DATABASE MANAGEMENT SYSTEM (SEMESTER - 4)

CS/BCA/SEM-4/BCA-401/09

1. ..... *Signature of Invigilator*

2. ..... *Signature of the Officer-in-Charge*

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/BCA/SEM-4/BCA-401/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

DATABASE MANAGEMENT SYSTEM (SEMESTER - 4)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

	Group – A										Group – B			Group – C				
Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

.....

Head-Examiner/Co-Ordinator/Scrutineer

4430 (04/06)

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ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

DATABASE MANAGEMENT SYSTEM

SEMESTER - 4

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) Overall logical structure of a database can be expressed graphically by

a) ER diagram b) records

c) relations d) hierarchy. ☐

ii) A normal form in which every determinant is a key is

a) 2 NF b) 3 NF

c) BCNF d) 4 NF. ☐

iii) Which of the following levels of abstraction involves the views of data ?

a) External level b) Conceptual level

c) Physical level d) none of these. ☐

iv) One of the cause of the failure of file system is

a) Data availability b) Fixed records

c) Sequential records d) Lack of security. ☐

v) The ability to modify the internal schema without causing any change to the external schema is

a) Physical data independence b) Logical data independence

c) External data independence d) none of these. ☐

vi) The information about data in a database is called

a) Meta data b) Tera data

c) Hyper data d) none of these. ☐

vii) Which of the following features is supported in the relational database model ?

a) Complex data types b) Multi-valued attributes

c) Associations with multiplicities d) Generalization relationships. ☐

viii) Four DML commands are

a) CREATE, UPDATE, DELETE, SELECT

b) INSERT, UPDATE, DROP, SELECT

c) CREATE, ALTER, DELETE, SELECT

d) INSERT, MODIFY, DELETE, SELECT

e) INSERT, UPDATE, DELETE, SELECT. ☐

ix) Given the relation schema Bank (Bank ID, Account Numb, Balance, Customer) with FDs :

{ BankID, AccountNumb → Balance ; BankID, AccountNumb → Customer ;

Customer → BankID }.

What is the highest normal form for the relation schema Bank ?

a) First b) Second

c) Third d) Boyce Code. ☐

x) A relation is considered to be in second normal form if it is in first normal form and it has no ..... dependencies.

a) referential b) functional

c) partial key d) transitive. ☐

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following questions. 3 × 5 = 15

2. What is E-R diagram ? Discuss about relationship cardinality. 2 + 3

3. State the properties of Hierarchical Model. 5

4. a) What is FD ? 1

   b) What is the highest NF of each of the following relations ? 4

      i) R1 (J, K, L) with FDs are J → K, J → L, K → L

      ii) R2 (J, K, L, M) with FDs are J → KL, LM → K

5. "All primary keys are the super key but the converse is not true." Clarify.

   Define foreign key and composite attributes with example. 5

6. Explain ACID properties of transactions. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

7. a) What is multiple relationship ?

   b) What is attribute inheritance ?

   c) With an example describe Specialization & Generalization.

   d) Consider E-R diagram for the database of a departmental store. There are various departments in the store. One department sells many items. Some items may be sold by more than one department. A department has many employees. An employee can belong to at most one department. A manager is an employee who may look after more than one department but a department may be looked after by only one manager. A unique member called internal_hern_no is assigned to every item by the store. A supplier may supply more than one item. Every item is supplied by only one supplier at a time. Make E-R diagram for the database mentioned indicating primary key and show one entity set as a weak entity set if possible. 2 + 2 + 4 + 7

8. Considering the following tables serve the SQL queries, Relational Algebra and Relational calculus. 5 × 3

Run

Jersy_ No	Player_Name	Against	Run
11	Tendulkar	Sri Lanka	89
23	Mendis	India	58
11	Tendulkar	Pakistan	80
15	Akram	India	58
15	Akram	Sri Lanka	38
23	Mendis	Pakistan	38

Team

Jersy_ No	Player_Name	Team
11	Tendulkar	India
23	Mendis	Sri Lanka
15	Akram	Pakistan

a) Find out the names of the players from Team table whose 2nd letter of the name is *E*.

b) Find out the total runs scored in the tournament by Tendulkar.

c) Find out the Jersy_No, Player_Name, Team of every player in ascending order.

d) Who scored the highest run against India ? Display Jersy_No, Player_Name and Run.

e) Who scored the highest run against India and Sri Lanka ? Display Jersy_No, Player_Name and Run.

