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B.E. (Computer Science Engineering) Fifth Semester (C.B.S.)

Database Management Systems

P. Pages : 3 **NRJ/KW/17/4490**

Time : Three Hours * 0 4 1 4 * Max. Marks : 80

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.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Describe the overall architecture of DBMS with neat diagram. **7**

b) What are different database languages? **3**

c) Consider the relational schema
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 the name, street, city of all employees who work for 'IBM' and earn more tham Rs. 15,000/- **2**

ii) Find the name of all companies located in "Nagpur". **1**

iii) Find those who lives and works in same city. **1**

OR

2. a) List the various users of DBMS and explain its functions. Also explain the roles & responsibilities of DBA. **6**

b) Discuss the concept of Generalization & specialization. **3**

c) Consider the following schema & answer the following in SQL.
Teacher (Tid, Tname, Cid, city, sat)
Teach (Tid, Sid, Classname)
Subject (Sid, sname, duration, totlect)
Collage (Cid, cname, city, totemp)

i) Find the name of teachers who lives in Nagpur and salary is greater than 15,000/- **1**

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ii) Find all teacher who teacher 'DBMS'. **2**

iii) Find the subject name whose name ends with char 'S' and requires 50 total lectures. **1**

iv) Find the name and id of all teacher who work for 'SP' college. **1**

3. a) Define relation Algebra. Explain any three relational algebra operator with the help of example. **7**

b) Let the following relational schema be given as R (A, B, C) and S (D, E, F). Give an expression in SQL that is equivalent to following Query. **6**

a) $\pi_C(\sigma_B = 20(R))$ b) RXS

c) $\pi_B(R)$ d) $\pi_{B,\varepsilon}(\sigma_{C=D}(R \bowtie S)$

e) $\sigma\varepsilon > 20(S)$ f) $\pi_{C,F}(R \bowtie S)$.

OR

4. a) What is Referential integrity? Explain in brief. **3**

b) Explain primary key and foreign key. **4**

c) What is relational calculus? Explain domain and tuple calculus with the help of example. **6**

5. a) Define functional dependency. Explain the rules of interference or Armstrong axions with supporting rules. Compute $(ABE)^+$ and $(AB)^+$ for the relation R = (A,B,C,D,E) with following functional depend any. **8**

$\{ A \rightarrow BC$
$CD \rightarrow E$
$B \rightarrow D$
$E \rightarrow A\}$

b) What do you mean by primary and secondary indexing? Differentiate sparse and dense indexing. **5**

OR

6. a) Construct Bt tree for following set of lay value **7**
(2, 3, 5, 7, 12, 18, 20, 24, 30, 32).
Assume number of pointers that will fit in one node is four & six.

b) Explain the concept of Normalization? Consider the relational schema R = (A, B, C) with functional dependary. **6**
$f = \{ AB \rightarrow C$
$C \rightarrow A \}$

i) Determine the minimal key of R.

ii) Show that the schema R is in 3NF but not in BCNF.

7. a) What is Query processing? Explain the different phaser involved in query processing. **7**

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b) Let relation (A, B, C) and (C, D, E) have the following properties, R_1 has 20,000 tuples, r_2 has 45,000 tuples, 25 tuples of r_1 fit on one block & 30 tuple of r_2 fit on one block. Estimate the number of block transfers required using each of the following join. Strategies for $r_1 \bowtie r_2$. **6**

i) Block nested loop join.
ii) Nested loop join.
iii) Merge join.
iv) Hash join.

OR

8. a) What is query optimization? Explain Heuristic based approach. **7**

b) Explain pipelining & materialization with example. **6**

9. a) Define Transaction. Explain the ACID Properties of Transaction. **6**

b) What is locking protocol? Explain two phase locking protocol with the help of example. **7**

OR

10. a) State the reasons for the occurrence of deadlock. Suggest its prevention method. **7**

b) Explain two phase commit protocol in detail. **6**

11. a) Describe different types of failures that occurs in the system? How they are recovered. **7**

b) Explain the log based recovery algorithm in detail. **7**

OR

12. Write short notes on **any four.**

i) Data warehousing. **4**

ii) Data mining. **4**

iii) Distributed databases. **3**

iv) Check points. **3**

v) Web databases. **3**

vi) ARIES Recovery Algorithm. **3**

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