

Roll No. \_\_\_\_\_

**ANNA UNIVERSITY**  
**UNIVERSITY DEPARTMENTS**  
**B.E./B.Tech. DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2011**  
**Computer Science and Engineering**  
**(Common to Information Technology)**  
**Third Semester (Regulations – 2008)**  
**CS9202 Database Management Systems**

Time: 3 hrs

Max. Marks : 100

**Answer ALL Questions**

**Part-A (10x2=20 Marks)**

1. Define physical data independence.
2. State any two characteristics of relations.
3. What are triggers? Mention any two applications of triggers.
4. Let  $R = (A,B)$  and  $S=(A,C)$ , and let  $r(R)$  and  $s(S)$  be relations. Write the relational algebra expression equivalent to the DRC expression  $\{ \langle a,b,c \rangle \mid \langle a,b \rangle \in r \wedge \langle a,c \rangle \in s \}$
5. List the two properties to be satisfied by the normalization process. Which of these properties is extremely critical?
6. List the Armstrong's inference rules.
7. What are cascadeless schedules? How are they achieved?
8. Name the two methods of avoiding deadlock. Write the major difference between them.
9. List four performance measures of magnetic disks.
10. Consider a file of fixed length records as shown in figure 10. Show the organization of the records after deletion of record 3.

header				
Record 0	A-102	Adyar	10000	
Record 1	A-305	Chrompet	20000	
Record 2	A-218	Guindy	25000	
Record 3	A-222	Saidapet	15000	
Record 4	A-101	Anna Nagar	50000	
Record 5	A-308	Velachery	35000	

Figure 10

**Part-B (5x16=80 Marks)**

11. (i) Describe the architecture of database system with a neat diagram. (8)
- (ii) Consider a CONFERENCE\_REVIEW database in which researchers submit their research papers for consideration. Reviews by reviewers are recorded for use in the paper selection process. The database system caters primarily to reviewers who record answers to evaluation questions for each paper they review and make recommendations regarding whether to accept or reject the paper. The data requirements are summarized as follows:
  - Authors of papers are uniquely identified by email id. First and last names are also recorded.
  - Each paper is assigned a unique identifier by the system and is described by a title, abstract, and the name of the electronic file containing the paper.
  - A paper may have multiple authors, but one of the authors is designated as the contact author.
  - Reviewers of papers are uniquely identified by email address. Each reviewer's first name, last name, phone number, affiliation and topics of interest are also recorded.

- Each paper is assigned between two and four reviewers. A reviewer rates each paper assigned to him or her on a scale of 1 to 10 in four categories. Finally each reviewer provides an overall recommendation regarding each paper.
  - Each review contains two types of written comments: one to be seen by the review committee and the other as feedback to the author(s).
- Design an ER diagram for the CONFERENCE-REVIEW database. (8)

12. (a) (i) Consider the following six relations for an order processing database application in a company:

Customer (Cust#, Cname, City)

ORDER (Order#, Odate, Cust#, Ord\_amt)

ORDER\_ITEM (Order#, Item#, Qty)

ITEM (Item#, Unit\_price)

SHIPMENT (Order#, Warehouse#, Ship\_date)

WAREHOUSE (Warehouse#, City)

Assume that an order can be shipped from several warehouses. Specify the following queries in (i) relational algebra (ii) SQL (4+8)

- List the Order# and Ship\_date for all orders shipped from Warehouse# 'W2'.
- List the Warehouse information from which the Customer named 'John Smith' was supplied his orders. Produce a listing: Order#, Warehouse#.
- Produce a listing: Cust\_Name, #\_of\_Orders, Avg\_Order\_Amount, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
- List the Order# for orders that were shipped from all warehouses that the company has in New York.

(a) (ii) Write notes on Distributed Database Systems. (4)  
(OR)

12. (b) (i) State the major difference between Integrity and Security. Discuss the various ways in which integrity is achieved. (12)

(b) (ii) Are views updatable? Discuss. Also, discuss the two main approaches used for implementing views. (4)

13. (a) (i) Consider the relation for published books: (10)

BOOK (Title, Author, Type, Price, Affil, Publisher)

Affil refers to the affiliation of the author. Suppose the following dependencies exist:

Title → Publisher, Type

Type → Price

Author → Affil

- What normal form is the relation in? Explain your answer.
- Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition.

(a) (ii) Classify the anomalies that arise due to the existence of redundant information in tuples and discuss with examples. (6)

(OR)

13. (b) (i) Explain 4NF and 5NF with an example. (10)

(b) (ii) Consider the relation schema R = (A, B, C, D, E) with the following set of functional dependencies: (2+4)

A → BC

CD → E

B → D

E → A

- List the candidate keys for R.
- Suppose that we decompose the schema into (A, B, C) and (A, D, E). Is this decomposition lossless? Justify.

14. (a) (i) Explain the properties of a transaction with suitable examples. (8)  
(a) (ii) Explain intent locking protocol and its need. (8)

(OR)

14. (b) (i) Define deadlock. Explain the deadlock recovery and deadlock prevention mechanisms. (8)  
(b) (ii) Explain Two Phase Commit Protocol. (4)  
(b) (iii) Test the following schedule for serializability. (4)

T1	T2	T3
		Read(X)
		Read(Y)
		Read(Z)
Read(X)		
Write(X)		
	Read(Y)	
	Write(Y)	
Read(Y)		
	Read(X)	
		Write(Z)

15. (a) (i) Explain the need for RAID and the different levels of RAID. (12)  
(a) (ii) Write notes on primary indices. How are secondary indices different from primary indices? (4)

(OR)

15. (b) (i) Explain the different algorithms used for selection operation and their associated cost. (12)  
(b) (ii) Write notes on static hashing. How is dynamic hashing different from static hashing? (4)