9. a) Explain Codd's rules of DBMS.

b) What is Relational Algebra ? Explain Select, Projection, Set Union, Set Difference, Set Intersection with example. 6 + 3 + 6

10. a) With an example describe aggregation. What are the types of Database Language ? Explain them. What is data dictionary ?

b) Explain data types of a DBMS. 3 + 4 + 3 + 5

11. a) Write down the comparison of three models in DBMS.

b) What is schema of DBMS ? What are the types of schema ? Explain them. What is sub-schema ? 7 + 2 + 4 + 2

END

Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/BCA/SEM-4/BCA-401/2010

2010

DATABASE MANAGEMENT SYSTEM

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) Association among several entities is known as

      a) attribute b) relationship

      c) field d) none of these.

   ii) In ER model ⬭ symbol is used for

      a) attribute b) entity

      c) relation d) none of these.

   iii) Relational algebra is a

      a) procedural language

      b) non-procedural language

      c) object oriented language

      d) all of these.

iv) SQL stands for
   a) Select Query Language
   b) Structured Query Language
   c) Both (a) & (b)
   d) None of these.

v) BCNF is a type of
   a) Indexing b) DFD
   c) Normalization d) None of these.

vi) Which of the following is *not* one of the four categories described in the data dictionary ?
   a) Data structure b) Data store
   c) Process d) Data flow.

vii) An index on the search key is called a
   a) primary index b) secondary index
   c) multi-level index d) all of these.

viii) A person who has central control over the system is called a
   a) data analyst
   b) data selector
   c) database administrator
   d) none of these.

ix) Any relation that is not part of the logical model, but is made visible to a user as a virtual relation, is called as
   a) relation b) view
   c) tuple d) none of these.

x) In relation algebra $\prod$ symbol is used for
   a) selection b) union
   c) intersection d) projection.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain hierarchical data model with suitable examples.

3. State the properties of relational model.

4. Describe the three-level architecture of DBMS.

5. "All primary keys are the super key but the converse is not true." Clarify. Define candidate key and alternate key with example.

6. Describe briefly the role of DBA in the base design. What is the data dictionary. 2 + 3

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is multiple relationship ?

   b) What is attribute inheritance ?

   c) With an example, describe specialization and generalization.

   d) Draw ER diagram showing the cardinality for the following problem :

      i) A bill is sent to a customer. A customer may receive many bills.

      ii) A clerk works in a blank. The bank has many clerks

      iii) Students appears for seats in colleges. Each student can get almost one seat. A college has many seats. A student can sent many applications. 2 + 2 + 4 + 2 + 2 + 3

8. a) State Armstrong's axioms.

   b) What is functional dependency ? Explain with example.

   c) Explain the difference between external, internal and conceptual schemas. 5 + 5 + 5

9. a) Distinguish between logical and physical data dependency.

   b) Explain the database languages with SQL command.

   c) Define 2nd NF, 3rd NF and BCNF with example.

   4 + 4 + 7

10. Consider the following two schemas :

    EMP (EMP#, ENAME, JOB, HIREDATE, MANAGER#, SALARY, COMM, DEPT#)

    DEPT (DEPT#, DNAME, LOCATION)

    Perform the following queries on the tables (write appropriate SQL statement) :

    i) List the name, salary and PF amounts of all employees (PF is calculated as 10% of the basic)

    ii) List the number of employees and average salary in DEPT# 20

    iii) List the department number and total salary payable in each department

    iv) List the names of the employees who are more than twenty years old in the company

    v) List the names of the employees whose name either starts or ends with *S*.

    3 + 3 + 3 + 3 + 3

11. Write short notes on any *three* of the following : 3 × 5

    a) Data dictionary

    b) Data abstraction

    c) Query optimization technique

    d) ACID property

    e) Functional dependency.

Name : .....

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Invigilator's Signature : .....

