

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2014****Fifth Semester**

Branch : Computer Science and Engineering/Information Technology

DATABASE MANAGEMENT SYSTEMS (R,T)

(Old Scheme – Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

**Part A***Answer all questions.**Each question carries 4 marks.*

1. Describe the three-schema architecture.
2. Explain the concept of physical data independence, and its importance in database systems.
3. What is union compatibility? Why do the UNION, INTERSECTION, and DIFFERENCE operations require that the relations on which they are applied be union compatible?
4. Describe the four clauses in the syntax of a simple SQL retrieval query. Show what type of constructs can be specified in each of the clauses. Which are required and which are optional?
5. Draw a state diagram and discuss the typical states that a transaction goes through during execution.
6. What is a cascadeless schedule? Why is cascadelessness of schedules desirable?
7. Explain the distinctions among the terms primary key, candidate key, and superkey.
8. Use Amstrongs axioms to prove the soundness of the pseudotransitivity rule.
9. Why is data replication useful in DDBMSs? What typical units of data are replicated?
10. When are voting and elections used in distributed databases?

(10 × 4 = 40 marks)

**Part B***Answer all questions.**Each full question carries 12 marks.*

11. (a) Draw an ER diagram for a Library Management Database. Assume suitable entities? Be sure to indicate various attributes of each entity and relationship set ; also specify key and participation constraints for each relationship set.

Or

**Turn over**

- (b) Draw an ER diagram for a Hospital Management Database. Assume suitable entities? Be sure to indicate various attributes of each entity and relationship set ; also specify key and participation constraints for each relationship set.
12. (a) What is meant by relational algebra? With suitable example define all the variations of join operations. Represent the same in relational algebra.

Or

- (b) What are nested queries? What is correlation in nested queries? How would you use the operators IN, EXISTS, UNIQUE, ANY, and ALL in writing nested queries? Why are they useful? Illustrate your answer with suitable example.
13. (a) How does a query tree represent a relational algebra expression? What is meant by an execution of a query tree? Discuss the rules for transformation of query trees and identify when each rule should be applied during optimization.

Or

- (b) What is a timestamp? How does the system generate timestamps? Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?
14. (a) (i) Define fourth normal form. When is it violated? When is it typically applicable?  
(ii) Define join dependency and fifth normal form. Why is 5NF also called project-join normal form (PJNF)?

Or

- (b) Explain the concept of normalization. Consider the universal relation  $R = A, B, C, D, E, F, G, H, I, J$  and the set of functional dependencies  $F = AB \rightarrow C, BD \rightarrow EF, AD \rightarrow GH, A \rightarrow I, H \rightarrow J$ . What is the key for  $R$ ? Decompose  $R$  into 2NF and then 3NF relations.
15. (a) Discuss the architecture of a DDBMS. What are the main software modules of a DDBMS? Discuss the main functions of each of these modules in the context of the client-server architecture.

Or

- (b) Discuss about different approaches to concurrency control in DDBMS.

(5 × 12 = 60 marks)

