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**Question Paper Code: 54805**

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Fourth Semester

Information Technology

15UIT405 - DATABASE MANAGEMENT SYSTEMS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. In the E-R diagrams, the term cardinality is a synonym for the term? CO1- R  
(a) Attribute                      (b) Degree                      (c) Entities                      (d) Cartesian
2. Which is an unary operation in relational algebra? CO2- R  
(a) Selection Operation                      (b) Primitive Operation  
(c) Projection Operation                      (d) Generalized selection operation
3. Project join Normal form is also referred as ----- CO3- R  
(a) 2NF                      (b) 3NF                      (c) 4NF                      (d) 5NF
4. Which of the following is a procedure for acquiring the necessary locks for a transaction where all necessary locks are acquired before any are released? CO4- R  
(a) Record controller                      (b) Exclusive lock  
(c) Authorization rule                      (d) Two phase lock
5. Which type of file is easiest to update or modify? CO5- R  
(a) Sequential                      (b) Hashed                      (c) Indexed                      (d) Clustered

PART – B (5 x 3= 15 Marks)

6. List the components of storage manager CO1- R
7. Write a SQL query to find all the courses taught in the Summer 2009 semester CO2- R  
but not in the Winter 2010 semester.
8. What is functional dependency and Trivial functional dependency? CO3- R
9. Differentiate between strict two phase locking protocol and rigorous two phase CO4- R  
locking Protocol

10. Differentiate between Sparse and Hash Indices. CO5- R

PART – C (5 x 16= 80 Marks)

11. (a) Why would you choose a database system over file system? CO1- U (16)  
Discuss the architecture of DBMS with a neat diagram

Or

(b) Explain in detail about the E-R components for a Life insurance CO1- U (16)  
company with almost all components and explain.

12. (a) Consider the following relations: CO2- U (16)

Student(*snum*: integer, *sname*: string, *major*: string, *level*: string,  
*age*: integer)

Class(*name*: string, *meets at*: string, *room*: string, *fid*: integer)

Enrolled(*snum*: integer, *cname*: string)

Faculty(*fid*: integer, *fname*: string, *deptid*: integer)

Write a SQL Query for the following

1. Find the names of all Juniors (level = JR) who are  
enrolled in a class  
taught by Soman.

2. Find the age of the oldest student who is either a History  
major or  
enrolled in a course taught by Soman.

3. Find the names of all students who are enrolled in two  
classes that  
meet at the same time.

4. For each faculty member that has taught classes only in  
room R128,  
print the faculty member's name and the total number of  
classes she or he has taught.

Or

(b) Illustrate the uses of Embedded SQL and Dynamic SQL with CO2- U (16)  
suitable examples.

13. (a) (i) What are the three data anomalies that are likely to occur as a CO3- App (8)  
result of data redundancy? Can data redundancy be completely  
eliminated in database approach? Why or Why not?

(ii) Give a set of FDs for the relation schema  $R(A,B,C,D)$  with CO3- App (8)  
primary key  $AB$  under which  $R$  is in 2NF but not in 3NF. .

Or

- (b) Suppose you are given a relation  $R$  with four attributes  $ABCD$ . CO3- App (16)  
 For each of Consider a relation  $R$  with attributes  $ABCDE$ . Let the following FDs be given:  $A \rightarrow BC$ ,  $BC \rightarrow E$ , and  $E \rightarrow DA$ . Similarly, let  $S$  be a relation with attributes  $ABCDE$  and let the following FDs be given:  $A \rightarrow BC$ ,  $B \rightarrow E$ , and  $E \rightarrow DA$ . Identify the normal form of relation 'R' and 'S'.
14. (a) Consider a database with objects  $X$  and  $Y$  and assume that there CO4- U (16)  
 are two transactions  $T1$  and  $T2$ . Transaction  $T1$  reads objects  $X$  and  $Y$  and then writes object  $X$ . Transaction  $T2$  reads objects  $X$  and  $Y$  and then writes objects  $X$  and  $Y$ .
1. Give an example schedule with actions of transactions  $T1$  and  $T2$  on objects  $X$  and  $Y$  that results in a write-read conflict.
  2. Give an example schedule with actions of transactions  $T1$  and  $T2$  on objects  $X$  and  $Y$  that results in a read-write conflict.
  3. Give an example schedule with actions of transactions  $T1$  and  $T2$  on objects  $X$  and  $Y$  that results in a write-write conflict.
  4. For each of the three schedules, show that Strict 2PL disallows the schedule
- Or
- (b) Consider the following classes of schedules: *serializable*, *conflict-serializable*, *view-serializable*, *recoverable*, *avoids-cascading-aborts*, and *strict*. For each of the following schedules, state which of the preceding classes it belongs to. If you cannot decide whether a schedule belongs in a certain class based on the listed actions, explain briefly. The actions are listed in the order they are scheduled and prefixed with the transaction name. If a commit or abort is not shown, the schedule is incomplete; assume that abort or commit must follow all the listed actions. CO4- U (16)
1.  $T1:R(X)$ ,  $T2:R(X)$ ,  $T1:W(X)$ ,  $T2:W(X)$
  2.  $T1:W(X)$ ,  $T2:R(Y)$ ,  $T1:R(Y)$ ,  $T2:R(X)$
  3.  $T1:R(X)$ ,  $T2:R(Y)$ ,  $T3:W(X)$ ,  $T2:R(X)$ ,  $T1:R(Y)$
  4.  $T1:R(X)$ ,  $T1:R(Y)$ ,  $T1:W(X)$ ,  $T2:R(Y)$ ,  $T3:W(Y)$ ,  
 $T1:W(X)$ ,  $T2:R(Y)$

15. (a) Explain the difference between Hash indexes and B+ tree indexes. In Particular. CO5- U (16)
- Or
- (b) Briefly explain different levels of RAID. Discuss the factor to be considered in choosing a RAID level CO5- U (16)