CS/BCA/SEM-4/BCA-401/2011

2011

DATABASE MANAGEMENT SYSTEM

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) Updating a database means

      a) revisiting the file structure

      b) revisiting the database structure or schema

      c) changing one or more database

      d) normalization of database.

   ii) To select a tuple from a relational database, the symbol used in relational algebra is

      a) Pie

      b) Lamada

      c) Sigma

      d) Gama.

iii) What tuple relational calculus does it to

a) Select entire table

b) Select domain variable

c) Select database schema

d) Select tuple variables.

iv) The operation of a certain relation X, produces Y such that Y contains only selected attributes of X. Such an operation is

a) Projection b) Selection

c) Union d) Difference.

v) Which index is specified on the non-ordering fields of a file ?

a) Primary b) Clustering

c) Secondary d) None of these.

vi) One approach for standardizing data storage is

a) MIS

b) CODASYL specification

c) structured programming

d) data storage can not be standardized.

vii) ..... is not a relational database.

a) Oracle b) RDBMS

c) YGL d) DBMS IV.

viii) A database management system

a) allow simultaneous access to multiple files

b) allow simultaneous access to multiple records of database

c) both (a) and (b)

d) none of these.

ix) Which is the SQL command to remove row from a table ?

a) REMOVE

b) DELETE

c) TRUNCATE

d) All of these.

x) Which of the SQL command to change a data in table ?

a) UPDATE

b) INSERT

c) BROWSE

d) APPEND.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What do you mean by DBMS ? How many types of DBMS are there ? 2 + 3

3. What are the differences between Traditional File Management System and Database Management System ? 3 + (1 + 1)

4. What do you mean by Data Dependency ? What do you mean by redundant data ? 2 + 3

5. Indicate disadvantages of DBNS. Write down the application of DBNS. 2 + 3

6. What are the functions of a Database Administrator ? 5

7. What is information ? How does it differ from data ? 2 + 3

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. a) Let R = (A, B, C) and let r1 and r2 both be relation on schema R. Give an expression in SQL that is equivalent to each of the following queries :

   i) $r_1 \cup r_2$

   ii) $r_1 \cap r_2$

   iii) $r_1 - r_2$

   vi) $\Pi_{AB}(r1) \times \Pi_{Bc}(r2)$.

   b) Describe Record based data model.

   c) What do you mean by strong and weak entities ? 8 + 5 + 2

9. a) What do you mean by integrity constraint ? Describe.

   b) What is lossless decomposition ?

   c) What do you mean by closure ?

   d) Suppose that we decompose the schema, R = (A, B, C, D, E) into (A, B, C) and (A, D, E). Show that this decomposition is loss less decomposition, if the following set F of FDs holds-

   $A \rightarrow BC$

   $CD \rightarrow E$

   $B \rightarrow D$

   $E \rightarrow A$ 3 + 3 + 3 + 6

10. a) Compute the closure of the set F of FDs for the relation schema, R = (A, B, C, D, E)

   $A \rightarrow BC$

   $CD \rightarrow E$

   $B \rightarrow D$

   $E \rightarrow A$.

   List the candidate keys for R.

   b) What do you mean by Super key, Candidate key and Primary key ?

   c) Describe any *two* limitations of file system. 7 + 3 + 5

11. a) What is data anomaly ? Define functional dependency. Describe Armstrong's axioms. Describe minimal set of FDs.

b) Consider the universal relation

$R = \{ A, B, C, D, E, F, G, H, I, J \}$ and the set of functional dependencies are

$F = \{ \{ A, B \} -> \{ C \}, \{ A \} -> \{ D, E \}, \{ B \} -> \{ F \}, \{ F \} -> \{ G, H \}, \{ D \} -> \{ I, J \} \}$.

This set represents which normal form ?

2 + 2 + 3 + 3 + 5

12. What is the difference between primary index and secondary index ? What is hashing ? Explain dynamic hashing.

Draw the ERD :

Consider a hospital :

Patients are treated in a single ward by the doctors assigned to them. Usually each patient will be assigned a single doctor, but in rare cases they will have two.

