QUESTION BANK

Q.1 Select the correct option:

1) An organisation uses a computer to store and process information because it hopes for speed, accuracy, efficiency, economy etc. beyond what could be achieved using clerical methods; the objectives of using a DBMS must in .... be the same although the justifications may be more indirect.

   (a) essence   (b) quality   (c) spirit   (d) substance

2) Early computer applications were based on existing clerical methods and stored information was .... in much the same way as manual files.ed

   (a) parsed   (b) partitioned (c) petitioned (d) pigeon-holed

3) But the computer's processing speed gave a potential for relating data from different sources to produce valuable management information, provided that some standardisation could be imposed over departmental boundaries: the idea emerged of the .... database as a central resource.

   (a) individualized   (b) integrated   (c) intercalated   (d) isolated

4) Data is captured as close as possible to its point of origin and transmitted to the database, then .... by anyone within the organisation who requires it.

   (a) exacted   (b) extended (c) extracted (d) extruded

5) However many .... have become attached to this idea in practice, it still provides possibly the strongest motivation for the introduction of a DBMS in large organisations.

   (a) codicils   (b) contingencies   (c) postulates (d) provisos

6) A DBMS gives some protection against change by taking care of basic storage and retrieval functions in a standard way, leaving the applications developer to concentrate on specific organisational requirements; changes in one of these areas need not have .... elsewhere.

   (a) repercussions   (b) resistance   (c) resonance   (d) reverberations

7) In general a DBMS is a substantial piece of software, the result of many man-years of effort, but because its development costs are spread over a number of purchasers it can probably provide more facilities than would be economic in .... product.

   (a) a cut-and-dried   (b) a made-to-measure   (c) an off-the-rack   (d) a one-off

8) The points discussed above are probably most relevant to the larger organisation using a DBMS for its administrative functions, the environment in which the idea of databases first originated; in other .... the convenience of a DBMS may be the primary consideration.

   (a) contents   (b) contests   (c) contexts   (d) contretemps

9) The purchaser of a small business computer needs all the software to run it in package form, written so that the minimum of expertise is required to use it, and the same applies to departments (e.g. Research & Development) with special needs which cannot be .... by a large centralised system.
   (a) fortified   (b) gratified   (c) qualified   (d) satisfied

10) When comparing database management systems it is obvious that some are designed in the expectation that professional DP staff will be available to run them, while others are aimed at the total ....
    (a) apprentice   (b) novice   (c) recruit   (d) trainee

11) Which of the following is a reason to model data?
    (A) Understand each user's perspective of data
    (B) Understand the data itself irrespective of the physical representation
    (C) Understand the use of data across application areas
    (D) All of the above

12) If an entity can belong to only one lower level entity then the constraint is
    (A) disjoint   **(B)** partial
    (C) overlapping   **(D)** single

13) The common column is eliminated in
    (A) theta join   **(B)** outer join
    (C) natural join   **(D)** composed join

14) In SQL, testing whether a subquery is empty is done using
    (A) DISTINCT   **(B)** UNIQUE
    (C) NULL   **(D)** EXISTS

15) Use of UNIQUE while defining an attribute of a table in SQL means that the attribute values are
    (A) distinct values   **(B)** cannot have NULL
    (C) both **(A)** & **(B)**   **(D)** same as primary key

16) The cost of reading and writing temporary files while evaluating a query can be reduced by
    (A) building indices   **(B)** pipelining
    (C) join ordering   **(D)** none of the above

17) A transaction is in _____ state after the final statement has been executed.
    (A) partially committed   **(B)** active
    (C) committed   **(D)** none of the above

18) In multiple granularity of locks SIX lock is compatible with
    (A) IX   **(B)** IS
    (C) S   **(D)** SIX

19) The statement that is executed automatically by the system as a side effect of the modification of the database is
   (A) backup   **(B)** assertion
   (C) recovery   **(D)** trigger

20) The normal form that is not necessarily dependency preserving is
   (A) 2NF   **(B)** 3NF
   (C) BCNF   **(D)** 4NF

21) The property / properties of a database is / are :
   (A) It is an integrated collection of logically related records.
   (B) It consolidates separate files into a common pool of data records.
   (C) Data stored in a database is independent of the application programs using it.
   (D) All of the above.

