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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: CS208

Course Name: PRINCIPLES OF DATABASE DESIGN

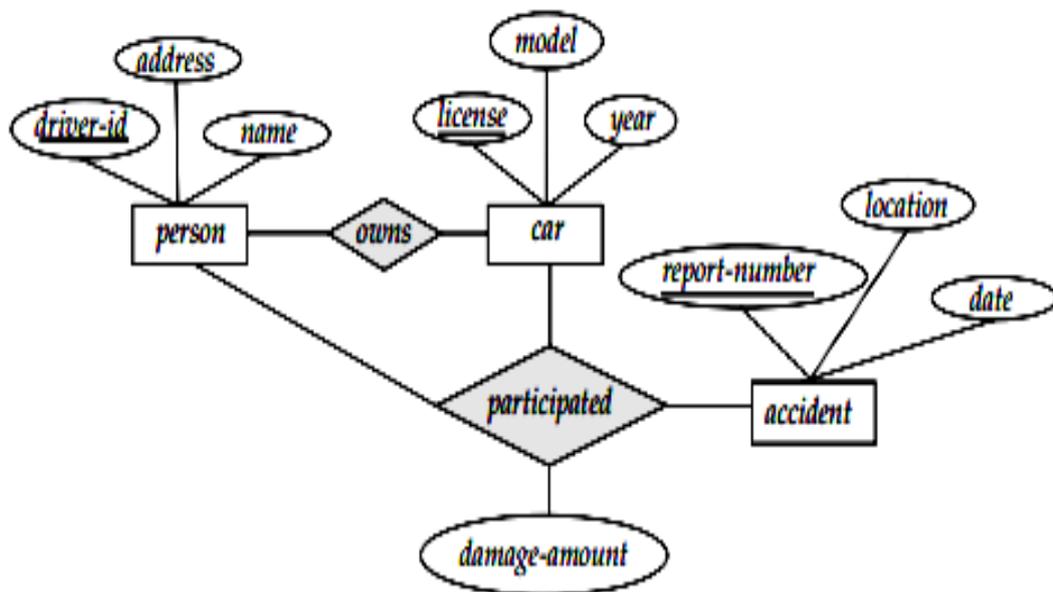
Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

- | | | Marks |
|---|--|-------|
| 1 | List three significant differences between a file-processing system and a DBMS. | (3) |
| 2 | When is the concept of weak entity used in data modelling? Define the following terms:
(i) Identifying relationship type
(ii) Owner entity type | (3) |
| 3 | Consider the relational database shown below:
employee (<u>person-name</u> , street, city)
works (<u>person-name</u> , <u>company-name</u> , salary)
company (<u>company-name</u> , city)
manages (<u>person-name</u> , <u>manager-name</u>)
Define the integrity constraints in the given relation. State the assumptions used. | (3) |
| 4 | Design a relational database corresponding to the following E-R diagram. | (3) |



PART B

Answer any two full questions, each carries 9 marks.

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|---|--|-----|
| 5 | a) Explain the characteristics of the database approach. | (3) |
| | b) Explain three schema architecture with figure. | (6) |
| 6 | a) Who all are the actors on the scene in DBMS and explain their roles? | (3) |
| | b) Explain the left outer join, right outer join and full outer join operations with examples. | (6) |

- 7 Consider the following schema: (9)
 Suppliers(sid, sname, address)
 Parts(pid, pname, colour)
 Catalog (sid, pid, cost)
 The key fields are underlined. Foreign key in Catalog are sid and pid referring to Supplier and Parts, respectively. Write the relational algebra expression for the following queries:
 (i) Find the sids of suppliers who supply some red or green part.
 (ii) Find the sids of suppliers who supply every part.
 (iii) Find the names of suppliers who supply some red part.

PART C*Answer all questions, each carries 3 marks.*

- 8 Illustrate the concept of trigger in SQL with an example. (3)
 9 Give any three examples to illustrate the schema modification statements in SQL. (3)
 10 Explain any three uses of attribute closure algorithm. (3)
 11 Consider the following set F of functional dependencies for relation schema (3)
 $R = (A, B, C, D, E)$.
 $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$
 Compute the canonical cover of F.

PART D*Answer any two full questions, each carries 9 marks.*

- 12 a) What is an assertion? (2)
 b) Write an assertion for the bank database to ensure that the assets value for the Perryridge branch is equal to the sum of all the amounts lent by the Perryridge branch. (7)
 The schema for branch and loan are shown below:
 branch(branch_name, branch_city, assets)
 loan(loan_number, branch_name, amount)
 13 a) Explain the difference between BCNF and 3NF with an example. (4)
 b) Given below are two sets of FDs for a relation R(A,B,C,D,E). Are they equivalent? (5)
 $F_1 = \{A \rightarrow B, AB \rightarrow C, D \rightarrow AC, D \rightarrow E\}$
 $F_2 = \{A \rightarrow BC, D \rightarrow AE\}$
 14 a) Give suitable example for nested sub queries. Write the advantages of nested query? (4)
 b) Suppose that we decompose the schema $R = (A, B, C, D, E)$ into (5)
 $R_1(A, B, C)$
 $R_2(A, D, E)$
 Test whether the given decomposition is a lossless-join decomposition, if the following set F of functional dependencies holds in R:
 $F = \{A \rightarrow BC, D \rightarrow E, B \rightarrow D, E \rightarrow A\}$

PART E*Answer any four full questions, each carries 10 marks.*

- 15 a) What is the main difference between a primary index and a clustering index? Give examples. (3)
 b) How does multilevel indexing improve the efficiency of searching an index file? Explain your answer. (4)
 c) Is it possible in general to have two primary indices on the same relation for different search keys? Explain your answer. (3)
 16 a) Draw the structure of a B+-tree with q-1 search values. Differentiate between internal nodes and leaf nodes of B+-tree. (5)
 b) Construct a B+-tree for the following set of key values: (5)
 (2, 3, 5, 7, 11, 17, 19, 23, 29, 31)

Assume that the tree is initially empty and values are added in ascending order. Construct B+-trees for the case where the number of pointers that will fit in one node is four.

- 17 a) What is Big Data? (3)
 b) What is the significance of Big Data in current data management scenarios? (3)
 c) How is Big Data different from traditional data sources? (4)
- 18 a) What are the different types of locks used in concurrency control? (2)
 b) How conversions of locks are achieved in concurrency control? (3)
 c) Explain how we can guarantee serializability by two phase locking protocol. (5)
- 19 a) Consider the following relations: (10)
 Instructor(IID, Iname,Iage,Idept,Isalary)
 Teaches(IID,CID, semester)
 Course(CID,Ctitle,credit)
 The foreign keys in Teaches are same as the primary key names. Perform heuristics-based query optimization on the following SQL query.
 SELECT IID
 FROM Instructor, Teaches, Course
 WHERE Instructor.IID = Teacher.IID AND Course.CID = Teaches.CID AND
 Teaches.semester = "Even" AND Course.title = "DBMS";
- 20 a) Explain the components of GIS systems. (4)
 b) What are the characteristics of data in GIS. (6)