Healthcare assistants also attend to the patients; a number of these are associated with each ward. Initially the system will be concerned solely with drug treatment. Each patient is required to take a variety of drugs a certain number of times per day and for varying lengths of time.

The system must record details concerning patient treatment and staff payment. Some staff are paid part time and doctors and card assistants work varying amounts of overtime at varying rates (subject to grade).

The system will also need to track what treatments are required for which patients and when and it should be capable of calculating the cost of treatment per week for each patient (though it is currently unclear to what use this information will be put). 4 + 2 + 4 + 5

13. Write short notes on any *three* of the following : 3 × 5

a) Normalization

b) Query Optimization Technique

c) Codds rule

d) Selection and Projection

e) Inner join and Outer join.

Name : .....

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CS/BCA/SEM-4/BCA-401/2012

2012

DATABASE MANAGEMENT SYSTEM

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) The value of the attributes describe a particular

      a) attribute b) entity

      c) instance d) none of these.

   ii) System catalog is a system created database that describes

      a) database objects

      b) data dictionary information

      c) user access information

      d) all of these.

iii) DBA is a

a) Software b) Hardware

c) Person d) Others.

iv) To select a tuple from a relational database table, the symbol used in relational algebra is

a) sigma b) pie

c) lamda d) project.

v) Any relation that is not part of the logical model, but is made visible to a user as a virtual relation, is called as

a) relation b) view

c) tuple d) none of these.

vi) Normalization removes

a) dependency of data b) uniqueness of data

c) redundancy of data d) none of these.

vii) Log table is used for

a) updating b) recovery

c) query d) deadlock.

viii) Which is the command in SQL to change the structure in a table ?

a) Alter b) Update

c) Append d) None of these.

ix) A relation is considered to be in second normal form if it is in first normal form and it has no ..... dependencies.

a) referential b) functional

c) partial d) transitive.

x) Cardinality of a table is equal to the

a) number of rows in the table

b) number of columns in the table

c) number of domains of the table

d) none of these.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain the three schema architecture.

3. Write down the functions of a DBA.

4. Consider the following tables with their functional dependencies –

   Professor (Professor_code, Department, Head_of_dept, Percent_time)

   (Department, Professor_code) → (Head_of_dept, Percent time)

   Department → (Head_of_dept

   (Head_of_dept, Professor_code) → (Department, Percent_time)

   It is assumed that —

   i) A professor can work in more than one department

   ii) The percentage of the time he spends in each department is given

   iii) Each department has only one head_of_dept.

   Normalize the table up to BCNF.

5. What is spurious tuple ? How spurious tuples are generated ?

6. Define super key, candidate key and primary key.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is the highest NF of each of the following relations ?

   i) R1 (*A, B, C*) with FDs are $A \rightarrow B$, $A \rightarrow C$, $C \rightarrow B$

   ii) R2 (*A, B, C, D*) with FDs are $A \rightarrow B\,C$, $CD \rightarrow B$

   b) Explain generalization, specialization and aggregation in entity relation diagram.

   c) "All primary keys are the super key but the converse is not true". Explain. What is attribute inheritance ?

   4 + 6 + 3 + 2

8. Define ER model. What is an entity ? What is multi-valued attribute ? Draw the ER diagram from the following information :

   "A store has different counters managed by different employee. A counter has item but no two counters have common items. Customers buy from different counters but bill are prepared at the bill counter only. Once in a month the performance of the persons managing different counters are evaluated in terms of sale. Items are also reviewed and slow moving items are identified. 2 + 2 + 2 + 9

9. Consider the following two schemas :

EMP (EMP#, ENAME, JOB, HIREDATE, MANAGER#, SALARY, COMM, DEPT#).

