

# CBGS SCHEME

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17CS53

## Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any **FIVE** full questions, choosing **ONE** full question from each module.

### Module-1

- 1 a. Compare DBMS and early file systems , bringing out the major advantages of the database approach. (06 Marks)  
b. With a neat block diagram, explain the architecture of a typical DBMS. (10 Marks)  
c. What are the responsibilities of the DBA and the database designers? (04 Marks)

OR

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- 2 a. Define the following terms :  
i) Data model ii) Schema iii) Instance iv) Canned Transaction. (08 Marks)  
b. Draw an ER diagram to represent the Election Information System based on the following description :

In the Indian national election, a state is divided into a number of constituencies depending upon the population of the state. Several candidates contest elections in each constituency. Candidates may be from some party or independent. The election information system must record the number of votes obtained by each candidate. The system also maintains the voter list and a voter normally belongs to a particular constituency.

Note that the party details must also be taken care in the design. (12 Marks)

### Module-2

- 3 a. Define the following terms : i) Key ii) Super key iii) Candidate key  
iv) Primary key v) Foreign key. (05 Marks)  
b. Enumerate the steps involved in converting the ER constructs to corresponding relational tables. (07 Marks)  
c. Considering the schema

Sailors (sid , sname , rating , age)

Boats (bid , bname , color)

Reserves (sid , bid , day)

Write relational algebraic queries for the following :

- i) Find names of sailors who have reserved boat # 103.  
ii) Find names of sailors who have reserved a red boat.  
iii) Find names of sailors who have reserved a red or green boat.  
iv) Find names of sailors who have reserved all boats. (08 Marks)

OR

- 4 a. Explain with examples , the basic constraints that can be specified when a database table is created in SQL. (12 Marks)  
b. Write SQL queries for the following relational schema :

CUSTOMER (CID , CNAME , EMAIL , ADDR , PHONE)

ITEM (ITEM\_NO , ITEM\_NAME , PRICE , BRAND)

SALES (CID , ITEM\_NO , # ITEMS , AMOUNT , SALE\_DATE)

SUPPLIER (SID , SNAME , SPHONE , SADDR)

SUPPLY (SID , ITEM\_NO , SUPPLY\_DATE , QTY)

- i) List the items purchased by customer 'Prasanth'.
  - ii) Retrieve items supplied by all suppliers starting from 1<sup>st</sup> Jan 2019 to 30<sup>th</sup> Jan 2019.
  - iii) Get the details of customers whose total purchase of items worth more than 5000 rupees.
  - iv) List total sales amount, total items , average sale amount of all items.
  - v) Display customers who have not purchased any items.
- (08 Marks)

### Module-3

- 5 a. What are assertions and triggers in SQL? Write a SQL program to create an assertion to specify the constraint that the salary of an employee must not be greater than the salary of the department. The employee works for in the COMPANY database. (07 Marks)
- b. Write a trigger in SQL to call a stored procedure INFORM\_SUPERVISOR( ) whenever a new record is inserted or updated, check whether an employee's salary is greater than the salary of his or her direct supervisor in the COMPANY database. (07 Marks)
- c. How do you create a view in SQL? Give examples. Can you update a view table? If yes, how? If not, why not? Discuss. (06 Marks)

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**OR**

- 6 a. With real world examples, explain the following : i) JDBC ii) Correlated queries iii) Stored Procedure iv) Schema change statements in SQL. (12 Marks)
- b. Write a complete high level language program (in Java or C) to display the rows of a customer table created in oracle having < custid , custname , balance > columns with embedded SQL. (08 Marks)

### Module-4

- 7 a. What are the problems caused by insertion , updation and deletion anomalies? Discuss with an example. (06 Marks)
- b. For the below given relation R (A, B, C, D, E) and its instance , check whether the FDs given hold or not. Give reasons.
- i)  $A \rightarrow B$     ii)  $B \rightarrow C$     iii)  $D \rightarrow E$     iv)  $CD \rightarrow E$ . (04 Marks)

