P. Pages : 3   **TKN/KS/16/7439**

Time : Three Hours   *0950*   Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.

1.	a) Explain various responsibilities of DBA.	**4**
	b) Discuss the concept of Generalization and specialization.	**5**
	c) Construct E-R diagram for online book store.	**5**

OR

2.	a) List various users of DBMS & Explain its functions.	**4**
	b) What is data independence ? Write short note on physical & logical data independence.	**5**

c) Consider the relational database -   **5**
lives (person, name, street, city)
works (person_name, company_name, salary)
located_in (company_name, city)
manages (person_name, manager_name)
Write SQL to find the following:-

i) Find name, street, city of all employees who work for 'TCS' and earn more than Rs. 20,000/-

ii) Find these who live & work in the same city

iii) Find those who earn more than the average salary of all the employer in their own company.

3.	a) Differentiate between schema & Instance.	**4**
	b) What are the various operation in Relational algebra ? Explain any three with example.	**6**
	c) What is integrity constraints.	**3**

OR

4. a) Explain different types of keys that are used in RDBMS. **6**

b) Consider the following databases schema: **7**
Employee (ename, ss#, Add, Salary, Sex)
Dept (D_name, Dno, Magrss#, Mgrstart,_date)
Dept_Location (Dno, Dlocation)
Project (Pname, Pno, Plocation, Dno)
Works_On (SS#, Pno, hours)
Solve the following queries in relational Algebra
   i)   Retrieve average salary of all female employees
   ii) Retrieve the names & addresses of all employees who work in "Research Department".
   iii) For each project, List the project name and total hours per week spent on that project.
   iv) Find all employee in dept. no. 4 who work for more than 12 hours per week.

5. a) Consider the universal relation : **6**
$R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependency's
$F = \{$

$\quad AB \rightarrow C$

$\quad A \rightarrow DE$

$\quad B \rightarrow F$

$\quad F \rightarrow GH$

$\quad D \rightarrow IJ$

$\quad \}$
   i)   What is the key for relation R   ii)   Decompose R into 2NF
   iii) Decompose R into 3NF

b) Define functional dependency, Explain the rules of Inference or Armstrong axioms with **7**
supporting rules.

OR

6. a) Explain extendible hashing with an example. **6**

b) Construct a B^+ tree for the following set of key value: **7**
(2, 3, 5, 7, 11, 17, 19, 23, 29, 31)
Assume number of pointers that will fit in one node in four.

7. a) What is meant by term heuristic optimization ? Discuss the main heuristics that are applied **5**
during query optimization.

b) Let relation r_1 (A, B, C) and r_2 (C, D, E) have the following properties : r_1 has 20,000 **8**
tuples, r_2 has 45,000 tuples, 25 tuples of r_1 fit on one block, and 30 tuples of r_2 fit on one
block. Estimate the number of block transfers required using each of the following join
strategies for $r_1 \bowtie r_2$.
   i)   Nested loop join   ii)   Block nested loop join
   iii) Merge Join   iv)   Hash Join

OR

8.	a)	What is query processing ? Explain basic steps involved in query processing.	**7**
	b)	Explain pipelining & materialization with example.	**6**
9.	a)	Write short note on **any four.**	
		a) Serializability.	**3**
		b) Recoverability.	**3**
		c) Check Points.	**3**
		d) Dead Lock handling.	**4**
		e) Time Stamp based protocols.	**3**
		f) Two phase locking protocol.	**4**

<div align="center">OR</div>

10.	a)	Define transaction. Explain the atomicity, durability, isolation and consistency preservation properties of a database transaction.	**7**
	b)	Explain the working of ARIES recovery algorithm.	**6**
11.		Write short note on following **any three.**	
		a) Shadow Paging.	**4**
		b) Distributed database.	**4**
		c) Data warehousing.	**5**
		d) Web database.	**4**
		e) Data mining & its Application.	**5**

<div align="center">OR</div>

12.	a)	Describe different types of failures that occurs in the system ? How they are recovered.	**7**
	b)	What is buffering ? Explain role of operating system in buffer management.	**7**

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