22) The DBMS language component which can be embedded in a program is
   (A) The data definition language (DDL).   **(B)** The data manipulation language (DML).
   (C) The database administrator (DBA).   **(D)** A query language.

23) A relational database developer refers to a record as
   (A) a criteria.   **(B)** a relation.
   (C) a tuple.   **(D)** an attribute.

24) The relational model feature is that there
   (A) is no need for primary key data.
   (B) is much more data independence than some other database models.
   (C) are explicit relationships among records.
   (D) are tables with many dimensions.

25) Conceptual design
   (A) is a documentation technique.
   (B) needs data volume and processing frequencies to determine the size of the database.
   (C) involves modelling independent of the DBMS.
   (D) is designing the relational model.

26) The method in which records are physically stored in a specified order according to a key field in each record is
   (A) hash.   **(B)** direct.
   (C) sequential.   **(D)** all of the above.

27) A subschema expresses
   (A) the logical view.   **(B)** the physical view.
   (C) the external view.   **(D)** all of the above.

28) Count function in SQL returns the number of
    (A) values.   **(B)** distinct values.
    (C) groups.   **(D)** columns.

29) In a relational model, degree is termed as
    (A) number of tables.   **(B)** number of attributes.
    (C) number of rows.   **(D)** number of candidate keys of the table.

30) The database schema is written in
    (A) DML.   **(B)** HLL.
    (C) DDL.   **(D)** DCL.

31) The model which uses plex structure as its basic structure is
    (A) Relational Model.   **(B)** Network Model.
    (C) Hierarchical Model.   **(D)** None of the above.

32) The Third Normal Form (3NF) removes
    (A) functional dependency.   **(B)** transitive dependency.
    (C) multivalued dependency.   **(D)** fully functional dependency.

33) Relationship in an E-R diagram is represented by
    (A) rectangle.   **(B)** ellipse.
    (C) triangle.   **(D)** None of the above.

34) Which of the following is not an ACID property of transactions
    (A) atomicity.   **(B)** concurrency.
    (C) isolation.   **(D)** durability.

35) The term deadlock is related to
    (A) Database recovery.   **(B)** Database security.
    (C) Concurrency Management.   **(D)** Database transaction.

36) QBE stands for
    (A) Query by Enterprise.   **(B)** Query by Evaluation.
    (C) Query by Example.   **(D)** Query by Execution.

37) It is better to use files than a DBMS when there are
    (A) Stringent real-time requirements.   **(B)** Multiple users wish to access the data.
    (C) Complex relationships among data. **(D)** All of the above.

38) The conceptual model is
    (A) dependent on hardware.   **(B)** dependent on software.
    (C) dependent on both hardware and software
    (D) independent of both hardware and software.

39) What is a relationship called when it is maintained between two entities?
    (A) Unary   **(B)** Binary
    (C) Ternary   **(D)** Quaternary

40) Which of the following operation is used if we are interested in only certain columns of a table?
    (A) PROJECTION   **(B)** SELECTION
    (C) UNION   **(D)** JOIN

41) Which of the following is a valid SQL type?
    (A) CHARACTER   **(B)** NUMERIC
    (C) FLOAT   **(D)** All of the above

42) The RDBMS terminology for a row is
    (A) tuple.   **(B)** relation.
    (C) attribute.   **(D)** degree.

