

# CBCS SCHEME

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## Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Database Management System

Max. Marks: 80

Time: 3 hrs.

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

### Module-1

1. a. What are the responsibilities of the DBA and Database Designer? (06 Marks)
- b. With neat diagram, explain "three schema Architecture". (05 Marks)
- c. Discuss the different types of user friendly interfaces and the types of user who typically use each. (05 Marks)

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OR

2. a. Explain with block diagram the different phases of database design. (08 Marks)
- b. Draw an ER-Diagram of movie database. Assume your own entities (minimum 4) attributes and relationships. (08 Marks)

### Module-2

3. a. Discuss the characteristics of relations. (06 Marks)
- b. Outline the steps to convert the basic ER Model to relational Database schema. (06 Marks)
- c. Define the following: (04 Marks)
  - i) Relation state
  - ii) Relation schema
  - iii) Arity
  - iv) Domain.

OR

4. a. Discuss the various types of set theory operations with example. (08 Marks)
- b. Consider the two tables, show the results of the following:

T <sub>1</sub>		
A	B	C
10	a	5
15	b	8
25	a	6

T <sub>2</sub>		
P	Q	R
10	b	6
25	c	3
10	b	5

i)  $T_1 \setminus T_2$   $\nabla$   
 $T_1 \cdot B = T_2 \cdot Q$

ii)  $T_1 \setminus T_2$   $\nabla$   
 $T_1 \cdot A = T_2 \cdot P$

iii)  $T_1 \setminus T_2$   $\nabla$   
 $(T_1 \cdot A = T_2 \cdot P) \text{ AND } (T_1 \cdot C = T_2 \cdot R)$

iv)  $T_1 - T_2$

(08 Marks)

**Module-3**

- 5 a. How does SQL implement the entity integrity constraints of the relational data model?  
 Explain with an example. (04 Marks)
- b. Discuss: i) Shared variables ii) Communication variables. (06 Marks)
- c. Explain with examples in SQL:  
 i) Drop command  
 ii) Delete command  
 iii) Update command. (06 Marks)

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**OR**

- 6 a. With program segment, explain retrieving of tuples with embedded SQL in C. (06 Marks)
- b. Consider the following tables:  
 works (Pname, Cname, Salary)  
 lives (Pname, Street, City)  
 located-In (Cname, City)  
 write the following queries in SQL:  
 i) List the names of the people who work for the company 'Wipro' along with the cities they live in.  
 ii) Find the names of the persons who do not work for 'Infosys'.  
 iii) Find the people whose salaries are more than that of all of the 'oracle' employees.  
 iv) Find the persons who works and lives in the same city. (10 Marks)

**Module-4**

- 7 a. What do you mean by closure of attribute? Write an algorithm to find closure of attribute. (06 Marks)
- b. Explain any two informal quality measures employed for a relation schema design. (04 Marks)
- c. Given below are two sets of FDs for a relation R (A, B, C, D, E). Are they equivalent?  
 i)  $A \rightarrow B$ ,  $AB \rightarrow C$ ,  $D \rightarrow AC$ ,  $D \rightarrow E$  (06 Marks)  
 ii)  $A \rightarrow BC$ ,  $D \rightarrow AE$

**OR**

- 8 a. What do you mean by multivalued dependency? Explain the 4NF with example. (06 Marks)
- b. Suggest and explain three different techniques to achieve INF using suitable example. (04 Marks)
- c. Consider the following relation for CARSALE (CAR-NO, Date-Sold, Salesman No, Commission, Discount)  
 Assume a car can be sold by multiple salesman and hence primary key is {CAR\_No, Salesman\_No}.  
 Additional dependencies are  
 $\text{Date\_Sold} \rightarrow \text{Discount}$   
 $\text{Salesman\_No} \rightarrow \text{Commission}$   
 i) Is this relation in 1NF, 2NF or 3NF? Why or why not?  
 ii) How would you normalize this completely? (06 Marks)

**Module-5**

(04 Marks)

- 9 a. Discuss the ACID properties of a transaction.  
 b. What are the anomalies occur due to interleaved execution? Explain them with example. (06 Marks)

- c. Consider the three transactions  $T_1$ ,  $T_2$  and  $T_3$  and schedules  $S_1$  and  $S_2$  given below. Determine whether each schedule is serializable or not? If a schedule is serializable write down the equivalent serial schedule (S).