DEPT (DEPT#, DNAME, LOCATION)

Perform the following queries on the tables (Write appropriate SQL statement) :

i) List the name, salary and PF amounts of all emplayees (PF is calculated as 10% of the basic)

ii) List the number of employees and average salary in DEPT# 20.

iii) List the department number and total salary payable in each department.

iv) List the names of the employees who are more than 20 years old in the company.

v) List the names of the employees whose name either starts or ends with 'S'. 3 + 3 + 3 + 3 + 3

10 a) Explain ACID properties.

b) Distinguish between logical and physical data dependency.

c) Define 2NF, 3NF, BCNF with proper example. 5 + 4 + 6

11. a) Explain the difference between external, internal and conceptual schemas.

b) What is multi-level index ?

c) Explain the query optimization technique with relevant examples. 5 + 5 + 5

Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/BCA/SEM-4/BCA-401/2013

2013

DATABASE MANAGEMENT SYSTEM

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Which of the following keyword is used in SQL to eliminate duplicate rows from the query result ?

a) NO DUPLICATE b) DISTINCT

c) UNIQUE d) none of these.

ii) Relational algebra is a ..... language.

a) non-procedural b) procedural

c) programming d) none of these.

iii) The ..... command returns the number of rows deleted.

a) Truncate b) Delete

c) Drop d) none of these.

iv) Which of the following clauses is used to enforce a condition on a SQL statement containing "group by" caluse ?

a) Where b) Having

c) Order by d) None of these.

v) Generalization is a ..... approach.

a) bottom up b) top down

c) both (a) & (b) d) none of these.

vi) Functional dependency is the dependency between

a) Tuples b) Attributes

c) Values d) None of these.

vii) COMMIT is a ..... statement.

a) TCL b) DCL

c) DML d) DQL.

viii) Which of the following is not an aggregate function ?

a) SUM b) MIN

c) MAX d) DISTINCT.

ix) Files of unordered records are called

a) heap files b) sorted files

c) hash files d) none of these.

x) The main goal of indexing is to

a) search an item faster from a table

b) insert an item faster into a table

c) delete an item faster from a table

d) none of these.

xi) The degree of a relationship describes

a) the number of attributes attached to a relation

b) the number of entities attached to a relation

c) the number of relations used to connect the entities

d) none of these.

xii) The full form of CODASYL is

a) Correlated Data System Language

b) Conference on Data System Language

c) Cohesion of Data Systems Language

d) None of these.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Differentiate between the following : $2\frac{1}{2} + 2\frac{1}{2}$

a) Delete and Truncate operations.

b) Referential integrity and entity integrity.

3. R (A, B, C, D, E) and $A \rightarrow BC$, $B \rightarrow E$, $CE \rightarrow D$ in R. Find the candidate key for R.

4. What do you mean by degree of a relationship ? What is cardinality of a relationship ? What is a ternary relationship ? 1 + 1 + 2 + 1

5. Explain the disadvantages of file oriented approach.

6. "Minimal super key is candidate key". With a suitable example, justify the statement.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. What do you mean by fully functional dependency ? A relation R (A, B, C) having FDs — $A \rightarrow B$, $A \rightarrow C$, $C \rightarrow B$. Is the relation in 2NF ? Can it be decomposed to 3NF ? Justify your answer. 5 + 10

8. Consider a relation —

   Bank (Customer_name, account_no, account_type, balance, branch)

   Solve the following queries using SQL, Relational Algebra and Tuple Relational Calculus. 5 × 3

   i) Retrieve total balance amount for individual branch.

ii) Retrieve the name of the customers who have an account in "Dunlop" branch and balance less than Rs. 10,000.

iii) List the information of all customers of savings branch.

iv) Who have the minimum balance among all customers ?

v) Display the balance of thsoe customers whose balance starts with the letter '*A*'.

9. Consider the universal relation :

$R = \{ A, B, C, D, E, F, G, H, I, J \}$ and the set of functional dependencies :

$AB \rightarrow C$

$A \rightarrow DE$

$B \rightarrow F$

$F \rightarrow GH$

$D \rightarrow IJ$

For the above relation R and functional dependencies, consider the decomposition $D = \{ R1, R2, R3 \}$ where

$R1 = \{ A, B, C, D, E \}$

$R2 = \{ B, F, G, H \}$

$R3 = \{ D, I, J \}$

Find out whether this decomposition is lossless or lossy.

10. Differentiate between various levels of data abstraction. What is data independence ? Explain the difference between physical and logical data independence. List any two significant differences between a file processing system and a DBMS. 5 + 2 + 4 + 4

11. Difference between the following : 10 + 5

    a) Theta Join

    b) Equi Join

    c) Natural Join

    d) Outer Join

    Define the five basic operators of relational algebra with an example each.