A	B	C	D	E
a <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>	d <sub>1</sub>	e <sub>1</sub>
a <sub>1</sub>	b <sub>2</sub>	c <sub>1</sub>	d <sub>1</sub>	e <sub>1</sub>
a <sub>2</sub>	b <sub>2</sub>	c <sub>1</sub>	d <sub>2</sub>	e <sub>3</sub>
a <sub>2</sub>	b <sub>3</sub>	c <sub>3</sub>	d <sub>2</sub>	e <sub>2</sub>

- c. Using the minimal cover algorithm , find the minimal cover for the following FDs :  $F = \{AB \rightarrow C, A \rightarrow D, BD \rightarrow C, D \rightarrow BG, AE \rightarrow F\}$ . (10 Marks)

**OR**

- 8 a. Normalize the below relation upto 3NF :

Module	Dept	Lecturer	Text
M1	D1	L1	T1
M1	D1	L1	T2
M2	D1	L1	T1
M2	D1	L1	T3
M3	D1	L2	T4
M4	D2	L3	T1
M4	D2	L3	T5
M5	D2	L4	T6

(10 Marks)

- b. Define Multi valued Dependency and Join Dependency. Explain 4NF and 5NF with examples. (10 Marks)

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**Module-5**

- 9 a. Describe the database inconsistency problems : Lost update , dirty read and blind write. (06 Marks)
- b. With a neat diagram, explain the various states of a transaction execution. (07 Marks)
- c. Check whether the below schedule is conflict serializable or not.  
{b2 , r2(X) , b1 , r1(X) , w1(X) , r1(Y) , w1(Y) , w2(X) , e1, c1, e2, c2}. (07 Marks)
- OR**
- 10 a. What is 2PL? Explain with an example. (06 Marks)
- b. How do you detect a deadlock during concurrent transaction execution? (06 Marks)
- c. Explain the various database recovery techniques, with examples. (08 Marks)

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# **Fifth Semester B.E. Degree Examination, July/August 2022**

## **Database Management System**

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

## Module-1

- 1 a. With a neat block diagram, explain the architecture of a typical DBMS. (08 Marks)

b. Define the following terms:

(i) Data Model	(ii) Schema construct	(iii) Instance
(iv) Canned Transaction	(v) Meta Data	

c. Illustrate Data Independence. Explain the types of data independence. (07 Marks)

**OR** **EWIT-LIBRARY**

2 a. Explain the different types of end users in DBMS. (04 Marks)

b. Compare the Specialization and Generalization with an example. (06 Marks)

c. Define attribute and explain the types of attributes with an example to each. (10 Marks)

OR  EWIT-LIBRARY

Module-2

- 3 a. Explain the steps to convert the basic ER model to relational database scheme with suitable example for each. (10 Marks)

b. Consider the following schema for a Company database :

EMPLOYEE (NAME , SSN , ADDRESS , SEX , SALARY, DNO, SUPERSSN, SALARY)  
DEPARTMENT (DNAME , DNO , MGRSSN , MGR\_START\_DATE)  
PROJECT (PNAME, PNO, PLOCATION, DNO)  
WORKS\_ON (SSN, PNO, HOURS)  
DEPENDENT (SSN, DEPENDENT\_NAME, SEX, BDATE, RELATIONSHIP)

Give the relational algebra expression for the following :

  - Retrieve the name of the manager who have more than two dependents.
  - Find the name of employees who work on all projects controlled by department 5.
  - Retrieve the names of employees of all employees who do not have dependent.
  - Retrieve the names of employees who gets the second highest salary.
  - Retrieve the name of employee who do not have a supervisor. (10 Marks)

OR

- 4 a. Discuss the various set theory operation used in relational algebra with an example. (10 Marks)

b. Explain the entity integrity and referential integrity constraint. Why each is considered important. Give example. (05 Marks)

c. Consider the two tables. Apply the LEFT and RIGHT OUTER JOIN operation show the result for  $T_1 \bowtie_{(T1.P = T2.A)} T_2$  and  $T_1 \bowtie_{(T1.Q = T2.B)} T_2$ .

