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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

Course Code: CS208

Course Name: PRINCIPLES OF DATABASE DESIGN (CS, IT)

Max. Marks: 100

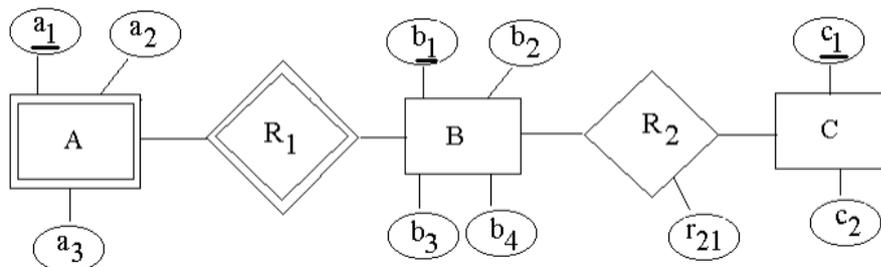
Duration: 3 Hours

Limit answers to the required points.

PART A

Answer all questions. Each carries 3 marks.

- 1 What are the responsibilities of the DBA? (3)
- 2 Define the following terms: (3)
 - i) Data model ii) Database schema iii) Meta-data
- 3 Consider the following ER diagram. Using this ER diagram create a relational database (primary keys are underlined). (3)



- 4 What are the different ways of classifying a DBMS? (3)

PART B

Answer any two questions. Each carries 9 marks.

- 5 With the help of a neat diagram explain the three-schema architecture of DBMS. (9)
- 6 Explain the following terms briefly: - (9)
 - i) Participation constraint
 - ii) Overlap constraint
 - iii) Covering constraint
- 7 Consider the following database with primary keys underlined (9)

Suppliers (sid, sname, address)

Parts (pid, pname, color)

Catalog (sid, pid, cost)

sid is the key for Suppliers, *pid* is the key for Parts, and *sid* and *pid* together form the key for Catalog. The Catalog relation lists the prices charged for parts by Suppliers.

Write relational algebra for the following queries: -

- i) Find then names of suppliers who supply some red part
- ii) Find the *sids* of suppliers who supply some red or green part
- iii) Find the *sids* of suppliers who supply some red part and some green part.

PART C*Answer all questions. Each carries 3 marks.*

- 8 What are the basic data types available for attributes in SQL? (3)
- 9 List the aggregate functions in SQL. (3)
- 10 Let $E = \{B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$ is a set of Functional Dependencies. Find a minimal cover for E. (3)
- 11 Define Boyce-Codd normal form(BCNF). Give an example of a relation that is in 3NF but not in BCNF. (3)

PART D*Answer any two questions. Each carries 9 marks.*

- 12 Consider the following relations for bank database (Primary keys are underlined):

Customer (customer-name, customer-street, customer-city)

Branch (branch-name, branch-city, assets)

Account (account-number, branch-name, balance)

Depositor (customer-name, account-number)

Loan (loan-number, branch-name, amount)

Answer the following in SQL:

- i) Create tables with primary keys and foreign keys (5)
- ii) Create an assertion for the sum of all loan amounts for each branch must be less than the sum of all account balances at the branch. (4)
- 13 Given $R(A,B,C,D,E)$ with the set of FDs, $F = \{AB \rightarrow CD, ABC \rightarrow E, C \rightarrow A\}$.
- i) Find any two candidate keys of R (3)
- ii) What is the normal form of R? Justify your answer. (6)
- 14 a) What are Armstrong's axioms? (3)
- b) Write an algorithm to compute the attribute closure of a set of attributes (X) under a set of functional dependencies (F). (3)
- c) Explain three uses of attribute closure algorithm. (3)

PART E*Answer any four questions. Each carries 10 marks.*

- 15 What are the different types of single-level ordered indices? Explain. (10)
- 16 a) What is a B⁺-tree? (2)
- b) Describe the structure of both internal and leaf nodes of a B⁺-tree of order p (8)
- 17 Differentiate between static hashing and dynamic hashing. (10)
- 18 How concurrency is controlled using Timestamp Ordering algorithm. (10)
- 19 Explain the concepts behind the following: -
- i) Log-Based Recovery (5)
- ii) Deferred Database Modification. (5)
- 20 a) What are the components of GIS? (3)
- b) Explain the characteristics of data in GIS. (3)
- c) What are the constraints in GIS? (4)
