

Scheme of Valuation/Answer Key

(Scheme of evaluation (marks in brackets) and answers of problems/key)

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2019

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.

Marks

- 1 **High-level** or **conceptual data models** provide concepts that are close to the way many users perceive data, whereas **low-level** or **physical data models** provide concepts that describe the details of how data is stored on the computer storage media, typically database. (3)
- 2 Entity types that do not have key attributes of their own are called weak entity types. In contrast, strong entity types that do have a key attribute. (2)
Any one example. (1)
- 3 The entity integrity constraint states that no primary key value can be NULL. This is because the primary key value is used to identify individual tuples in a relation. Having NULL values for the primary key implies that we cannot identify some tuples. (3)
- 4 E1(A12,A13) (3)
E11(A111,A112,A113,A13) (Assuming A11 has 3 values)
R1 (A13, A21,RA1)
E2(A21,A22)
E3(A21,A31,A32,A33)

PART B

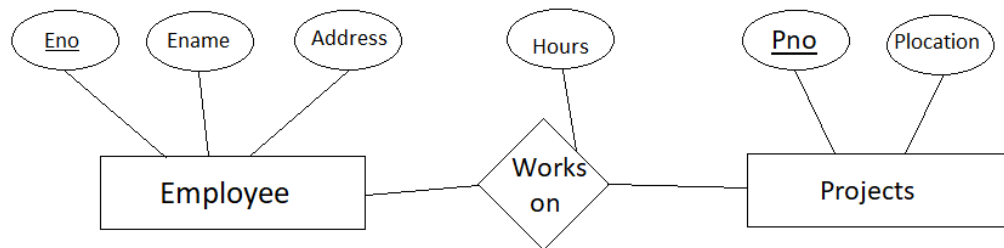
Answer any two full questions, each carries 9 marks.

- 5 a) Comparison between DML and DDL (2 Marks) (4)
Example (2 Marks)
- b) Logical data independence is the capacity to change the conceptual schema without having to change external schemas or application programs. Only the view definition and the mappings need to be changed in a DBMS that supports logical data independence. (3)

Physical data independence is the capacity to change the internal schema without having to change the conceptual schema. Hence, the external schemas need not be changed as well. Changes to the internal schema may be needed because some physical files were reorganized.

Logical data independence is harder to achieve because it allows structural and (2) constraint changes without affecting application programs—a much stricter requirement.

- 6 a) Any suitable design. (An example is given below) (9)



- b)
- 7 a) Foreign keys: (3)
 SSN in TRIP refers SALESPERSON
 TripId in EXPENSE refers TRIP
- b) Since multiple solutions do exists for them, any query that will give the correct (3)
 result can be given full marks
- c) Since multiple solutions do exists for them, any query that will give the correct (3)
 result can be given full marks

PART C

Answer all questions, each carries 3 marks.

- 8 Trigger: In many cases it is convenient to specify the type of action to be taken (1)
 when certain events occur and when certain conditions are satisfied. (2)
 Example (2)
- 9 The basic data types available for attributes include numeric, character string, bit (3)
 string, Boolean, date, and time. (3)
- 10 $A^+ = \{ABCD\}$ (3)
 A is not a candidate key.

The closure of A is not equivalent to R.

- 11 A functional dependency $X \rightarrow Y$ is a full functional dependency if removal of any attribute A from X means that the dependency does not hold anymore; that is, for any attribute $A \in X$, $(X - \{A\})$ does not functionally determine Y. A functional dependency $X \rightarrow Y$ is a partial dependency if some attribute $A \in X$ can be removed from X and the dependency still holds; that is, for some $A \in X$, $(X - \{A\}) \rightarrow Y$. (3)

Any one Example

PART D

Answer any two full questions, each carries 9 marks.

- 12 a) The given table is not in 1NF. (5)

Any decomposition that makes the given table to be in 1NF. (Not necessarily be lossless)

- b) A relation schema R is in third normal form (3NF) if, whenever a nontrivial functional dependency $X \rightarrow A$ holds in R, either (a) X is a superkey of R, or (b) A is a prime attribute of R. (4)

Boyce-Codd normal form (BCNF) was proposed as a simpler form of 3NF, but it was found to be stricter than 3NF. That is, every relation in BCNF is also in 3NF; however, a relation in 3NF is not necessarily in BCNF.

A relation schema R is in BCNF if whenever a nontrivial functional dependency $X \rightarrow A$ holds in R, then X is a superkey of R.

- 13 a) Aggregate functions of SQL (3)

- b) $M = \{A \rightarrow B, B \rightarrow C\}$ (3)

- c) A decomposition $D = \{R_1, R_2, \dots, R_m\}$ of R has the lossless (nonadditive) join property with respect to the set of dependencies F on R if, for every relation state r of R that satisfies F, the following holds, where * is the NATURAL JOIN of all the relations in D: $*(\pi_{R_1}(r), \dots, \pi_{R_m}(r)) = r$. (3)

If a decomposition does not have the lossless join property, we may get additional spurious tuples after the PROJECT (π) and NATURAL JOIN (*) operations are applied; these additional tuples represent erroneous or invalid information.

- 14 a) Key is AB (9)

2NF: R1(A,B,C,G,H), R2(A,D,E), R3(B,F)

3NF: R1A(A,B,C), R1B(C,G), R1C(G,H), R2(A,D,E), R3(B,F)

PART E

Answer any four full questions, each carries 10 marks.

- 15 a) 20000 blocks (6)
binary search : 15 block accesses
linear search : 10000 block accesses.
- b) Any example to show the improvement. (4)
- 16 Structure of internal nodes (2.5)
Structure of leaf nodes (2.5)
- 17 a) Types of problems: (10)
The Lost Update Problem.
The Temporary Update (or Dirty Read) Problem
The Incorrect Summary Problem
The Unrepeatable Read Problem.
- One example for each problem.
- 18 a) ACID properties + explanations (4)
b) Proper justification with or without example. (3)
c) **Binary Locks.** A **binary lock** can have two **states** or **values**: (3)
Shared/Exclusive (or Read/Write) Locks
Conversion (Upgrading, Downgrading) of Locks
- 19 a) Query trees (10)
SQL Query Given is referring an attribute which is not in the relation.
In the Where Condition of SQL query is using dept attribute of TEACHES Table.
But Dept attribute is not there in the TEACHES table.
(TEACHES.DEPT=INSTRUCTION.DEPT).
- 20 a) A short note on Big data (4)
b) The Semantic Web provides a common framework that allows data to be shared (3)
and reused across application, enterprise, and community boundaries.
c) The Resource Description Framework (RDF) is the format Semantic (3)
Technology uses to store data on the Semantic Web or in a semantic graph
database.
