SPRING END SEMESTER EXAMINATION-2019

4th Semester B.Tech & B.Tech Dual Degree

DATABASE MANAGEMENT SYSTEM

CS-2004

(For 2018(L.E) & 2017 Admitted Batches)

Time: 3 Hours | Full Marks: 50

Answer any SIX questions.
Question paper consists of four sections-A, B, C, D.
Section A is compulsory.
Attempt minimum one question each from Sections B, C, D.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions. [1 × 10]

(a) State the difference between data, database and database management system?

(b) Differentiate between schema and instance.

(c) What is the use of data dictionary in DBMS?

(d) What is aggregation? How is it represented using ER diagram? Give example to support your answer.

(e) What are the DBMS keys? Explain in brief.

(f) Compute the outer join of the following relations r(R) and s(S).

R

A	B	C
10	42	22
30	52	33

S

C	D
22	44
11	55
22	66

(g) What is trivial functional dependency?

(h) Write the ACID properties of transactions with citing one example of "A" property.

(i) What do you mean by serializability?

(j) Define normalization and de-normalization. When can we prefer to de-normalization?

SECTION-B

2. (a) Draw and explain each block of the database management system structure. [4]

(b) An educational institute database needs to store information about faculty members (identified by faculty-id, with faculty-name, doj, and specialization as attributes); departments (identified by dept-id, with dept-name as attributes); projects (identified by proj-id, with proj-name, proj-location as attributes) and children of faculty members (with child-name and child-age as attributes). A department can have many faculty members and a faculty member can teach in more than one department. Faculty members can works on different projects. A department can have many projects and a project can belongs to at most one department. Each department is managed by one HOD, who is a faculty member. A child must be identified uniquely by name when the parent (who is a faculty member; assume that only one parent works for the institute) is known. We are not interested in information about a child one the parent leaves the institute. [4]

Answer the following questions:

a) Draw the ER diagram that captures the above information.

b) Translate the ER diagram into relations. Also identify the primary key and foreign keys.

3. (a) What do you mean by the integrity constraints? Explain each with the proper example. [4]

(b) Explain the Armstrong's Axioms and additional inference rules with the example. [4]

SECTION-C

4. Consider the following relations: [2×4]

PERSON(P_id, F_name, L_name, Occupation, Salary, City)

ORDER(O_id, P_id, Item, Quantity, Price, Order_date)

The primary keys are P_id and O_id respectively. Express the following queries in SQL and relational algebra.

a) Find the person's name and city whose name starts with S.

b) Find the person with the highest salary.

c) Find the name of person(s) who have ordered on the same date.

d) Find the name of person(s) who have not ordered any item.

5. (a) Consider the following relation R(A,B,C,D, E,F,G) with a set of functional dependencies F = {A → BC, B → CD, D → EF, BC → AG, ABG → DF} and find the canonical cover/minimal cover. [4]

(b) Given R{A, B, C, D, E, F, G, H} with FDs {A → BCDEFGH, BCD → AEFGH, BCE → ADEFGH, CE → H, CD → H}. Identify the best normal form that R satisfies (2NF/3NF/BCNF). [4]

6. (a) Construct a B-Tree of order 5 for the data items: 25, 37, 66, 45, 55, 97, 86, 17, 32, 82, 30. Redraw the tree after deleting 86 from the original B - Tree. [4]

(b) What are the different states of a transaction? Explain with the suitable diagram. [4]

SECTION-D

7. (a) What is conflict and view serializability? Consider the following non serial schedule : [4]

R1(X),R2(Y),W3(Z),W2(Y),W2(X),R1(Z),W3(Y),W2(X) and check for conflict and view serializability.

(b) Explain two-phase locking protocol with example. [4]

8. Write short notes on the following [4×2]

(a) File system Vs DBMS

(b) 4th Normal Form & 5th Normal Form

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