43) Which of the following operations need the participating relations to be union compatible?
    (A) UNION   **(B)** INTERSECTION
    (C) DIFFERENCE   **(D)** All of the above

44) The full form of DDL is
    (A) Dynamic Data Language   **(B)** Detailed Data Language
    (C) Data Definition Language   **(D)** Data Derivation Language

45) Which of the following is an advantage of view?
    (A) Data security   **(B)** Derived columns
    (C) Hiding of complex queries   **(D)** All of the above

46) Which of the following is a legal expression in SQL?
    (A) SELECT NULL FROM EMPLOYEE;
    (B) SELECT NAME FROM EMPLOYEE;
    (C) SELECT NAME FROM EMPLOYEE WHERE SALARY = NULL;
    (D) None of the above

47) The metdata is created by the
    (A) DML compiler   **(B)** DML preprocessor
    (C) DDL interpreter   **(D)** Query interpreter

48) When an E-R diagram is mapped to tables, the representation is redundant for
    (A) weak entity sets   **(B)** weak relationship sets
    (C) strong entity sets   **(D)** strong relationship sets

49) When   , then the cost of computing   is
    (A) the same as R   S   **(B)** greater the R   S
    (C) less than R   S   **(D)** cannot say anything

50) In SQL the word 'natural' can be used with
    (A) inner join   **(B)** full outer join
    (C) right outer join   **(D)** all of the above

51) The default level of consistency in SQL is
    (A) repeatable read   **(B)** read committed
    (C) read uncommitted   **(D)** serializable

52) If a transaction T has obtained an exclusive lock on item Q, then T can
    (A) read Q   **(B)** write Q
    (C) both read and write Q   **(D)** write Q but not read Q

53) Shadow paging has
    (A) no redo   **(B)** no undo
    (C) redo but no undo   **(D)** neither redo nor undo

54) If the closure of an attribute set is the entire relation then the attribute set is a
    (A) superkey   **(B)** candidate key
    (C) primary key   **(D)** not a key

55) DROP is a _____ statement in SQL.
    (A) Query   **(B)** Embedded SQL
    (C) DDL   **(D)** DCL

56) If two relations R and S are joined, then the non matching tuples of both R and S are ignored in
    (A) left outer join   **(B)** right outer join
    (C) full outer join   **(D)** inner join

57) Which one of the following statements is false?
    (A) The data dictionary is normally maintained by the database administrator.
    (B) Data elements in the database can be modified by changing the data dictionary.
    (C) The data dictionary contains the name and description of each data element.
    (D) The data dictionary is a tool used exclusively by the database administrator.

58) An advantage of the database management approach is
    (A) data is dependent on programs.
    (B) data redundancy increases.
    (C) data is integrated and can be accessed by multiple programs.
    (D) none of the above.

59) A DBMS query language is designed to
    (A) support end users who use English-like commands.
    (B) support in the development of complex applications software.
    (C) specify the structure of a database.
    (D) all of the above.

60) Transaction processing is associated with everything below except
   (A) producing detail, summary, or exception reports.
   (B) recording a business activity.
   (C) confirming an action or triggering a response.
   (D) maintaining data.

Q.2

a. What is DBMS and what are components of DBMS? What are the advantages of DBMS over file oriented approach.
b. What are the DBMS languages? Briefly explain.

Q.3
a. Explain the relevance of Data Dictionary in a Database System.
b. Discuss the role of DBA.
c. Explain the terms primary key, candidate key, alternate key and secondary key. In the given table identify each key.
               STUDENT(SID,Regno, Name, City)

Q.4
a. In an organisation several projects are undertaken. Each projects can employ one or moreemployees. Each employee can work on one or more projects. Each project is undertaken on the request of client. A client can request for several projects. Each project has only one client. A project can use a number of items and a item may be used by several projects. Draw an E-R diagram and convert it to a relational schema.
b. Define
               (i) Identifying relationship.
               (ii) Specialisation / generalization.
               (iii) Aggregation.

Q.5
a. What is hash file organization? What are the causes of bucket overflow in a hash file organization?   What   can   be   done   to   reduce   the   occurrence   of   bucket overflow?
b. What do you understand by RAID? Explain RAID Level 4 and Level5.

