

**BASICS OF RDBMS
(CSEN 3206)**

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) In the relational modes, cardinality is termed as
 - (a) Number of tuples
 - (b) Number of attributes
 - (c) Number of tables
 - (d) Number of constraints.
 - (ii) In a relational model, a relation means
 - (a) connector between two entities
 - (b) attribute
 - (c) table
 - (d) primary key–foreign key relation.
 - (iii) An entity set that does not have sufficient attributes to form a primary key is a
 - (a) strong entity set
 - (b) weak entity set
 - (c) simple entity set
 - (d) primary entity set.
 - (iv) In order to permanently remove all the data from the STUDENT table without changing its structure, one needs to execute:
 - (a) DROP TABLE STUDENT;
 - (b) DELETE ALL FROM STUDENT;
 - (c) DROP ALL FROM STUDENT;
 - (d) DELETE FROM STUDENT;
 - (v) The statement in SQL which allows to change the definition of a table is
 - (a) Modify
 - (b) Update
 - (c) Alter
 - (d) Create.
 - (vi) Key to represent relationship between tables is called
 - (a) Primary key
 - (b) Secondary Key
 - (c) Foreign Key
 - (d) Parent key.
 - (vii) Minimal Super Key is
 - (a) minimal key
 - (b) inferior key
 - (c) candidate key
 - (d) foreign key.
 - (viii) The ability to modify the internal schema without causing any change to external schema is
 - (a) external data independence
 - (b) logical data independence
 - (c) physical data independence
 - (d) internal data independence.

- (ix) Which of the following systems is responsible for ensuring durability?
(a) Recovery system (b) Atomic system
(c) Concurrency control system (d) Compiler system.
- (x) Which of the following SQL is syntactically correct?
(a) Select * from T1 where name in (NULL, null);
(b) Select * from T1 where name = NULL;
(c) Select * from T1 where name is NULL;
(d) All the above are syntactically correct.

Group – B

2. (a) Draw an ER diagram for a hospital management system with at least 5 entities.
(b) Give an example of converting a weak entity into table?
10 + 2 = 12
3. (a) Can a relation in a ERD have attributes? If yes, give an example; if no, justify your answer.
(b) What is three tire architecture? Why it is preferred over two tire architecture?
(c) What is mapping cardinality? Give example.
4 + (2 + 2) + 4 = 12

Group – C

4. (a) Given the following database:
Supplier(SNO, SFName, SLName, SAddr)
Parts(PID, PDetails, PColour)
Price(SNO, PID, UnitPrice)
Also given that, Price[SNO] \subseteq Supplier[SNO], Price[PID] \subseteq Parts[PID]
Write relational algebraic expression for each of the following:
(i) Find the unit prices of all the parts which are either black or red in colour.
(ii) Find the SNOs of all the suppliers who have already supplied a part that is green in colour.
(iii) List the names of all suppliers who are supplying only red coloured parts.
Find the SNOs of all the suppliers who have supplied items whose unit prices are between 2000 and 4000.
(b) Explain division operation of relational algebra with example.
(4 × 2) + 4 = 12
5. (a) Given the functional dependencies for a relation R(F1, F2, F3, F4, F5):
(A) $F1 \rightarrow \{F2, F3\}$; (B) $\{F2, F3\} \rightarrow F1, F4$; (C) $F4 \rightarrow F5$
(i) Draw functional dependency diagram.
(ii) Determine the candidate key(s).
(iii) Find the highest normal form the relation R conforms (use the definitions of normal forms only).

- (b) What is multi-valued dependency? Give an example.

$$(2 + 2 + 4) + (2 + 2) = 12$$

Group – D

6. (a) Given the following database:

Supplier(SNO, SFName, SLName, SAddr)

Parts(PID, PDetails, PColour)

Price(SNO, PID, UnitPrice)

Also given that, Price[SNO] \subseteq Supplier[SNO], Price[PID] \subseteq Parts[PID]

Write SQL for each of the following:

- (i) List all the last name of the suppliers which are 5 characters long and ends with 'P'.
- (ii) Print the details and unit prices of all white and green parts.
- (iii) Print the name of the supplier who supplies the part with maximum unit price.
- (iv) Find the number of PIDs whose unit prices are already listed.

- (b) What is referential integrity constraint?

$$(2 + 2 + 3 + 3) + 2 = 12$$

7. (a) Given the following tables:

EMP(empid, ename, sal, comm)

SALES(billno, empid, amount)

Write trigger so that whenever any record is inserted in the SALES table, 5% of the amount is to be added as commission to that employee concerned. At the same time, it has to be kept in mind that the total commission earned by the employee should never cross his/her salary. For example, if the salary of an employee is 10,000 and at this moment commission earned is 9900 and a new sale of 20,000 is made by him/her. The commission earned comes out to be 10900 (=9900+5% of 20,000). Since salary is 10,000, commission earned should be restricted to 10,000. You may write more than one triggers, if you cannot manage the job to be done by one trigger. Remember, when you are inserting a record in SALES table, the trigger updates the EMP table.

- (b) What is view?

- (c) Given the following tables:

dept(deptno, dname, loc)

emp(empno, ename, job, mgr, hiredate, sal, comm, deptno)

Create a view that displays the name, empno, hiredate, yearly salary and department name of all the employees. Assume that sal field of emp table is the monthly salary of the employee. Heading of yearly salary should be "Annual Salary".

$$6 + 2 + 4 = 12$$

Group – E

8. (a) Consider a B+ tree whose nodes contain up to 4 keys (i.e. 5 pointers). Create a B+ tree with values 47, 11, 71, 50, 24, 42, 60, 30, 35, 55, 76, 31.
- (b) What is serializability? Explain different types of serializability.
- 6 + (2 + 4) = 12**
9. (a) Consider a database with objects A and B and two transactions T1 and T2. Transactions T1 reads objects A and B and then writes object A. Transactions T2 reads objects A and B and then writes objects A and B.
- (i) Write a schedule with T1 and T2 that result in a write-read conflict.
- (ii) Write a schedule with T1 and T2 that result in a read-write conflict.
- (iii) Write a schedule with T1 and T2 that result in a write-write conflict.
- (b) An employee record has the following structure
Employee(eno:number(4), name:varchar(22), salary:number(9,2), dept:char(10));
- (i) Calculate the record size R in bytes.
- (ii) If the file has 500 records, calculate the blocking factor bfr and the number of blocks b, assuming an unspanned organization with block size B = 512 bytes.
- What is the unused space in each block and in the last block?

6 + 6 = 12

Department & Section	Submission Link
AEIE	https://classroom.google.com/c/MzE3MTQ3MDkxOTAx/a/MzY0MzE3NTUxMDU5/details