FUNDAMENTALS OF RDBMS
(CSEN 3221)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) The situation where no transaction can proceed with normal execution is known as _____
(a) Road block (b) Deadlock (c) Execution halt (d) Abortion

(ii) If a transaction **T** may never make progress, then the transaction is said to be _____
(a) Deadlocked (b) Starved (c) Committed (d) Rolled back.

(iii) If a transaction may release locks but may not obtain any locks, it is said to be in _____ phase
(a) Growing phase (b) Shrinking phase
(c) Deadlock phase (d) Starved phase.

(iv) Primary indexing, secondary indexing and clustered indexing are all types of
(a) Ordered indexes (b) unordered indexes
(c) Linear index (d) relative search indexes.

(v) Which of the following is true?
(a) B + tree allows only the rapid random access
(b) B + tree allows only the rapid sequential access
(c) B + tree allows rapid random access as well as rapid sequential access
(d) B + tree allows rapid random access and slower sequential access.

(vi) In order to maintain the consistency during transactions, database provides
(a) Commit (b) Rollback (c) Flashback (d) Retain

(vii) Third normal form is based on the idea of _____
(a) Functional Dependency (b) Closure Dependency
(c) Normal Dependency (d) Transitive Dependency.

(viii) Which of the following statements about normal forms is FALSE?
(a) BCNF is stricter than 3 NF
(b) Lossless, dependency-preserving decomposition into 3 NF is always possible
(c) Loss less, dependency–preserving decomposition into BCNF is always possible
(d) Any relation with two attributes is BCNF

(ix) Which of the following makes the transaction permanent in the database?
(a) View (b) Rollback (c) Commit (d) Abort.

(x) If one attribute is determinant of second, which in turn is determinant of third, then the relation cannot be:
(a) BCNF (b) 2NF (c) 1NF (d) 3NF.

Group – B

2. (a) What are Logical & Physical data independence in RDMS?

(b) Define weak entity and strong entity in RDBMS.

(c) What is Referential integrity?

4 + 4 + 4 = 12

3. (a) What are the different types of Cardinality ratio in DBMS? Explain with suitable example.

(b) Explain simple, composite and multivalued attributes

(c) What is Relationship attribute E-R Model?

4 + 6 + 2 = 12

Group – C

4. (a) Consider the following relation and answer the following queries using Relational algebra:
Dept (**dno**, dname, total_employee, location);
Emp (Fname, MiddileName, SurName, **eid**, age, Mob, Dname, dept_id);
Find out the name of all employees who are working for Department =" Electrical".

(b) Find out the name of all employees who sit in location CB- Block.

(c) Find out the name of all employees whose age are below 45 years.

3 + 6 + 3 = 12

5. (a) Why normalization is required in Database design?

(b) Consider the following Relation (R) and its Functional dependencies.
R(θ, μ , γ, α , β),
{θ, μ} → {α},
{θ, μ} → { β },

{α}→ {γ}.
θ, μ , γ, α and β are all atomic.
Determine the candidate key/ keys.
What is the highest level of normalization in the Relation (R)? Split the relation R further to Achieve highest level of Normalization (i.e. BCNF).

(c) Explain how BCNF is better than 3NF.

4 + (1 + 3) + 4 = 12

Group – D

6. (a) Consider the following relation:
Customer (Fname, MiddileName, SurName, cust_id, age, Mob_no,Location);
What is super key? What could be the super keys (any three) of above-mentioned relation Customer?

(b) Apply your knowledge and identify the candidate key/keys.

(c) What could be the domain constraint of the attributess in the above-mentioned relation Customer?

4 + 4 + 4 = 12

7. (a) Consider the following relation:
Emp (Fname, MiddileName, SurName, **eid**, age, Mob, Dname, dept_id);
Dept (**dno**, dname, total_employee, location);
Find out the name of all employees who are above 35 years and sit in location 'CME' (use SQL).

(b) Find the records of all young employee's name and their associated department who are below 35 years (use SQL).

(c) What is view?

4 + 4 + 4 = 12

Group – E

8. (a) Consider the following schedule:
$R_1(x) \rightarrow W_1(x) \rightarrow R_1(Y) \rightarrow W_2(X) \rightarrow R_1(Z) \rightarrow W_2(Y) \rightarrow C_2 \rightarrow A_1$
Explain whether it is recoverable or not recoverable.

(b) Explain **Lost update** and **Dirty read** with suitable examples.

(c) Explain conflict serializable schedule with a suitable example?

4 + 4 + 4 = 12

9. (a) What is two phase locking protocol in Transaction scheduling?

(b) Consider the following Transaction schedule:

T1	T2

Read_Lock(Y)	Read_lock(X)
Read(Y)	Read(X)
Unlock(Y)	Unlock(X)
	Write_Lock(Y)
	Read(Y)
	Y=X+Y;
	Unlock(Y)
Write_Lock(X)	
Read(X)	
X=X+Y;	
Write(X)	
Unlock(X)	

Is there any anomaly in the above schedule?

(c) Consider the following keys:
10, 20, 65, 45, 86, 70, 95, 100, 105, 35.
Construct a **B tree** of order 3.

4 + 4 + 4 = 12

Department & Section	Submission Link
ECE & EE	https://classroom.google.com/u/1/w/Mjk1NjE2MzAzOTUx/tc/MzY0MzU5MDU2MzM4