	T <sub>1</sub>	
P	Q	R
10	a	5
15	b	8
25	a	6

	T <sub>2</sub>		
A	B	C	
10	B	6	
25	C	3	
10	B	5	

(05 Marks)

**Module-3**

- 5 a. Consider the following schema for a Library Database :
- Book (Book\_id , Title, Publisher\_Name, Pub\_year)  
 Book\_Authors (Book\_id , Author\_Name)  
 PUBLISHER (Name, Address, Phone)  
 Book\_COPIES (Book\_id , Branch\_id , No\_of\_copies )  
 Book\_LENDING (Book\_id , Branch\_id , Card\_No , Date\_out, Due\_Date)  
 LIBRARY\_BRANCH (Branch\_id , Branch\_Name, Address)
- Write SQL Queries to :
- (i) Retrieve he details of all books in the library with library\_id, tittle, Name of publisher, author, Number of copies in each branch etc.
  - (ii) Get the particulars of borrower who have borrowed more than 3 books, but from Jan 2017 to June 2017.
  - (iii) Delete a book in Book table, Update the contents of other tables to reflect this data manipulation operation.
  - (iv) Partition the Book table based on year of publication. Demonstrate its working with a simple query.
  - (v) Create a view of all books and its number of copies that are currently available in the library. (10 Marks)
- b. Explain with an example in SQL:
- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| (i) DROP command    | (ii) DELETE command | (iii) INSERT command |
| (iv) UPDATE command | (v) ALTER command   | (10 Marks)           |

**OR**

- 6 a. Define store procedure. Explain the creating and calling of stored procedure with suitable example. (08 Marks)
- b. Briefly explain types of JDBC drivers. (05 Marks)
- c. With the program segment. Explain retrieving of tuples with embedded SQL in C. (07 Marks)

**Module-4**

- 7 a. Explain the informal design guidelines used as measure to determine the Quality of relation schema design. (08 Marks)
- b. Define Normal Form. Explain 1NF, 2NF and 3NF with suitable example for each. (08 Marks)
- c. State the Armstrong inference rule. (04 Marks)

**EWIT-LIBRARY****OR**

- 8 a. What is functional dependency? Write an algorithm to find the minimal cover for set of functional dependency. Find canonical cover of F. The FD  
 $F = \{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$  (10 Marks)
- b. Consider R = (A, B, C, D, E) which is decomposed into  $R_1 = (A, B, C)$  ,  $R_2 (C, D, E)$  with FD = { $A \rightarrow BC$ ,  $CD \rightarrow E$ ,  $B \rightarrow D$ ,  $E \rightarrow A$ }  
 Show that the above decomposition of schema R is not lossless join decomposition. (10 Marks)

**Module-5**

- 9 a. Why concurrency control is needed demonstrate with example. (10 Marks)
- b. What is a transaction? Discuss the desirable properties of transactions. (05 Marks)
- c. With a neat diagram explain the state transition diagram for a transaction. (05 Marks)

**OR**

- 10 a. Briefly discuss the two-phase locking technique for concurrency control. (10 Marks)
- b. How to check conflict serializability of a schedule. Explain with an example. (10 Marks)

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17CS53

## Fifth Semester B.E. Degree Examination, Aug./Sept.2020 Data Base Management Systems

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Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. With a neat diagram, explain the components modules of DBMS and their interactions. (08 Marks)  
b. Explain the main characteristics of the database approach versus the file processing approach. (08 Marks)  
c. Define the following with example :  
i) Value set   ii) Data model   iii) Metadata   iv) Database. (04 Marks)

OR

- 2 a. List the advantages and disadvantages of DBMS. Discuss any five advantages by comparing with file system. (08 Marks)  
b. What are the structural constraints on a relationship type? Explain with an example. (06 Marks)  
c. Write a short note on Specialization and Generalization, with an example for each. (06 Marks)

### Module-2

- 3 a. Consider the following schema and write the relational algebra :  
Sailors (SID , Sname , Rating , Age)  
BOATS (BID , Bname , Color)  
RESERVE (SID , BID , Day)  
i) Retrieve the sailors name who have reserved red and green boats.  
ii) Retrieve the sailors name with age over 20 years and reserved black boat.  
iii) Retrieve the sailors name who have reserved green boat on Monday.  
iv) Retrieve the number of boats which are not reserved.  
v) Retrieve the sailors names who is the oldest sailor with rating 10. (10 Marks)  
b. List Set theory operations, used in relational data model. Explain any two with an example. (06 Marks)  
c. Define the followings :  
i) Relation state   ii) Domain   iii) Relation schema   iv) Arity. (04 Marks)