CS/BCA(H)/Even/4th Sem/BCA-401/2014

2014

Data Base Management Systems

Time Alloted : 3 Hours *Full Marks : 70*

The figure in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP - A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following: 10x1=10

i) The set of permitted values for each attribute is called its
   (a) attribute set (b) attribute range
   (c) domain (d) group

ii) The operation on certain relation X, produces Y such that Y contains only selected attribute of X, such operation is
   (a) projection (b) selection
   (c) union (d) difference

iii) What is the cardinality of a table with 100 rows and 10 columns?
   (a) 1000 (b) 100
   (c) 10 (d) 10000

iv) An attribute of one table matching with the primary key of another table is called

(a) foreign key (b) secondary key
(c) candidate key (d) surrogate key

v) If two relations have 5 and 10 rows respectively, then no. of tuples in Cartesian product will be

(a) 50 (b) 5
(c) 10 (d) 15

vi) The primary key indexing techniques do not allow

(a) Sets of relations (b) Multiple attributes
(c) duplicate data (d) Many to many relation

vii) A candidate key which is not a primary key is known as

(a) super key (b) alternate key
(c) foreign key (d) non prime attribute

viii) Which one is not a traditional set operator defined on relational algebra?

(a) Union (b) Intersection
(c) Set Difference (d) Join

ix) Which operator performs pattern matching in SQL?

(a) Except (b) Intersect
(c) Join (d) Like

x) Association among several entities is known as

(a)attribututes (b) relationship
(c) field (d) none of these

xi) 2NF is based on _____ dependency

a) transitive b)total
c) partial d) functional

xii) If $X \supseteq Y$ then $X \rightarrow Y$ is an example of _____ dependency

a) partial b) join
c) non trivial d) trivial

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. 3x5=15

2. Explain Relational Algebra using the operators (∂,∏,∪,-,X and show that: A∩B = A ∪ B – ((A-B)∪(B – A))
3. Describe the three-level architecture of DBMS.
4. a) Explain the difference between external, internal and conceptual schemas.
   b) What is the highest NF of each of the following relations?
      i. R1(J, K, L) with FDs are J→K, J→ L, K → L
      ii. R2 (J, K, L, M) with FDs are J → KL, LM → K
5. Explain ACID properties of transactions.
6. "All primary keys are the super key but the converse is not true." Clarify.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3x15=45

7. i) Describe dense and sparse indices with diagram.

   ii) Define concept of aggregation. Give two examples where this concept is useful.

   8+ 7 =15

8. i) Describe the three tier architecture of the general DBMS.
   ii) Let R =(A, B) and S =(A, C) and let r (R) and r(S) be relations. Write relational algebra expression equivalent to the domain relational calculus expressions:
      a) {< a > | there exist b (<a, b> belongs to r^ b = 17}
      b) {<a, b, c > | <a, b> belongs to r^ <a,c> belongs to s}

   7+4+4 = 15

9. i) Why certain functional dependencies are called trivial functional dependencies?

ii) Use Armstrong's axioms to prove the soundness of the union rule.
iii) Compute the closure of the following set F of FDs for each relation schema
R = (A,B,C,D,E).
A->BC
CD->E
B ->D
E-> A.
List the candidate key for R. 7+4+4=15

10. i) Construct a B+ tree for the following set of values:
(2,3,5,7,11,17,19,23,29.31)
Assume that the tree is initially empty and values are added in ascending order. Contract B + tree for the cases where the number of pointers that will fit in one node is as follows
a. Four
b. Six
c. Eight

ii) Consider the followings tables
employee (emp_name, street, city)
works (emp_name, company_name, salary)
company (company_name, city)
managers (emp_name, manager_name)
Give SQL, expression for the following queries
a.Find the names and cities of residence of all employees who work for First Bank Corporation.
b.Find the name, street address and cities of residencies of all employees who work for First Bank Corporation and earn more than Rs. 100000.
c.Find all employees in the database who earn more than each employee of Small Bank Corporation. 9 + 6 =15

11. Write short notes on any three topics 5x3=15
a. Functional Dependency
b. Indexing
c. Mapping cardinalities
d. Query processing and optimization
e. Hashing

WEST BENGAL UNIVERSITY OF TECHNOLOGY

BCA-401

DATA BASE MANAGEMENT SYSTEM

Time Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP A
(Multiple Choice Type Questions)

1. Answer *all* questions. $10 \times 1 = 10$

(i) Referential integrity is directly related to

(A) relational key (B) foreign key
(C) primary key (D) candidate key

(ii) Which level of Abstraction describes how data are stored in the database?