Q.6
a. Consider the relations:
               PROJECT(proj#,proj_name,chief_architect)
               EMPLOYEE(emp#,emp_name)
               ASSIGNED(proj#,emp#)
   Use relational algebra to express the following queries:
   (i) Get details of employees working on project COMP33.
   (ii) Get the employee number of employees who work on all projects.
   (iii) Get details of project on which employee with name 'RAM' is working.

b. Differentiate between join and outer join.

c. Consider a table student (std_id, std_name, date_of_birth, percent_marks, dept_name). Write a QBE query to display names of Computer Science department students who have scored more than 80%.

Q.7

a. Consider the relations

        EMP(ENO,ENAME,AGE,BASIC_SALARY)

        WORK_IN(ENO,DNO)

        DEPT(DNO,DNAME,CITY)

Express the following queries in SQL

(i) Find names of employees who work in a deptt. in Delhi.

(ii) Get the deptt. number in which more than one employee is working.

(iii) Find name of employee who earns highest salary in 'HR' department.

b. Explain various kinds of constraints that can be specified using CREATE TABLE command. Explain CASCADE and RESTRICT clauses of DROP SCHEMA command.

Q.8 Write short notes on following:

    (i) Extension and Intension.

    (ii) Weak and strong entity type.

    (iii) Views in SQL.

    (iv) Built in function in QBE.

Q.9

a. What is Oracle Process? Explain any four processes started by Oracle.

b. Explain Storage Organisation of Oracle.

Q.10

a. Describe five main functions of a database administrator.

b. Define the following with respect to an E-R diagram. Explain the manner in which each is mapped to a table. Illustrate with an example.

    (i)Relationship set. (ii) Aggregation. (iii) Multivalued attribute.

Q.11 Consider the following relations with primary keys underlined.

        Salesperson (SNo, Sname, Designation)

        Area (ANo, Aname, ManagerNo)

        Product (PNo, Pname, Cost)

        SAP (SNo, ANo, PNo)

(a) Define the schema in SQL specify the attributes, and keys assuming that ManagerNo is a foreign key. Specify the constraint that the cost of a product cannot be greater than Rs.10000/-.

(b) Answer using SQL

    (i) Get the names of all the products that are sold.

    (ii) Get the product numbers which are marketed by alteast two sales persons.

    (iii) Get the names of all salespersons who are not Managers.

Q.12

a. What is the basic difference between relational algebra and relational calculus? Define the atoms in tuple relational calculus. Use these to define the formulae.

b. Consider the following relations

     Person (name, street, city)
     Owns (name, reg_no, model, year)
     Accident (date, reg_no)
     Answer the following using tuple relational calculus
     (i) Find the names of persons who are not involved in any accident.
     (ii)Find the names and street of persons who own a maruti car.
     (iii)Find the registration numbers of the cars manufactured in the year 2004.

Q.13

a. Define functional and multivalued dependencies.
b. Consider the relation Student (stid, name, course, year). Given that
  A student may take more than one course but has unique name and the year of joining.
  (i) Identify the functional and multivalued dependencies for Student.
  (ii) Identify a candidate key using the functional and multivalued dependencies arrived at in step (b).
  (iii) Normalize the relation so that every decomposed relation is in 4NF.

Q.14

a. Explain the following
        (i)   ISA relationship.
        (ii)   NULL value.
        (iii)   Trigger.
        (iv)   EXEC statement in SQL.
b. Define a view ProductArea in relational algebra and SQL, using the relations of question (3) above, which contains the area name and the names of products sold in that area.

Q.15

a. Compare the two method for storing variable length records – byte string representation and fixed length representation. Discuss the merits and demerits of the two.
b. Describe the different RAID levels. Discuss the choices of the different RAID levels for different applications.

Q.16

a. Define two-phase locking protocol.

b. Differentiate between strict two-phase and rigorous two-phase with conversion protocols.

c. Consider the transactions t1, t2 and t3 and a schedule S given below.

$$S \quad read_1(A), read_2(B), write_1(C), read_3(B), read_3(C), write_2(B), write_3(A)$$ Where the subscript denotes the transaction number. Assume that the time stamp of t1<t2<t3. Using time-stamp ordering scheme for concurrency control find out if the schedule will go through. If there is to be a rollback, which transaction(s) will be rolled back?