$T_1 : R_1(x); R_1(z); W_1(x);$   
 $T_2 : R_2(x); R_2(y); W_2(z); W_2(y);$   
 $T_3 : R_3(x); R_3(y); W_3(y);$

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$S_1 : R_1(x); R_2(z); R_1(z); R_3(x); R_3(y); W_1(x); W_3(y); R_2(y); W_2(z); W_2(y);$   
 $S_2 : R_1(x); R_2(z); R_3(x); R_1(z); R_2(y); R_3(y); W_1(x); W_2(z); W_3(y); W_2(y);$

(06 Marks)

**OR**

- 10 a. Describe the problems that occur when concurrent execution uncontrolled. Give examples. (06 Marks)
- b. What is two phase locking? Describe with the help of an example. (04 Marks)
- c. What is Deadlock? Consider the following sequences of actions listed in the order they are submitted to the DBMS.  
Sequence S1:  $R_1(A); W_2(B); R_1(B); R_3(C); W_2(C); W_4(B); W_3(A)$   
Draw waits-for graph in case of Deadlock situation. (06 Marks)

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# CBCS Scheme

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Fifth Semester B.E. Degree Examination, June/July 2018

## Database Management Systems

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Max. Marks: 80

Time: 3 hrs.

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. (04 Marks)  
b. Describe the three – schema architecture. Why do we need mappings among schema levels? (04 Marks)  
c. Discuss various components of a DBMS, with a neat diagram. (08 Marks)

**OR**

- 2 a. Define an Entity and Attribute. Explain the different types of attributes that occur in an ER – diagram model, with an example. (06 Marks)  
b. Draw an ER – diagram of an Airline reservation system, taking into account at least five entities. Indicate all keys, constraints and assumptions that are made. (10 Marks)

### Module-2

- 3 a. Explain the data types available for attribute specification in SQL. (04 Marks)  
b. Explain briefly violations in entity integrity constraint, key and referential integrity constraints, with example. (06 Marks)  
c. Consider the following RESORT database,  
RESORT (resortno, resortname, resorttype, resortaddr, resortcity, numsuite)  
SUITE(suite no, resortno, suiteprice)  
RESERVATION (reservationno, resortno, visitorno, checkin, checkout, totalvisitor, suiteno)  
VISITOR (visitorno, firstname, lastname, visitoraddr)  
i) Write the SQL to list full details of all the resorts on Los Angeles.  
ii) Write the SQL to list full details of all the resorts having number of suites more than 30.  
iii) Write the SQL to list visitors in ascending order by firstname. (06 Marks)

**OR**

- 4 a. Explain how constraints are specified in SQL during table creation, with suitable example. (04 Marks)  
b. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course : (06 Marks)

STUDENT (SSn, Name, Major, bdate)  
COURSE (Courseno, Cname, dept)  
ENROLL (SSn, Courseno, Quarter, grade)  
BOOK\_ADOPTION (Courseno, Quarter, book\_isbn)  
TEXT (book\_isbn, book\_title, Publisher, Author)

Write the following queries in relational algebra on the database schema :

- i) List the number of courses taken by all students named John Smith in winter 2009 (i.e. Quarter = WO9).  
ii) Produce a list of text books (include courseno, book\_isbn, book\_title) for courses offered by the ‘CS’ department that have used more than two books.  
iii) List any department that has all its adopted books published by ‘Pearson’ publishing.  
c. Give an example of mapping of generalization or specialization into relation schemas. (06 Marks)

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.

Module-3

- 5 a. Discuss how each of the following constructs is used in SQL and discuss the various options for each construct :  
 i) Nested Queries ii) Aggregate functions iii) Triggers iv) Views and their updatability v) Schema change statements vi) Group by and having clause. (06 Marks)
- b. Draw and explain 3 – tier Architecture and technology relevant to each tier. Write the advantages of 3 – tier architecture. (06 Marks)
- c. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts? (04 Marks)

OR

- 6 a. What is Dynamic SQL and how is it different from Embedded SQL? (04 Marks)
- b. What is SQL J and how is it different from JDBC? (04 Marks)

c. Consider the following company database :

EMP (Name, Ssn, Salary, Superssn, dno)  
 DEPT (dnum, dname, mgrssn)  
 DEPT\_LOC (dnum, dlocation)  
 PROJECT (Pname, Pnumber, Plocation, dnum)  
 WORKS\_ON (Essn, Pno, Hours)

DEPENDENT (Essn, dept\_name, sex)

Write SQL queries for the following :

- i) Retrieve the names of all employees who work in the department that has the employee with the highest salary among all employees.
- ii) Retrieve the names of employees who make atleast 10,000 more than the employee who is paid the least in the company.
- iii) A view that has the employee name, supervisor name and employee salary for each employee who works in the 'Research' department.
- iv) A view that has the project name, controlling department name, number of employees and total hours worked per week on the project for each project with more than one employee working on it. (08 Marks)

Module-4

- 7 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? (04 Marks)
- b. Illustrate with examples. (06 Marks)
- c. Define Multivalued dependency. Explain fourth normal form, with an example. (06 Marks)
- c. Consider the Universal relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and the set of functional dependencies  $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$ . What is key of R? Decompose R into 2NF and then 3NF relations. (06 Marks)