(A) Physical level (B) View level
(C) Abstraction level (D) Logical level

(iii) Which of the following is true?

(A) A relation in BCNF is always in 3NF
(B) A relation in 3NF is always in BCNF
(C) BCNF and 3NF are same
(D) A relation in BCNF is not in 3NF

(iv) Consider a schema R (A, B, C, D) and functional dependencies A $\rightarrow$B and C $\rightarrow$D. Then the decomposing R_1(A, B) and R_2(C, D) is

(A) dependency preserving but not lossless join
(B) dependency preserving and lossless join
(C) lossless join but not dependency preserving
(D) lossless join

(v) To select a tuple from a relational database table, the symbol used in relational algebra is

(A) ρ (Row) (B) σ (Sigma)
(C) Π (Project) (D) none of these

(vi) R = (A, B, C, D), F = {AB $\rightarrow$C, C $\rightarrow$D}. Find candidate key

(A) AB (B) ABC
(C) ABCD (D) none of these

(vii) Which is the SQL command to remove rows from a table?

(A) REMOVE (B) DELETE
(C) TRUNCATE (D) All of these

(viii) The first phase of query processing is:

(A) decomposition (B) restructuring
(C) analysis (D) none of these

(ix) The distinguishable parts of a record are called:

(A) Files (B) Data
(C) Fields (D) Database

(x) Normalization of database is needed to:

(A) make data more intelligible to humans
(B) remove error in data entry
(C) eliminate redundant data
(D) all of these

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. Compute the closure of the following set F of functional dependencies for relation schema: 5
R = (A, B, C, D, E), F = {A →BC, CD →E, B →D, E →A}
List the candidate keys for R

3. Explain the query optimization technique with relevant examples. 5

4. What is lossless decomposition? Consider the relation R_1 (A, B, C) and R_2 (C, D). Show that this decomposition is dependency preserving or not. 5

5. How does BCNF differ from 3NF? Why is it considered stronger than 3NF? 5

6. Discuss the different database anomalies. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. (a) Consider the following schema: 10
Book(acc_no, yr_pub, title)
User(card_no, bname, baddress)
Borrow(acc_no, doi, card_no)
where acc_no is account number, yr_pub is year of publication, bname is borrower name, baddress is borrower address, doi is date of issue.
Perform the following queries on the table.(In SQL)
(i) Find the account number whose year of publication is 1985.
(ii) Display the title of the book which has been borrowed by "Vijoy"
(iii) Find the borrower name who lives in same city as "Vijoy"
(iv)Find the borrower name and address who should issue book on 14-05-1988
(v) Find the acc_no of Book whose year of publication is 1992 and title is "Compiler Design"

(b) State Armstrong's Axioms. 5

8. (a) What is index? Define clustering indices, hash indices, dense indices and Primary-secondary index. 1+(2×4)
   (b) What is data abstraction? 2
   (c) Define the concept of aggregation, generalization, and specialization and attribute inheritance. 4

9. What do you mean by Super key, Candidate key and Primary key? Take a single example of a database and explain the relationship between primary key, candidate key, foreign key in the same example. 2+2+2+3+3+3

10.(a) Explain with two examples why the set $\{\sigma, \pi, \cup, -, X\}$ is called the complete set of relational algebra operation. 7+8
   (b) Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number or recorded accidents. State all your assumptions.

11. Write short notes on any *three* of the following: 3×5
   (a) Role of DBA in database design.
   (b) Three-level architecture of DBMS.
   (c) Query language
   (d) B^+ tree
   (e) Logical and physical data independence.

