normal form, with an example. **(10 Marks)**

b. Consider the relation schema
R = {A, B, C, D, E}. Suppose the following dependencies hold :
{E $\rightarrow$ A , CD $\rightarrow$ E , A $\rightarrow$ BC , B $\rightarrow$ D}.
State whether the following decomposition of R are lossless join decomposition or not , Justify.
i) { (A, B, C) , (A, D, E) } ii) { (A, B, C) , (C, D, E) }. **(10 Marks)**

Module-5

9 a. Explain why a transaction execution should be atomic. Explain ACID properties by considering the following transaction :

```
T1 : read (A) ;
     A : = A – 50 ;
     write (A) ;
     read (B) ;
     B : = B + 50 ;
     write (B).
```

(10 Marks)

b. Explain the Database Recovery techniques. **(10 Marks)**

OR

10 a. Draw a state diagram and discuss the typical states that a transaction goes through during execution. **(10 Marks)**

b. With an algorithm , explain two phase locking. **(10 Marks)**

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