OR

- 4 a. Discuss the various types of JOIN operations with an example. Why is THETA join required? (06 Marks)  
b. Describe the steps of an algorithm for ER – to – Relational mapping. (10 Marks)  
c. Describe any two characteristics of relations with suitable example for each. (04 Marks)

### Module-3

- 5 a. How is view created and dropped? What problems are associated with updating views? (08 Marks)  
b. Consider the schema for COMPANY database :  
EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)  
DEPARTMENT (DNo, Dname, MgrSSN, MgrStartDate)  
DLOCATION (DNo, DLoc)  
PROJECT (PNo, PName, PLocation, DNo)  
WORK ON (SSN, PNo , Hours)

Write the SQL queries to :

- Make a list of all project numbers for projects that involve an employee whose last name is ‘Scott’, either as a worker or as a manager of the department that controls the project.
- Show the resulting salaries if every employee working on the ‘IOT’ project is given a 10% raise.
- Find the sum of salaries of all Employees of the ‘accounts’ departments as well as the maximum salary, the minimum salary and the average salary in this department.
- Retrieve the name of each Employee who works on all the projects controlled by department number 5 (Use NOT EXISTS Operator).
- For each department that has more than five employees, retrieve the department number and the number of its Employee who are making more than Rs 6,00,000. (12 Marks)

**OR**

- 6 a. Define Stored Procedure. Explain the creating and calling of stored procedure with suitable example. (08 Marks)  
 b. Explain three – tier architecture, with a neat diagram. (04 Marks)  
 c. Consider the schema for STUDENT database.

STUDENTS (SID, Sname, Major , GPA)

FACULTY (FID, Fname, Dept, Designation, Salary)

COURSE (CID, Cname, FID)

ENROL (CID, SID, GRADE)

Write the following query in SQL :

- Give a 15% raise to salary of all faculty.
- List all the departments having an average salary of above Rs 20,000.
- List the names of all faculty members beginning with ‘R’ and ending with letter “U”.
- List the names of students enrolled for the course ‘GS – 53’ and have received ‘A’ grade. (08 Marks)

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#### **Module-4**

- 7 a. Explain informal design guidelines for relation schemes. (06 Marks)  
 b. What is the need for normalization? Explain 1<sup>st</sup> , 2<sup>nd</sup> , 3<sup>rd</sup> normal forms, with an examples. (14 Marks)

**OR**

- 8 a. Find the minimal cover of F.D.  
 $E : \{B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$ . (06 Marks)  
 b. Consider R(A, B, C, D) with FD = {A → B, B → C, C → D}.  
 i) Find the key ii) Indicate the highest normal form and convert the relation into BCNF. (08 Marks)  
 c. Write an algorithm to find the closure of ‘X’ and ‘F’. (06 Marks)

#### **Module-5**

- 9 a. Explain the desirable properties of a transactions. (08 Marks)  
 b. Explain with a neat diagram, the state transition diagram for a transaction. (08 Marks)  
 c. What is two phase locking? Describe with the help of an example. (04 Marks)

**OR**

- 10 a. Why concurrency control is needed demonstrate with example? (10 Marks)  
 b. When deadlock and starvation problems occurs? Explain how these problems can be resolved? (10 Marks)

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17CS53

## Fifth Semester B.E. Degree Examination, June/July 2023 Database Management System

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Explain the characteristics of the Database approach. (08 Marks)  
b. Discuss any three advantages of using an DBMS approach. (06 Marks)  
c. Explain Three Schema Architecture. Why do we need mappings between Schema levels? (06 Marks)

**OR**

- 2 a. List and explain the various notations used in an ER diagram. (08 Marks)  
b. Discuss the various cases where use of a NULL Value would be appropriate. (06 Marks)  
c. Define the following with an example for each :  
i) Value set      ii) Multivalued Attributes      iii) Database      iv) Total participation  
v) Partial Participation      vi) Cardinality Ratio. (06 Marks)

### Module-2

- 3 a. From the tables “R” and “S”, find the following : i)  $R \cup S$       ii)  $R \cap S$       iii)  $S - R$   
iv)  $R \bowtie_{R.SNo = S.SNo} S$       v)  $R \bowtie_{R.SNo = S.SNo} S$       vi)  $R \bowtie_{R.Dept = S.Dept} S$  (06 Marks)