OR

- 8 a. Define Non – additive join property of a decomposition and write an algorithm of testing for non – additive join property. (04 Marks)
- b. A relation  $R(A, C, D, E, H)$  satisfies the following FDs :  $A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H$ . Find the Canonical cover for this set of FD's. (06 Marks)
- c. Consider two set of functional dependencies :  
 $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$  and  $G = \{A \rightarrow CD, E \rightarrow AH\}$ . Are they equivalent? (06 Marks)

**EWIT-LIBRARY****Module-5**

- 9 a. Discuss ACID properties of a database transaction. (04 Marks)  
b. Explain transaction support in SQL. (06 Marks)  
c. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)
- 10 a. What is two – phase locking protocol? How does it guarantee serializability? (04 Marks)  
b. What is Serializability? How can serializability be ensured? Do you need to restrict concurrent execution of transaction to ensure serializability? Justify your answer. (06 Marks)  
c. Discuss the time – stamp ordering protocol for concurrency control. (06 Marks)

**OR**

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## Fifth Semester B.E. Degree Examination, June/July 2019 Database Management System

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

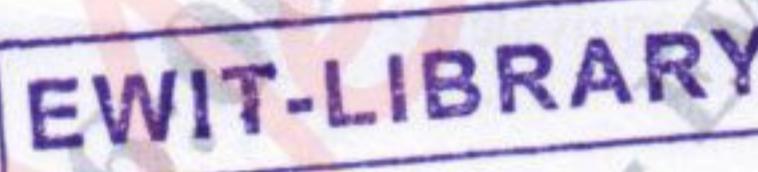
- 1 a. Define DBMS. Discuss the advantages of DBMS over the traditional file system. (08 Marks)  
b. Explain the component modulus of DBMS and their interaction, with the help of a diagram. (08 Marks)

**OR**

- 2 a. Define the following with an example :  
i) Weak entity type      ii) Participation constraints  
ii) Cardinality ratio      iv) Recursive relationship. (08 Marks)  
b. Draw an ER diagram of Banking system taking into account atleast five entities, indicate all keys, constraints and assumptions that are made. (08 Marks)

### Module-2

- 3 a. What is meant by Integrity Constraint? Explain the importance of referential integrity constraint. How referential integrity constraint is implemented in SQL? (08 Marks)  
b. Consider the following Movie database ;  
Movie (Title , director , Myear , Rating)  
Actors (Actor , Aage)  
Acts (Actor , title)  
Directors (Director , dage)  
Write the following queries in relational algebra on the database given ;



- i) Find movies made by "Hanson" after 1997.  
ii) Find all actors and directors.  
iii) Find "Coen's" movie with "Mc Dormand".  
iv) Find (director , actor) pairs where the director is younger than the actor. (08 Marks)

**OR**

- 4 a. Discuss insulation , deletion and modification anomalies. Why are they considered bad? Illustrate with an example. (08 Marks)  
b. Write the SQL queries for the following relational schema ;  
Sailors (Sid , Sname , Rating, Age)  
Boats (Bid , Bname , color)  
Reserve (Sid , Bid , Day)  
i) Retrieve the Sailor's name who have reserved red and green boat.  
ii) Retrieve the no : of boats which are not reserved.  
iii) Retrieve the Sailors name who have reserved boat number 103.  
iv) Retrieve the Sailors name who have reserved all boats. (08 Marks)

### Module-3

- 5 a. How are triggers and assertions defined in SQL? Explain. (08 Marks)  
b. How are views created and dropped? Explain how the views are implemented and updated. (08 Marks)

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.

**OR**

- 6 a. Explain the Single – tier and Client – server architecture, with a neat diagram. (08 Marks)  
 b. Explain the following :  
     i) Embedded SQL      ii) Database stored procedure. (08 Marks)

**Module-4**

- 7 a. Which Normal form is based on the concept of transitive functional dependency? Explain the same with an example. (08 Marks)

- b. What is the need for normalization? Consider the relation :

$\text{Emp-proj} = \{\text{SSn, Pnumber, Hours, Ename, Pname, Plocation}\}$ .

Assume  $\{\text{SSn, Pnumber}\}$  as primary key.

The dependencies are ;

$\{\text{SSn, Pnumber}\} \rightarrow \text{Hours}$

$\text{SSn} \rightarrow \text{Ename}$

$\text{Pnumber} \rightarrow \{\text{Pname, Plocation}\}$

Normalize the above relation to 3NF.

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(08 Marks)

**OR**

- 8 a. What is Functional Dependency? Find the minimal cover using the minimal cover algorithm for the following functional dependency.

