Birla Institute of Technology and Science, Pilani

Mid-semester examination

Data management & warehousing

MPBA G506

Total marks: 50 (Closed-book examination)

Time: 4:00 pm - 5:30 pm (90 minutes)

Attempt all questions

1 For the following statements, write True/False as your answer. 5

1.1 Self Joins can be performed when there is unary relationship between entities

1.2 Together, a prime and non-prime attribute determine a non-prime attribute is a violation of the third Normal Form (3NF)

1.3 **`ON DELETE CASCADE`** is used to delete tuples of only one relation

1.4 In the E-R diagram, derived attributes are represented with braces '{}' inside the entity

1.5 Crow's-foot notation is not used as a notation for mapping cardinality.

2 Fill in the blanks for the following statements 5

2.1 In a situation where an attribute that is part of the candidate key can determine a non-prime attribute is a violation of _________ Normal Form (___NF).

2.2 Relationships treated as higher-level entities in an ER diagram is known as __________________

2.3 The PIN code is a fixed-length six-digit attribute with only specific permitted values, which is also known as ___________ of that attribute.

2.4 From the security point of view, two-tier database architecture is ______ secure compared to three-tier database architecture.

2.5 The all-or-none requirement in a relation field is known as __________.

3 For the relation R (A, B, C, D, E) 5

Calculate the normal form

FD: { $E \rightarrow A$, $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$}

4 Match the following 5

4.1 Primary key	a. Belongs to the referenced relation
4.2 Super key	b. Represented using a two-headed arrow
4.3 Foreign key	c. Represented using double ellipses in the ER diagram
4.4 Referential integrity constraint	d. Superset of candidate key attributes
4.5 Multi-valued attribute	e. Belongs to referencing relation

5 Match the following 5

5.1 Select operator	a. $\times$	A. Modifies the name of attributes/relations
5.2 Project operator	b. σ	B. Filters the attributes
5.3 Cartesian operator	c. ρ	C. Requires a predicate
5.4 Rename operator	d. Π	D. Adds spurious tuples in output relation
5.5 Join operator	e. $\bowtie$	E. Filters the tuples

6 Write only one major difference between (one/two-liners only) 5

6.1 **`varchar(n)`** and **`nvarchar(n)`** data types
6.2 Primary key and unique key
6.3 SQL's **`delete`** and **`drop`** statement
6.4 Total and partial participation
6.5 Overlapping and disjoint specialization

7 Write executable and valid SQL code for the following queries for the preexisting **`student`** table. (As succinct as possible) 5

7.1 Fetch **`student_id`** and only show missing values.
7.2 Show the **`student_id`**, **`team_name`**, and **`marks`** of students sorted as per their **`team_name`** of those students who scored more than 70 marks.
7.3 Delete the tuples where **`marks`** are less than 60.
7.4 Increase the student **`marks`** by +1 if marks <100 (Use **`update`** statement)
7.5 Display the **`student_name`** of the students where the name contains 'esh'

8 Briefly explain in only one statement the following Database system concepts. (One/Two-liners only) 5

3.1 Compatible relations
3.2 Imperative programming
3.3 Physical schema
3.4 Data dictionary
3.5 Composite candidate key

9 For the relation R (A, B, C, D, E) 5

Calculate the Minimal cover

FD: { $A \rightarrow B$, $AB \rightarrow C$, $D \rightarrow ACE$ }

10 For the following section table 5

year	semester	course_id
2017	Fall	FIN-102
2018	Spring	FIN-112
2018	Fall	CS-121
2017	Spring	MU-123
2018	Fall	CS-315
2017	Fall	CS-319
2018	Fall	MU-192
2017	Spring	PHY-311
2018	Spring	FIN-102
2018	Fall	PHY-311

Show the output relation as per the following relational algebra queries.

1. $\Pi_{course\_id} (\sigma_{semester = \text{“Fall”} \wedge year=2017} (section)) \cup \Pi_{course\_id} (\sigma_{semester = \text{“Spring”} \wedge year=2018} (section))$
2. $\Pi_{course\_id} (\sigma_{semester = \text{“Fall”} \wedge year=2017} (section)) \cap \Pi_{course\_id} (\sigma_{semester = \text{“Spring”} \wedge year=2018} (section))$
3. $\Pi_{course\_id} (\sigma_{semester = \text{“Fall”} \wedge year=2017} (section)) - \Pi_{course\_id} (\sigma_{semester = \text{“Spring”} \wedge year=2018} (section))$
4. $\Pi_{course\_id} (\sigma_{semester = \text{“Fall”} \wedge year=2018} (section)) \cup \Pi_{course\_id} (\sigma_{semester = \text{“Spring”} \vee year=2017} (section))$
5. $\Pi_{course\_id} (\sigma_{semester = \text{“Fall”} \vee year=2018} (section)) \cap \Pi_{course\_id} (\sigma_{semester = \text{“Spring”} \wedge year=2017} (section))$