R		S	
S.No.	Dept	S.No	Dept
S1	CSE	S10	Maths
S2	ISE	S3	Chemistry
S3	Chemistry	S15	PSy
S4	Electronics	S16	Eng

- b. Explain SELECT and PROJECT Operations in relational Algebra. (06 Marks)  
c. What are the basic data types available for attributes in SQL? Explain each of them. (08 Marks)

**OR**

- 4 a. Consider the following schema :  
SUPPLIERS (Sid, Sname , address)  
PARTS (Pid , Pname , color)  
CATALOG (Sid, Pid , cost)  
Write the following SQL Queries :  
i) Find the Sids of the Suppliers who supply some red part or are at “Belagavi”.  
ii) Find the Sids of Suppliers who supply some red and some green part.  
iii) Find pairs of Sids such that Supplier with the first Sid charges more for some part than the Supplier with the second Sid. (06 Marks)  
b. Discuss Entity integrity and referential integrity constraints. (06 Marks)  
c. Explain the steps to convert the basic ER model to relational database schema. (08 Marks)



### Module-3

- 5 a. Define the term Stored Procedure. Explain creating and calling of Stored procedures with suitable notations. (10 Marks)  
b. Explain Impediment Mismatch problem. (05 Marks)  
c. What are views in SQL? Explain. (05 Marks)

**OR**

- 6 a. What are the components of JDBC Architecture? Describe four different alternatives for JDBC drivers. (10 Marks)  
 b. Explain the concepts of SQLJ. (05 Marks)  
 c. Explain the advantages of three tier application architecture. (05 Marks)

**Module-4**

- 7 a. Write an algorithm for finding minimal cover F for a set of Functional Dependencies E. (05 Marks)  
 b. Explain 1NF , 2NF and 3NF Normal Forms. (09 Marks)  
 c. Given a relation R = {A, B, C, D, E, H} and having the following FDs.  
 $F = \{ \{A \rightarrow BC\}, \{C, D \rightarrow E\}, \{E \rightarrow C\}, \{D \rightarrow A, E, H\}, \{A, B, H \rightarrow B, D\}, \{D, H \rightarrow B, C\} \}$ . Find the key for relation R with FD F. Normalize upto 3NF. (06 Marks)

**OR**

- 8 a. Explain Informal Design Guidelines for Relational Schemas. (08 Marks)  
 b. Explain BCNF Normal Form. (06 Marks)  
 c. A set of FDs for relation R {A, B, C, D, E, F} are  $AB \rightarrow C$  ,  $C \rightarrow A$  ,  $BC \rightarrow D$  ,  $ACD \rightarrow B$  ,  $BE \rightarrow C$  ,  $EC \rightarrow FA$  ,  $CF \rightarrow BD$  ,  $D \rightarrow E$ . Find an irreducible cover for this set of FD's. (06 Marks)

**Module-5**

- 9 a. Explain ACID properties of transactions. (04 Marks)  
 b. Explain Transaction support in SQL. (06 Marks)  
 c. Consider the three transactions  $T_1$ ,  $T_2$  and  $T_3$  and the schedules  $S_1$  and  $S_2$  given below. Draw the serializability (precedence) graphs for  $S_1$  and  $S_2$  and state whether each schedule is serializable or not. If a schedule is serializable , write down the equivalent serial schedule (S).

$T_1 : r_1(X) ; r_1(Z) ; w_1(X) ;$   
 $T_2 : r_2(Z) ; r_2(Y) ; w_2(Z) ; w_2(Y) ;$   
 $T_3 : r_3(X) ; r_3(Y) ; w_3(Y) ;$   
 $S_1 : r_1(X) ; r_2(Z) ; r_1(Z) ; r_3(X) ; r_3(Y) ; w_1(X) ; w_3(Y) ; r_2(Y) ; w_2(Z) ; w_2(Y) ;$   
 $S_2 : r_1(X) ; r_2(Z) ; r_3(X) ; r_1(Z) ; r_2(Y) ; r_3(Y) ; w_1(X) ; w_2(Z) ; w_3(Y) ; w_2(Y) ;$  (10 Marks)

**OR**

- 10 a. Describe the Shadow Paging recovery technique. (04 Marks)  
 b. Explain Strict2PL Protocol. (06 Marks)  
 c. Consider the below Figure 1(a) and (b) :

T <sub>1</sub>
read_item (X) ; $X := X - N ;$ write_item (X) ; read_item (Y) ; $Y := Y + N ;$ write_item (Y) ;

T <sub>2</sub>
read_item (X) ; $X := X + M ;$ write_item (X) ;



Figure 1 : (a) Transaction T<sub>1</sub> (b) Transaction T<sub>2</sub>.