$F = \{\text{AB} \rightarrow D, \text{B} \rightarrow C, \text{AE} \rightarrow B, \text{A} \rightarrow D, \text{D} \rightarrow EF\}$ . (08 Marks)

- b. Consider two sets of functional dependency.

$F = \{\text{A} \rightarrow \text{C}, \text{AC} \rightarrow \text{D}, \text{E} \rightarrow \text{AD}, \text{E} \rightarrow \text{H}\}$  and  $G = \{\text{A} \rightarrow \text{CD}, \text{E} \rightarrow \text{AH}\}$ .

Are they equivalent?

(08 Marks)

**Module-5**

- 9 a. Discuss the ACID properties of a database transaction. (04 Marks)  
 b. Why Concurrency control is needed? Demonstrate with an example. (12 Marks)

**OR**

- 10 a. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)

- b. Discuss the time – stamp ordering protocol for concurrency control. (05 Marks)

- c. Explain how shadow paging helps to recover from transaction failure. (05 Marks)

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

Time: 3 hrs.

Max. Marks: 80

*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. Explain the component module of DBMS and their interactions with the help of neat diagram.

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**OR**

- 2 a. Draw an ER-diagram for AIRLINE database schema with atleast five entity types and specify primary key and structural constraints and weak entity type. (10 Marks)  
b. Define the following terms:  
i) Weak entity type  
ii) Degree of a relationship type  
iii) Role names and recursive relationship. (06 Marks)

### Module-2

- 3 a. Discuss the different types of update operations on relational database. Explain how the basic operations deals with constraint violations. (08 Marks)  
b. Explain the data types available for attribute specification in SQL. (08 Marks)

**OR**

- 4 a. Consider the two tables  $T_1$  and  $T_2$ . Show the results of the following operations:

$T_1$		
P	Q	R
10	a	5
15	b	8
25	a	6

$T_2$		
A	B	C
10	b	6
25	c	3
10	b	5

- i)  $T_1 \triangleright \Delta_{T_1.P=T_2.A} T_2$   
ii)  $T_1 \triangleright \Delta_{T_1.Q=T_2.B} T_2$   
iii)  $T_1 \bowtie_{T_1.P=T_2.A} T_2$   
iv)  $T_1 \triangleright \Delta_{T_1.Q=T_2.B} T_2$   
v)  $T_1 \triangleright \Delta_{(T_1.P=T_2.A \text{ AND } T_1.R=T_2.C)} T_2$

(10 Marks)

- b. Explain Unary relational operations with an example. (06 Marks)

**Module-3**

- 5 Consider the following schema of order database  
**SALESMAN** (Salesmanid, name, city, commission);  
**CUSTOMER** (Custid, custname, city, grade, salesmanid);  
**ORDERS** (Ordno, purchaseamt, orddate, custid, salesmanid);  
Write SQL queries for the following:  
i) Find the name and numbers of all salesman who had more than one customer.  
ii) Count the customers with grade above Bangalore's average.  
iii) List all the salesman details whose first name is 'John'.  
iv) List all salesman and indicate those who have and don't have customers in their cities (Use UNION operation).  
v) Use the delete operation by removing salesman with id = 2000.
- (16 Marks)

**OR**

- 6 a. Explain three-tier architecture with neat diagram. (08 Marks)  
b. Define stored procedure. Explain creating and calling of stored procedure with an example. (08 Marks)

**EWIT-LIBRARY****Module-4**

- 7 a. Define normal form. Explain 1NF, 2NF and 3NF with suitable example. (08 Marks)  
b. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with example. (08 Marks)

**OR**

- 8 a. Explain the four informal guidelines that may be used as measures to determine the quality of relation schema design. (08 Marks)  
b. Write an algorithm for finding a minimal cover 'F' for a set of functional dependencies 'E'. Find the minimal cover for the given set of FD's  
G: {A → BCDE, CD → E} (08 Marks)

**Module-5**

- 9 a. Discuss the atomicity, durability, isolation and consistency preserving properties of a database transaction. (08 Marks)  
b. Why concurrency control is needed demonstrate with example? (08 Marks)

**OR**

- 10 a. Discuss Two-Phase Locking Technique for concurrency control. (10 Marks)  
b. Explain NO-UNDO/REDO Recovery based on deferred update. (06 Marks)

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## Fifth Semester B.E. Degree Examination, Aug./Sept.2020 Database Management System

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Discuss the advantages of using the DBMS approach. (06 Marks)
- b. Explain three-schema architecture with a neat diagram. Why do we need mapping between schema levels? (06 Marks)
- c. What is Data Independent? Explain different types of Data Independence. (04 Marks)

