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Siddaganga Institute of Technology, Tumakuru – 572 103

(An Autonomous Institution affiliated to VTU, Belagavi, Approved by AICTE, New Delhi)

Fifth Semester B.E. Computer Science & Engg. Examinations Feb. - Mar. 2022

Database Management Systems

Time: 3 Hours **Max. Marks: 100**

Note : 1. Answer any five questions choosing one full question from each unit.

Unit - I

1 a) Define the following:

i) Data Model ii) schema iii) Instances 3

BL:	2	CO:	1	PO:	1,2,3	PSO:	1

b) Draw the diagram for the following:

i) Three schema architecture.

ii) Component modules of DBMS and their interactions. 8

BL:	2	CO:	1	PO:	1,2,3	PSO:	1

c) Explain the advantages of using database approach each in brief. 9

BL:	2	CO:	1	PO:	1,2,3	PSO:	1

OR

2 a) Name the database interfaces. 9

BL:	2	CO:	1	PO:	1,2,3	PSO:	1

b) Explain the type of end-users with suitable example. 5

BL:	2	CO:	1	PO:	1,2,3	PSO:	1

c) Summarize the factors for "When not to use DBMS" 6

BL:	2	CO:	1	PO:	1,2,3	PSO:	1

Unit – II

3 a) Explain ER-to-Relational Mapping algorithm with suitable example for each step. 9

BL:	2	CO:	2	PO:	1,2,3	PSO:	1

b) Illustrate Binary relational algebraic operations with an example for each. 8

BL:	2	CO:	2	PO:	1,2,3	PSO:	1

c) Write the syntax for the following

i) Select ii) Project operators iii) Rename 3

BL:	1	CO:	2	PO:	1,2,3	PSO:	1

OR

4 a) Explain set theory operators in relational algebra with an example for each. 8

BL:	2	CO:	2	PO:	1,2,3	PSO:	1

b) Make use of the following COMPANY database:

EMP(Name, SSN, Salary, Super SSN, Gender, Dno.)

DEPT (DNum, DName, Mgr SSN, Dno.)

DEPENDENT(ESSN, Dep_Name, Sex)

WORKS_ON (ESSN, Pno., Hours)

PROJECT(Pname, Pnumber, Plocation,Dnum)

Please Turn Over

Construct the relational algebra queries for the following:

i. Retrieve the name, address, salary of employees who work for research department.
ii. Find the names of employees, who work with all projects controlled by department number 4.
iii. Retrieve the SSN of all employees who either in dept. Number : 4 or directly supervise an employee who work in department number : 4
iv. Retrieve the names of employees who have no departments.
v. Retrieve each department number, the number of employees in department and their average salary. 12

BL:	3	CO:	2	PO:	1,2,3	PSO:	1

Unit – III

5 a) Make use of the following relational schema:
WORKS(Pname, Cname, Salary)
LIVES(Pname, Street, City)
LOCATED_IN(Cname, City)
MANAGER(Pname, MgrName)
Build the SQL queries for the following:

i. Find the name of all persons who lives in city Bangalore.
ii. Retrieve the names of all person of "INFOSYS" whose salary is between Rs. 50000 and Rs. 60000.
iii. Find the names of all persons who lives in same city.
iv. List the names of people who work for "Tech M" along with the cities they live in.
v. Find the average salary of "INFOSYS" persons. 10

BL:	3	CO:	3	PO:	1,2,3,4,5	PSO:	1

b) Explain the following constructs used in SQL with an example for each.
i. Nested queries ii) Any two aggregate functions.
iii) Triggers iv) Views v) Any two DDL statements. 10

BL:	2	CO:	3	PO:	1,2,3,4,5	PSO:	1

OR

6 a) Explain in brief the concepts of embedded SQL with an example. 4

BL:	2	CO:	3	PO:	1,2,3,4,5	PSO:	1

b) Explain specifying the following constraints on tuples with an example for each.
i) Check ii) UNIQUE iii) NOT NULL 6