List all the possible schedules for transaction T<sub>1</sub> and T<sub>2</sub> and determine which are conflict serializable (Correct) and which are not. (10 Marks)

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17CS53

## Fifth Semester B.E. Degree Examination, Feb./Mar. 2022 Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Define DBMS. Explain in detail the characteristics of database approach. How does it differ from traditional file system? (10 Marks)  
b. What are the functions of Database Administrators (DBA)? (04 Marks)  
c. Explain the Three – Schema Architecture, with a neat diagram. (06 Marks)

OR

- 2 a. Write an E – R diagram for a banking database. Assume your own entries (minimum 5 entities), attributes and relations. Also mention cardinality ratio. (10 Marks)  
b. Explain with neat sketch, the different phases of database design. (10 Marks)

### Module-2

- 3 a. Consider the following schema for a Company database :  
EMPLOYEE (Name , SSN , Address , Sex , Salary, DNo)  
DEPARTMENT (DName , DNumber , MGRSSN , MGRSTARTDATE)  
PROJECT (PName, PNumber, PLocation, DNum)  
WORKS-ON (ESSN, PNo, Hours)  
DEPENDENT (ESSN, DependentName, Sex, BDate, Relationship)  
Write the queries in relational algebra to  
i) Retrieve the name and address of all employees who work for the ‘Research’ department.  
ii) Find the names of employees who work on all projects controlled by department number 5.  
iii) List all the projects on which employee ‘Smith’ is working.  
iv) Retrieve the names of employees who have no dependents. (10 Marks)  
b. What is a Relation? Explain the characteristics of relations. (10 Marks)

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OR

- 4 a. Explain the syntax of SELECT statement. Write the SQL query for the following relational algebra expression  
 $\Pi_{Bdate, Address} (\sigma_{FName = 'John' \text{ AND } LName = 'Smith'} (\text{EMPLOYEE}))$ . (06 Marks)  
b. With examples, explain aggregate function in SQL. (10 Marks)  
c. Explain how the ALTER TABLE command can be used to add and drop constraints. (04 Marks)

### Module-3

- 5 a. How is a view created and dropped? What are the problems associated with updation of views? (10 Marks)  
b. Explain the following :  
i) Embedded SQL      ii) Database Stored Procedures. (10 Marks)

**OR**

- 6 a. Explain the various steps in JDBC process by giving examples for each step. (10 Marks)  
 b. What is a Trigger? Explain with an example, how a trigger is created. (10 Marks)

**Module-4**

- 7 a. What is a Functional Dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. (10 Marks)  
 b. What is the need of Normalization? Explain second normal form. Consider the relation  $\text{EMP\_PROJ} = \{\text{SSN}, \text{PNumber}, \text{Hours}, \text{EName}, \text{PName}, \text{PLocation}\}$ . Assume  $\{\text{SSN}, \text{PNumber}\}$  as Primary key. The dependencies are  
 $\{\text{SSN}, \text{PNumber}\} \rightarrow \{\text{Hours}\}$   
 $\text{SSN} \rightarrow \{\text{EName}\}$   
 $\text{PNumber} \rightarrow \{\text{PName}, \text{PLocation}\}$   
 Normalize the above relation into 2NF. (10 Marks)

**EWIT-LIBRARY****OR**

- 8 a. Explain Multivalued dependency and fourth normal form, with an example. (10 Marks)  
 b. Consider the relation schema  $R = \{A, B, C, D, E\}$ . Suppose the following dependencies hold :  
 $\{E \rightarrow A, CD \rightarrow E, A \rightarrow BC, B \rightarrow D\}$ . State whether the following decomposition of R are lossless join decomposition or not, Justify.  
 i)  $\{(A, B, C), (A, D, E)\}$       ii)  $\{(A, B, C), (C, D, E)\}$ . (10 Marks)