**OR**

- 2 a. Explain the component modules of DBMS and their interaction with a neat diagram. (06 Marks)
- b. Explain different types of attributes that occur in ER model with an example. (06 Marks)
- c. Design a ER diagram for keeping track of information about Bank database taking into account atleast four entities. (04 Marks)

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### Module-2

- 3 a. Discuss the characteristics of relations that make them different from ordinary tables and files. (08 Marks)
- b. Explain the steps to convert the basic ER model to relational database schema. (08 Marks)

**OR**

- 4 a. What are the basic data types available for attributes in SQL? Explain with example. (06 Marks)
- b. Define foreign key. Explain all possible options that can be specified when a referential integrity constraint is violated. (04 Marks)
- c. Write the SQL syntax with example for the following :  
(i) ALTER      (ii) INSERT      (iii) UPDATE (06 Marks)

### Module-3

- 5 a. Explain the following with an example.  
(i) Correlated nested queries  
(ii) Assertions. (06 Marks)
- b. Explain aggregate functions in SQL with example. (04 Marks)
- c. Consider the following tables:

WORKS(Pname, Cname, Salary)

LIVES(Pname, Street, City)

LOCATED\_IN(Cname, City)

MANAGER(Pname, Mgrname)

Write the SQL Query for the following :

- (i) Retrieve the names of the people who work for Wipro along with the address they live in.
- (ii) Retrieve the name of the person who gets second highest salary.
- (iii) Find the number of employee and average salary of each company. (06 Marks)

OR

- 6 a. Explain the following with an example:  
 (i) Cursor  
 (ii) Database Stored Procedure. (08 Marks)
- b. Explain the Standard Three-Tier Architecture and list the advantages. (08 Marks)

**Module-4**

- 7 a. What is Functional Dependency? Explain the inference rules for functional dependency with proof. (08 Marks)
- b. Define 1NF, 2NF and 3NF by taking an example. (08 Marks)

OR

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- 8 a. Write an algorithm to find a minimal cover for a set of functional dependencies. (04 Marks)
- b. Find the closure sets with respect to F.  
 $F = \{ssn \rightarrow \{\text{Ename}, \text{Bdate}, \text{Address}, \text{Dnumber}\}, \text{Dnumber} \rightarrow \{\text{Dname}, \text{Dmgr\_ssn}\}\}$  (04 Marks)
- c. Which normal form is based on the concept of multivalue functional dependency? Explain the same with example. (08 Marks)

**Module-5**

- 9 a. What are the problems faced when concurrent transactions are executed in an uncontrolled manner? Give an example and explain. (06 Marks)
- b. With a neat diagram explain the states for transaction execution. (06 Marks)
- c. Briefly explain the desirable properties of transactions. (04 Marks)

OR

- 10 Write a note on : (08 Marks)
- a. Timesamp ordering  
 b. NO-UNDO/REDO recovery algorithm. (08 Marks)

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15CS53

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

Time: 3 hrs.

Max. Marks: 80

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

- 1 a. Describe the various advantages of using the DBMS approach. (08 Marks)  
b. Describe the three schema architecture. Why do we need mappings among schema level? How do different schema definition languages support this architecture? (08 Marks)
- 2 a. Describe the component modulus of a DBMS and their interactions with block diagram. (08 Marks)  
b. What is the significance of role names in the relationship? In what situation role names are essential? Explain with example. (08 Marks)
- 3 a. Describe the three main categories of constraints on database. Explain with example. (08 Marks)  
b. Briefly describe the steps involved in ER – to relational mapping algorithm. (08 Marks)
- 4 a. Describe the characteristics of Relations with examples. (08 Marks)  
b. Consider the following COMPANY relational schema as shown below:  
EMPLOYEE (Ename, SSn, Sex, Salary, Super\_SSn, Dno)  
DEPARTMENT (Dname, Dnumber, Mgr\_SSn)  
DEPT\_LOCATIONS (Dnumber, Dlocations)  
PROJECT (Pname, Pnumber, Plocations, Dnum)  
WORKS\_ON (ESSn, Pno, Hours)  
DEPENDENT (ESSn, Dependent\_name, Sex, Relationship)  
Give expression in relational algebra for each of the following queries.  
i) Make a list of project numbers for project that involve an employee whose last name is "Smith", either as a worker or as a manager of the department that controls the project.  
ii) Find the names of employees who work on all the projects controlled by department number 5.  
iii) Retrieve the names of employees who have no dependents.  
iv) List the names of managers who have atleast one dependent. (08 Marks)
- 5 a. Consider the COMPANY relation schema given in Q.No. 4(b). give an expression in SQL for each of the following queries :  
i) Retrieve the department name and number located in every locations in which 'Research' department is located.  
ii) For each department that has more than five employees, retrieve the department number and number of employees who are making more than Rs 27000.  
iii) List the names of Managers who have atleast one dependent.  
iv) Retrieve the names of each employee who has a dependent with the same first name and same sex as the employees. (08 Marks)  
b. Describe how constraints can be specified as Assertions and Actions as Triggers in SQL. (08 Marks)

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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.

