

**ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER - 2007****DATABASE MANAGEMENT SYSTEM****SEMESTER - 5**

Time : 3 Hours]

[Full Marks : 70

GROUP - A**(Multiple Choice Type Questions)**

1. Choose the correct alternatives for the following :

10 × 1 = 10

i) DDL stands for

- a) data-dictionary language
- b) dictionary defined language
- c) data defined language
- d) data definition language.

ii) The entity integrity rule requires that

- a) all entries are unique
- b) a part of the key may be null
- c) foreign key values do not reference primary key values
- d) duplicate object values are allowed.

.iii) A table can be logically connected to another table by defining a

- a) hyperlink
- b) common field
- c) primary key
- d) foreign key.



- iv) In a relational data model, the columns of a table are called

a) Relation	b) Tuple
c) Degree	d) Attributes.

☐

v) One of the following four expressions of the relation algebra is not equivalent to the other three. They are all based on the relations $R(A, B)$ and $S(B, C)$. Indicate which is not equivalent to the others :

a) $\pi_{AB}(R \times S)$	
b) $R \times \pi_B(S)$	
c) $R \cap ((\pi_A(R) \times \pi_B(S)))$	
d) $\pi_{A, R, B}(R \times S).$	<input type="checkbox"/>

vi) Boyce-Codd Normal Form (BCNF) is in

a) first normal form (1 NF)	
b) second normal form (2 NF)	
c) third normal form (3 NF)	
d) every determinant is a candidate key.	<input type="checkbox"/>

vii) F covers E implies

a) every FD in E also in F^+	b) every FD of F also in E^+
c) both (a) and (b)	d) none of these.

☐

viii) Additional schema for relationship set is essential for

a) many-to-many relationship	b) many-to-one relationship
c) one-to-many relationship	d) none of these.

☐



ix) The relation $R = (A, B, C)$ and set of functional dependencies

$F = \{A \rightarrow B, B \rightarrow C\}$. R is decomposed in two different ways

$R_1 = (A, B), R_2 = (B, C)$.

This is

- a) Lossless-join decomposition b) dependency preserving
c) both of (a) and (b) d) none of these. □

x) For a B -tree of order N with n nodes is of height

- a) $(\log_2 n)$ b) $(\log_2 n)$
c) $(2 \log_2 n)$ d) $(\log_2 n^2)$. □

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.

$3 \times 5 = 15$

2. a) What is weak entity ? Explain how weak entity is converted into relation (table).
b) What is functional dependency ? What is join dependency ? $3 + 2$
3. With suitable examples, show how recovery in a database system can be done using Log Files with

- a) Immediate updation
b) Deferred updation. $2 \frac{1}{2} + 2 \frac{1}{2}$

4. What do you mean by query optimization ? Estimate the size for following disjunctive selection :

$$\sigma_{\theta_1} \vee \sigma_{\theta_2} \vee \sigma_{\theta_3} \dots \vee \sigma_{\theta_n} (r).$$

Assume size for selection condition θ_i is S_i and n_r be number of tuple of r . [OR is denoted by \vee] $2 + 3$

5. What is a view ? What is the usefulness of a view ? Write an SQL query to create view name bank with following attributes :

(accno, acname, balance). 5

6. a) Define 'meta data'. 2
b) What is the difference between 'Strong Entity set' and 'Weak Entity set' ? 3

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following questions.

3 × 15 = 45

7. a) Describe in detail the various anomalies that can occur in various normal forms upto 4th Normal Form.
- b) Write short notes on B+ Tree & B- Tree.
- c) Write short notes on de-composition and de-normalization. 5 + 5 + 5
8. a) What is two-phase locking protocol ? How does it guarantee serializability ?
- b) Distinguish between conflict and view serializability.
- c) Consider two transactions T_1 and T_2 such that :

$T_1 : R1(A) \ W1(A) \ R1(B) \ W1(B)$

$T_2 : R2(A) \ W2(A) \ R2(C) \ W2(C).$

Let schedule $S : R1(A) \ W1(A) \ R2(A) \ W2(A) \ R1(B) \ W1(B) \ R2(C) \ W2(C)$

Find out whether the given schedule S is conflict serializable or not.

- d) Discuss in brief the ACID properties of transaction in DBMS.
(A = Atomicity, C = Consistency, I = Isolation, D = Durability).

3 + 4 + 4 + 4

9. a) What do you mean by 'Ternary relationship' ?
- b) Explain the difference between Primary key, Candidate key and Super key.
- c) Draw the E-R diagram of the following :

An exhibiting organization keeps information about paintings and sculptures. Each painting has a PAINTING-NAME, PAINTER-NAME and PAINTING-DESCRIPTION. Each sculpture has a SCULPTOR-NAME, SCULPTURE-NAME and SCULPTURE-DES. Paintings and sculptures may appear in the same gallery. For the purpose of keeping track of the location of items, each painting and sculpture is given a unique identifier, ART-NO. Each gallery has an identifier, GALLERY-NO, and a size. Each gallery can store any number of art objects. Each art object appears in one gallery only. The DATEPLACED-IN-GALLERY is kept for both paintings and sculptures.

Note that PAINTING-NAME is unique within PAINTER-NAME, and SCULPTURE-NAME is unique within SCULPTOR-NAME.

2 + 3 + 10



10. Let the following relation schemas be given :

$$R = \{ A, B, C \} \text{ and } S = \{ D, E, F \}.$$

Let r is instance for schema R and s is same for S . Give the following expressions into tuple relational calculus and domain relational calculus for each :

a) $\pi_A (r)$

b) $\sigma_{B=17} (r)$

c) $\pi_{B,D} (\sigma_{C='Std' \wedge E=19} (r \times s))$

d) $r \times s$

e) $\pi_{A,F} (\sigma_{C=D} (r \times s))$

$$5 \times (1\frac{1}{2} + 1\frac{1}{2})$$

11. a) State Armstrong's three axioms.

b) Prove Union rule from Armstrong's axioms

c) Define a view and state its advantages and limitations.

$$5 + 5 + 5$$

END