**Module-5**

- 9 a. Explain why a transaction execution should be atomic. Explain ACID properties by considering the following transaction :  
 $T_1 : \text{read}(A);$   
 $A := A - 50;$   
 $\text{write}(A);$   
 $\text{read}(B);$   
 $B := B + 50;$   
 $\text{write}(B).$  (10 Marks)  
 b. Explain the Database Recovery techniques. (10 Marks)

**OR**

- 10 a. Draw a state diagram and discuss the typical states that a transaction goes through during execution. (10 Marks)  
 b. With an algorithm, explain two phase locking. (10 Marks)

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17CS53

## Fifth Semester B.E. Degree Examination, Jan./Feb.2021 Database Management System

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Discuss the main characteristics of the database approach and how it differs from traditional file systems? (08 Marks)  
b. What are the different types of database end users? Discuss the main activities of each. (06 Marks)  
c. Describe the three schema architecture? (06 Marks)

**OR**

- 2 a. Design an ER diagram for company database with atleast four entities. (08 Marks)  
b. What is meant by Recursive relationship type? Give some example of recursive relationship type. (06 Marks)  
c. What is Generalization? Illustrate how it is helpful with an example. (06 Marks)

### Module-2

- 3 a. Discuss the characteristics of relation that make them different from ordinary tables. (08 Marks)  
b. Discuss DIVISION operation. Find the quotient for the following :  $A/B_1$ ,  $A/B_2$  and  $A/B_3$ ; where  $A$ ,  $B_1$ ,  $B_2$  and  $B_3$  are

SNo.	PNo.
$S_1$	$P_1$
$S_1$	$P_2$
$S_1$	$P_3$
$S_1$	$P_4$
$S_2$	$P_1$
$S_2$	$P_2$
$S_3$	$P_2$
$S_4$	$P_2$
$S_4$	$P_4$

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$B_1 =$	PNo. $P_2$

B <sub>2</sub> =	
PNo.	$P_2$
	$P_4$

B <sub>3</sub> =	
PNo.	$P_1$
	$P_2$
	$P_4$

(08 Marks)  
(04 Marks)

- c. Explain the basic datatypes available for attributes in SQL.

**OR**

- 4 a. Explain the steps to convert the basic ER model to Relational Database Schema? (10 Marks)  
b. For the following relations for a book club :  
MEMBERS (member-id, Name, Designation, Age)  
BOOKS (Bookid, BookTitle, Book-Author, Book-Publisher, Book-price)  
RESERVES (Member-id, Book-id, Date)

Write the SQL queries,

- (i) Find the names of members who are professors older than 45 years.
- (ii) List the titles of books reserved by professors.
- (iii) Find ID's of members who have not reserved books that cost more than Rs.500.
- (iv) Find the authors and titles of books reserved on 27-May-2017.
- (v) Find the names of members who have reserved all books. (10 Marks)

**Module-3**

- 5 a. What are the components of the JDBC architecture? Describe four different architectural alternatives for JDBC drivers. (10 Marks)
- b. Why are stored procedures important? How do we declare stored procedure and how they called from application code? (05 Marks)
- c. Explain the impedance mismatch between host Languages and SQL. (05 Marks)

**OR**

- 6 a. What is a three tier architecture? What advantages it offer over single tier and two tier architectures? Give a short overview of the functionality at each of the three tiers. (10 Marks)
- b. What is SQLJ and how it is different from JDBC? (05 Marks)
- c. What is CGI and what problems does it address? (05 Marks)

**Module-4**

- 7 a. Explain an Informal design guidelines for a relational schema design. (08 Marks)
- b. What do you understand by attribute closure? Give an example. (04 Marks)
- c. Consider the following relations for published books"
- Book (Book\_title, Author\_Name, Book\_type, List\_Price, Author\_Application, Publisher)
- Suppose the following dependencies exists
- Book\_Title → Publisher, Book\_Type
- Book\_Type → List\_price
- Author\_Name → Author\_Affiliation.
- (i) What normal form is the relation in? Explain your answer.
- (ii) Apply normalization until you cannot decompose the relations further, state the reasons behind each decomposition. (08 Marks)