**OR**

- 6 a. Explain the impedance mismatch between host language and SQL and describe how cursors address this. (08 Marks)
- b. Why are stored procedures important? How do we declare stored procedure and how are they called from application code? (08 Marks)

**EWIT-LIBRARY****Module-4**

- 7 a. Explain Second and Third normal forms with examples. How BCNF is stronger than 3NF? Explain. (08 Marks)
- b. Write the algorithm for finding a key K for R given a set of functional dependencies F. Consider  $R(A, B, C, D, E)$  with a set of FD's  $A \rightarrow BC$ ,  $BC \rightarrow AD$ ,  $D \rightarrow E$ . Find key for R and state its highest normal form. Give Reasons. (08 Marks)

**OR**

- 8 a. Explain informal design guidelines for relation schema. Give example. (08 Marks)
- b. Let  $R = \{SSn, Ename, Pnumber, Pname, Plocation, Hours\}$  and  $D = \{R_1, R_2, R_3\}$ . Where  $R_1 = EMP = \{SSn, Ename\}$ ,  $R_2 = PROJ = \{Pnmber, Pname, Plocation\}$ ,  $R_3 = WORKS\_ON = \{SSn, Pnumber, Hours\}$ . The following functional dependencies hold on R  
 $F = \{SSn \rightarrow Ename, Pnumber \rightarrow \{Pname, Plocation\}, \{SSn, Pnumber\} \rightarrow Hours\}$ . Prove that the above decomposition of relation R has lossless join property. (08 Marks)

**Module-5**

- 9 a. Explain the problems that occur when concurrent execution is uncontrolled. Give example. (08 Marks)
- b. Describe transaction support in SQL. Give example. (08 Marks)

**OR**

- 10 a. Describe the problems of deadlock and starvation and the different approaches to dealing with these problems. Explain with example. (08 Marks)
- b. Discuss the immediate update recovery techniques in both single - user and multiuser environments. What are the advantages and disadvantages of this recovery techniques? (08 Marks)

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# CBCS SCHEME

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15CS53

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

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. What do you mean by Database Management System? Explain the various advantages of using a Database Management System. (10 Marks)  
b. Describe the three schema architecture with block diagram. Why do we need mappings between schema levels? (06 Marks)

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OR

- 2 a. Explain DBMS component modules along with a neat diagram. (10 Marks)  
b. Define Entity , Entity set, Attribute with respect to ER model. List different types of attributes along with their symbols. (06 Marks)

### Module-2

- 3 a. Discuss the Entity integrity and Referential integrity constraints. Why is each considered important? (06 Marks)  
b. Discuss the following relational algebra operations. Illustrate with an example for each : JOIN , DIFFERENCE , SELECT , UNION. (10 Marks)

OR

- 4 a. Give the E.R to relational mapping algorithm. Discuss each step with an example. (10 Marks)  
b. Explain the following in SQL :  
i) Unspecified WHERE – clause and use of the Asterisk.  
ii) Explicit sets and NULLS.  
iii) Renaming attributes and joined tables. (06 Marks)

### Module-3

- 5 a. Considered the following relations for a database that keeps track of business trips of sales persons in a sale office.  
SAILORS (SID, SNAME , RATING , AGE)  
BOATS (BID , BNAME, COLOR)  
RESERVES (SID , BID , DAY).  
Specify the following queries in SQL.  
i) Find the names of sailors who have reserved a red or a green boat.  
ii) Find the names of sailors who are older than the oldest sailors with a rating of 10.  
iii) Find sailors whose rating is better than same sailor called “Ramesh”. (10 Marks)  
b. How does SQL allow implementation of general integrity constraints? (06 Marks)

OR

- 6 a. Describe the concept of a cursor and how it is used in embedded SQL. (06 Marks)  
b. Explain the term stored procedure and give examples why stored procedures are useful. (05 Marks)  
c. What are the differences between JDBC and SQLJ? (05 Marks)

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.

**Module-4**

- 7 a. Explain any two informal quality measures employed for a relational schema design. (04 Marks)  
b. Explain 1NF , 2NF and 3NF with an example for each. (12 Marks)

**OR**

- 8 a. Define Multivalued dependency. Explain 4NF, with an example. (08 Marks)  
b. Define JOIN dependency. Explain 5NF, with an example. (08 Marks)

**Module-5**

- 9 a. Briefly explain the two phase locking protocol used in concurrency control. (08 Marks)  
b. What is Schedule? Illustrate with an example. (05 Marks)  
c. What is Shadow paging scheme? Where it is used? (03 Marks)

**OR**

- 10 a. Discuss the ACID properties of the database transaction. (04 Marks)  
b. What is Time stamping? Explain a mechanism of concurrency control that uses time stamping with the help of an example. (08 Marks)  
c. Write a note on Write ahead log protocol. (04 Marks)

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# CBCS SCHEME

USN

15CS53

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

Time: 3 hrs.