BL:	2,2	CO:	3	PO:	1,2,3,4,5	PSO:	

c) Make use of the following Employees Info table and Employee position table and construct the SQL queries.
Employee Info Table:-

Emp_ID	Emp FName	Emp LName	Dept.	Poject	Addr.	DOE	Gender
1	Sanjay	Mehra	HR	P1	HYD	1/12/1976	M
2	Ananya	Mishra	Admin	P2	DEL	2/5/1968	F
3	Rohan	Diwan	Account	P3	BOM	1/1/1980	M
4	Sonia	Kulkarni	HR	P1	HYD	2/5/1992	F
5	Ankit	Kapoor	Admin	P2	DEL	3/7/1994	M

Contd…

Employee Position Table:-

Emp ID	Emp Position	Date of Joining	Salary
1	Manager	01/05/22	50000
2	Executive	02/05/22	75000
3	Manager	01/05/22	90000
2	Lead	02/05/22	85000
1	Executive	01/05/22	300000

- Build SQL query with the help of SELECT-FROM-WHERE for the following:

i. Write a query to fetch the current date
ii. Write a query to retrieve the EmpFname and EmpLname in a single column as "FULL NAME".
iii. Write a query to fetch the number of employees working in "HR" department.
iv. Write a query to find only the address column i,e only the place name of Employee Info table.
v. Write a query to fetch the position of an employee whose name is "sanjay'. 10

BL:	2	CO:	3	PO:	1,2,3,4,5	PSO:	1

Unit – IV

7 a) Choose the relation schema:
R(A,B,C,D,E,F) and the functional dependencies A→B, C→DF, AC→E, D→F.
What is the PRIMARY KEY of this relation R?
What is the highest normal form?
Preserving the dependency, decompose R into third Normal form. 10

BL:	2	CO:	4	PO:	1,2,3,4,5	PSO:	1

b) State and prove Armstrong's inference rules. 6

2	2	CO:	4	PO:	1,2,3,4,5	PSO:	1

c) Define the following each with an example.
i) Boyee-CODD-NORMAL FORM
ii) FUNCTIONAL DEPENDENCY 4

BL:	2	CO:	4	PO:	1,2,3,4,5	PSO:	1

OR

8 a) Discuss the Informal design guidelines for relation schema with respect to Redundant information in tuples update anomalies. 6

BL:	2,2	CO:	4	PO:	1,2,3,4,5	PSO:	1

b) Make use of the following two sets FD's (Functional Dependencies) F&G for a relation R(A,B,C,D,E) and find if they equivalent?
F= {A→C, AC→D, E→AD, E→H} and G={A→CD, E→AH} 6

BL:	2	CO:	4	PO:	1.2.3.4.5	PSO:	1

c) Define MINIMAL COVER of FD's. Write an algorithm for finding a minimal cover "F" for a set of functional dependencies "E". Apply the algorithm to find minimal cover for F&G. 8

BL:	2	CO:	4	PO:	1,2,3,4,5	PSO:	1

Unit – V

9 a) What is a TRANSACTION? Name the basic transaction operations in database. 5

BL:	1	CO:	5	PO:	1,2,3,4,5	PSO:	1

b) Show the transition diagrams, by illustrating states for transaction execution. 7

BL:	2	CO:	5	PO:	1,2,3,4,5	PSO:	1

c) Illustrate ARIES RECOVERY algorithm with an example. 8

BL:	2	CO:	5	PO:	1,2,3,4,5	PSO:	1

OR

10 a) Why concurrency control is needed? Explain with respective diagrams. 9

BL:	2	CO:	5	PO:	1,2,3,4,5	PSO:	1

b) Explain basic time stamping algorithm. 4

BL:	2	CO:	5	PO:	1,2,3,4,5	PSO:	1

c) Summarize two-phase locking protocol used in concurrency control. 7

BL:	2	CO:	5	PO:	1,2,3,4,5	PSO:	1

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