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- 8 a. A set of functional dependencies for the relation R{A, B, C, D, E, F} is AB→C, C→A, BC→D, ACD→B, BE→C, EC→FA, CF→BD, D→E. Find minimal cover for this set of functional dependencies. (10 Marks)
- b. Define fourth normal form? When is it violated? Why is it useful? (06 Marks)
- c. Why is the domain key normal form (DKNF) known as ultimate normal form? (04 Marks)

**Module-5**

- 9 a. Explain the desirable properties of transaction. (08 Marks)
- b. Describe the four levels of isolation in SQL. (06 Marks)
- c. What is the two phase locking protocol? How does it Guarantee serializability? (06 Marks)

**OR**

- 10 a. What is a time stamp? How does the system generates time stamps? (06 Marks)
- b. Describe the actions taken by the recovery manager during checkpointing. (06 Marks)
- c. Explain shadow paging with an example. (08 Marks)

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# CBGS SCHEME

USN

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17CS53

## Fifth Semester B.E. Degree Examination, July/August 2021 Database Management System

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $42+8=50$ , will be treated as malpractice.
- 1 a. Define DBMS. Discuss the advantages of DBMS over traditional file system. (06 Marks)  
b. What are the responsibilities of DBA and Database Designers? (04 Marks)  
c. With an aid of a neat diagram, describe a Three – Schema Architecture and Data Independence. (10 Marks)
  - 2 a. What are Structural constraints on a relation type? Explain with examples. (05 Marks)  
b. What is a Weak Entity type? Explain the role of partial key in design of weak entity type. (05 Marks)  
c. Design an ER – Diagram for a UNIVERSITY database schema and indicate all key and cardinality constraints. (10 Marks)
  - 3 a. List and explain characteristics of Relations. (05 Marks)  
b. List Set theory operations used in relational data model. Explain any two with examples. (05 Marks)  
c. Briefly discuss the different type of Update Operations on relational database. Show an example of a violation of the referential integrity in each of the update operations. (10 Marks)
  - 4 a. Explain the following SQL commands : CREATE , INSERT , SELECT and UPDATE. Give their syntax and atleast one example for each. (14 Marks)  
b. Write the SQL statement for the :
    - i) Show the resulting salaries if every employees working on the ‘Product X’ project is given a 10% raise.
    - ii) Retrieve all employees in department 5. Whose salary is between \$ 30,000 and \$ 40,000.
    - iii) Retrieve the name and address of all employees who work for the ‘Research’ department. (06 Marks)
  - 5 a. Explain how the group by clause works. What is the difference between the WHERE and HAVING clause? (05 Marks)  
b. What is a View? Explain how view’s are created and dropped. (05 Marks)  
c. Explain with an example constraints as Assertions and Actions as trigger. (10 Marks)
  - 6 a. What is a CURSOR? Explain with example, retrieving multiple tuples with embedded SQL. (10 Marks)  
b. Explain the concept of Create, Passing parameter, Call stored procedure from JDBC. (10 Marks)
  - 7 a. Briefly explain the informal design guidelines used as measure to determine the quality of relations schema design. (08 Marks)  
b. Define the 1NF, 2NF and 3NF with a suitable example for each. (12 Marks)

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- 8 a. Write an Algorithm to find a minimal cover for a set of functional dependencies. (06 Marks)  
b. Find the minimal cover of G : The given set of FDs be G : { $A \rightarrow BCDE$  ,  $CD \rightarrow E$ }. (04 Marks)  
c. Define Multi – valued dependency. Explain 4NF with an example. (10 Marks)
- 9 a. Discuss ACID properties of a database transaction. (04 Marks)  
b. Explain the following with suitable example :  
i) The lost update problem    ii) The Temporary update (dirty read) problem. (06 Marks)  
c. What is Schedule? Explain Conflict Serialization schedule with example. (10 Marks)
- 10 a. Briefly explain the two phase locking protocol used in concurrency control. (10 Marks)  
b. Explain the following with an example :  
i) NO – UNDO / REDO Recovery based on deferred update.  
ii) Shadow paging. (10 Marks)

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