Max. Marks: 80

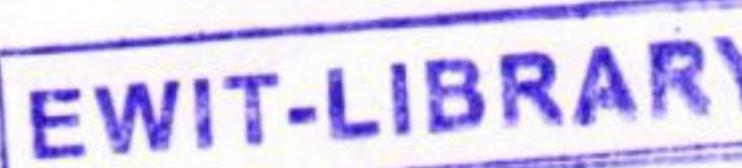
**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. What is database? What are the advantages of using DBMS approach? (08 Marks)  
b. With a neat diagram, explain “three schema architecture”. (08 Marks)

**OR**

- 2 a. Explain the following :  
i) Composite versus Simple attributes  
ii) Single Valued Versus Multivalued attributes  
iii) Stored versus Derived attributes  
iv) Null values. (08 Marks)  
b. Write an ER diagram for Hotel Management System considering atleast 4 entities. (08 Marks)



### Module-2

- 3 a. Explain the three basic update operations on relations with example for each. (08 Marks)  
b. Explain the Relational Algebra Operations from set Theory. (08 Marks)

**OR**

- 4 a. Consider the following schema and write relational algebra expressions for the queries given below :  
Employee (Fname, Minit, Lname, SSN, Bdate, Address, Sex, Salary, Super\_ SSN, Dno)  
Department (Dname, Dnumber, Mgr\_ SSN, Mgr\_Start\_date)  
Dept\_Location (Dnumber, Dlocation)  
Project (Pname, PNumber, Plocation, Dnum)  
Works\_ON(ESSN, Pnumber, Hours)  
Dependent (ESSN, Dependent\_name, Sex, Bdate, Relationship).  
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 the projects controlled by department number 5.  
iii) Retrieve the names of employees who have no dependents.  
iv) List the names of employees with two or more dependents. (08 Marks)  
b. Explain the different constraints that can be applied on database with example. (08 Marks)

### Module-3

- 5 a. Considering the same schema given in question 4a write the following queries in SQL.  
i) Retrieve the birth data and address of the employee(s) whose name is ‘Joh. B. Smith’.  
ii) For each employee, retrieve the employee’s first and last name and the first and last name of his/her immediate supervisor.  
iii) Retrieve all employees whose address is in Houston, Texas.  
iv) Retrieve all employees in department 5 whose salary is between \$30,000 and \$40,000  
v) Retrieve the names of all employees who do not have supervisors. (10 Marks)  
b. What is a view? Explain with example how views are created and dropped. (06 Marks)

**OR**

- 6 a. What is JDBC? Explain the various JDBC classes and interfaces. (08 Marks)  
b. What are Assertions and Triggers? Explain with example how Assertions and Triggers are created. (08 Marks)

**Module-4**

- 7 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with example. (08 Marks)  
b. Define functional dependency. Explain the inference rules for functional dependency. (08 Marks)

**OR**

- 8 a. Which normal form is based on the concept of multivalued functional dependency? Explain the same with example. (08 Marks)  
b. Define Boyce Codd Normal Form. Explain with example. Why BCNF is considered as stricter than 3NF. (08 Marks)

**Module-5****EWIT-LIBRARY**

- 9 a. Explain the desirable properties of transactions. Also explain different transaction states. (08 Marks)  
b. Explain two phase locking techniques for concurrency control. (08 Marks)

**OR**

- 10 a. Explain recovery techniques based on deferred update. (08 Marks)  
b. Explain shadow paging database recovery concept. Also mention catastrophic failures. (08 Marks)

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

Time: 3 hrs.

Max. Marks : 80

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

Module-1

- 1 a. Define DBMS. Discuss the advantages of DBMS over the traditional file system. (08 Marks)  
 b. Explain the component modulus of DBMS and their interaction, with the help of a diagram. (08 Marks)

OR

- 2 a. Define the following with an example :  
 i) Weak entity type  
 ii) Participation constraints  
 iii) Cardinality ratio  
 iv) Recursive relationship. (08 Marks)  
 b. Draw an ER diagram of Banking system taking into account atleast five entities, indicate all keys, constraints and assumptions that are made. (08 Marks)

Module-2

- 3 a. Discuss the Entity integrity and Referential integrity constraints. Why is each considered important? (06 Marks)  
 b. Discuss the following relational algebra operations. Illustrate with an example for each : JOIN, DIFFERENCE, SELECT, UNION. (10 Marks)