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Paper Code : BCA-401

DATABASE MANAGEMENT SYSTEMS

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) Functional Dependencies are the types of constraints that are based on
   a) Key b) Key revisited
   c) Superset key d) none of these.

   ii) Which data type can store unstructured data ?
   a) Raw b) Char
   c) Numeric d) Varchar.

   iii) Which of the following is not a DDL statement ?
   a) SELECT b) DROP
   c) CREATE d) none of these.

   iv) If every functional dependency in set E is also in closure of F then this is classified as
   a) F is covered by E b) E is covered by F
   c) $F+$ is covered by E d) none of these.

v) Which of the following is not an aggregate function ?

a) SUM b) MIN

c) MAX d) DISTINCT.

vi) A normal form in which every non-prime attribute is fully dependent on prime attribute is

a) 1NF b) 2NF

c) 3NF d) BCNF.

vii) The operation of a certain relation *X*, produces *Y* such that *Y* contains only selected attributes of *X*. Such an operation is

a) Projection b) Selection

c) Union d) Difference.

viii) The main goal of indexing is to

a) search an item faster from a table

b) insert an item faster into a table

c) delete an item faster from a table

d) none of these.

ix) Which command returns the number of rows deleted ?

a) Truncate b) Delete

c) Drop d) None of these.

x) ON DELETE and ON UPDATE statements are associated with

a) Primary key b) Foreign key

c) Alternate key d) none of these.

xi) Database ..... , which is the logical design of the database, and the database ..... , which is a snapshot of the data in the database at a given instant in time.

a) Instance, Schema b) Relation, Schema

c) Relation, Domain d) Schema, Instance.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) Define super key, candidate key and primary key.
   b) R (A,B,C,D) and $A \rightarrow BC$, $B \rightarrow E$, $CE \rightarrow D$ in R. Find the candidate key for R. 3 + 2
3. Describe the three schema architecture in DBMS.
4. Explain two-phase locking protocol.
5. Consider the relation $R = \{ A,B,C,D,E,F,G,H,I,J \}$ and the set of functional dependencies :
   $F = \{ AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ \}$
   Decompose R into 3NF.
6. How to represent a weak entity set in ER diagram ? Quote suitable example. What is NULL ? What is its importance ? 3 + 1 + 1

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Design an ER-diagram for traditional "Library Management System".
   b) Draw a schematic diagram of DBMS.
   c) Consider the following schema :
   Employee_Salary (EmpNo, EName, Dept, DOB, Salary)
   Write SQL to perform the following :
   - Display the number of employees in each department.
   - Display the total and average salaries of employees in "Computer Science" department.
   - Display the sum of salaries for all departments.
   - Display the highest and lowest salary for "Computer Science" department.
   - Display the names of those employees whose name starts with "A". 5 + 5 + 5

8. a) Define 2NF and 3NF.
   b) What do you mean by "loss decomposition" and "lossless decomposition" ?
   c) Consider the following relation schema R given by
      R = { Ssn, Ename, Pnumber, Pname, Plocation, Hours }
      R is decomposed into three sub-schemas, namely, R1, R2, R3
      R1 = { Ssn, Ename }
      R2 = { Pnumber, Pname, Plocation }
      R3 = { Ssn, Pnumber, Hours }
      Explain with justification, whether or not, the above decomposition is lossless.
   d) Differentiate between 3NF and BCNF. 3 + 4 + 5 + 3

9. Consider the relation.
   Bank (customer_name, account_no, account_type, balance and branch)
   a) Retrieves the name of the customer who has an account in 'Dunlop' branch and balance less than 10,000.
   b) Lists the information of all the customers of saving branch.
   c) Displays the balance of those customers whose name starts with 'A'.
   d) Retrieves the total balance amount for individual branch.
   e) Who have the minimum balance among all the customers ? 5 × 3

10. a) What do you mean by transaction ? Explain the transaction states.
    b) Explain log based recovery and checkpoints.
    c) What do you mean by shadow paging ?
    d) What do you mean by deadlock handling ? Explain in detail. 6 + 4 + 2 + 3

11. Write short notes on any *three* of the following : 3 × 5
    a) File indexing
    b) B-tree
    c) Query optimization technique
    d) Armstrong's axioms
    e) Network data model.