OR

- 4 a. Give the E.R to relational mapping algorithm. Discuss each step with an example. (10 Marks)  
 b. Explain the following in SQL :  
 i) Unspecified WHERE – clause and use of the Asterisk.  
 ii) Explicit sets and NULLS.  
 iii) Renaming attributes and joined tables. (06 Marks)

Module-3

- 5 a. How are triggers and assertions defined in SQL? Explain. (08 Marks)  
 b. How are views created and dropped? Explain how the views are implemented and updated. (08 Marks)

OR

- 6 a. Explain the Single – tier and Client - server architecture, with a neat diagram. (08 Marks)  
 b. Explain the following :  
 i) Embedded SQL  
 ii) Database stored procedure. (08 Marks)

Module-4

- 7 a. Explain any two informal quality measures employed for a relational schema design. (04 Marks)  
b. Explain 1NF, 2NF and 3NF with an example for each. (12 Marks)

OR

- 8 a. Define Multivalued dependency. Explain 4NF, with an example. (08 Marks)  
b. Define JOIN dependency. Explain 5NF, with an example. (08 Marks)

Module-5

- 9 a. Why Concurrency control is needed demonstrate with example? (12 Marks)  
b. Discuss the desirable properties of transactions. (04 Marks)

OR

- 10 a. When deadlock and starvation problem occurs? Explain how these problems can be resolved. (09 Marks)  
b. Explain how shadow paging helps to recover from transaction failure. (07 Marks)

# CBCS Scheme

USN



15CS53

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Database Management Systems

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

1. a. Explain the main characteristics of the database approach versus the file processing approach. (08 Marks)
- b. Explain the three – schema architecture with neat diagram. Why do we need mappings among schema levels? How do different schema definition languages support this architecture? (08 Marks)
  
2. a. Discuss with examples, different types of attributes. (07 Marks)
- b. Draw an ER diagram for a BANK database schema with atleast five entity types. Also specify primary key and structural constraints. (09 Marks)

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**OR**

3. a. Describe the characteristics of relations with suitable example for each. (08 Marks)
- b. What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraint violations. (08 Marks)
  
4. a. Describe the steps of an algorithm for ER – to – relational mapping. (10 Marks)
- b. In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with suitable example. (06 Marks)

### Module-2

5. Consider the COMPANY DATABASE  
EMPLOYEE (Fname, Minit, Lname, Ssn, Bdate, Address, Sex, Salary, super-ssn, Dno)  
DEPARTMENT (Dname, Dnumber, Mgr\_ssn, Mgr\_st\_date)  
DEPART\_LOCATIONS(Dnumber, Dlocation)  
PROJECT (Pname, Pnumber, Plocation, Dnum)  
WORKS\_ON (Essh, Pno, Hours)  
DEPENDENT (Essh, Dependent\_name, Sex, Bdate, Relationship).

Specify the following queries in SQL on the database schema given above :

- a. For every project located in Stafford, list the project number the controlling department number and the department manager's last name, address and birth date. (04 Marks)
- b. List the names of all employees who have a dependent with the same first name as themselves. (02 Marks)
- c. For each project, list the project name and the total hours per week (by all employees) spent on that project. (04 Marks)
- d. Retrieve the name of each employee who works on all the projects controlled by 'Research' department. (06 Marks)

**OR**

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.

- 6** a. Define Stored Procedure. Explain the creating and calling of stored procedure with suitable example. (08 Marks)  
 b. Explain the Single – tier and Client – server architecture, with neat diagram. (08 Marks)

**Module-4**

- 7** a. Explain the informal design guidelines used as measures to determine the quality of relation schema design. (08 Marks)  
 b. Define Normal form. Explain 1NF, 2NF and 3NF with suitable examples for each. (08 Marks)

**OR**

- 8** a. Define Minimal cover. Write an algorithm for finding a minimal cover F for a set of functional dependencies E. Find the minimal cover for the given set of FDs be (08 Marks)  
 $E : \{B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$ .  
 b. Consider the universal relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and the set of functional dependencies (08 Marks)  
 $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$ . Determine whether each decomposition has the lossless join property with respect to F.  
 $D_1 = \{R_1, R_2, R_3\}$  ;  $R_1 = \{A, B, C, D, E\}$  ;  $R_2 = \{B, F, G, H\}$  ;  $R_3 = \{D, I, J\}$ .

**Module-5**

- 9** a. Why Concurrency control is needed demonstrate with example? (12 Marks)  
 b. Discuss the desirable properties of transactions. (04 Marks)

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**OR**

- 10** a. When deadlock and starvation problems occurs? Explain how these problems can be resolved. (09 Marks)  
 b. Explain how shadow paging helps to recover from transaction failure. (07 Marks)

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