Q.17

a. Describe the nested-loop join and block-nested loop join. Compare them.

b. Two relations R with 60000 tuples and occupying of 300 blocks is to be joined with a relation S with 40000 tuples and occupying 400 blocks. What is the total cost using the two algorithms of (a) above in terms of block transfers. Give both the best case and the worst case figures.

Q.18

a. Explain the ACID properties of a transaction.

b. Compare wait-die deadlock prevention scheme with wait-wound scheme.

c. What are the costs to be considered when a transaction has to be rolled back when recovering from deadlock?

Q.19 Write short notes on
   (i) Views in relational algebra.
   (ii) Data dictionary.
   (iii) Assertions in SQL.
   (iv) B^+ tree.

Q.20

a. Describe the responsibilities of the DBA and the database designer.

b. What are the four main characteristics of the database approach?

Q.21

a. Differentiate between DDL and DML.

b. List any two disadvantages of a database system.

c. Explain the utilities that help the DBA to manage the database.

Q.22 Differentiate between
   (i) Logical and physical data independence.
   (ii) WHERE and HAVING clause in SQL.
   (iii) Strong entity set and weak entity set.
   (iv) Spanned and unspanned organisation.

Q.23

a. Discuss with examples about various types of attributes present in the ER model.

b. Information about films contains information about movies, stars and studios. Movies have a title, year of production, length and the film type. Stars have a name and address. Studios have a owner and a banner. Movies are shot in studios which own them. A movie is shot in only one studio. Stars are connected to one or more studios but can act in any film which may or may not be owned by the studio.

Arrive at an E-R diagram. Clearly indicate attributes, keys, the cardinality ratios and participation constraints.

Q.24

a. What is the main goal of RAID technology? Describe the levels 1 through 5.

b. An employee record has the following structure

```
struct employee {
    int    eno;
    char   name[22];
    float  salary;
    char   dept[10];
};
```

(i) Calculate the record size R in bytes.

(ii) If the file has 500 records, calculate the blocking factor bfr and the number of blocks b, assuming an unspanned organization with block size B = 512 bytes.

(iii) What is the unused space in each block and in the last block?

Q.25   Define the following terms

(i) Hashing   (ii) Specialization
(iii) Value set.   (iv) DBMS.
(v) Host language.   (vi) Database state.
(vii) Trigger.

Q.26

a. Differentiate between natural join and outer join.

b. For the relations R and S given below:

R

A	B	C
1	2	3
4	5	6
7	8	9

S

B	C	D
2	3	10
2	3	11
6	7	12

Compute

(i) $\Pi_{A,C}(R)$ (ii) $\sigma_{B=2}(S)$
(iii) natural join   (iv) outer join

Q.27

a. Define union compatibility? Explain why INTERSECTION of two relations can not be performed if they are not union compatible?

b. What is a view in SQL? When can views be updated?

c. Using SQL create a view RS for the relations R and S of Q8. The view consists of the columns A and D renamed as X and Y respectively. Insert a tuple <10, 15> into it. Show the contents of the view. **(6)**

Q.28

a. Consider the relations defined below:

        PHYSICIAN (regno, name, telno, city)

        PATIENT (pname, street, city)

        VISIT (pname, regno, date_of_visit, fee)

        Where the regno and pname identify the physician and the patient uniquely respectively. Express queries (i) to (iii) in SQL.

        (i)   Get the name and regno of physicians who are in Delhi.

        (ii)   Find the name and city of patient(s) who visited a physician on 31 August 2004.

        (iii)   Get the name of the physician and the total number of patients who have visited her.

        (iv)   What does the following SQL query answer

            SELECT DISTINCT name

            FROM PHYSICIAN P

            WHERE NOT EXISTS

                (SELECT *

                  FROM VISIT

                     WHERE   regno   =   p.regno   )

Q.29   Write short notes on

(i)   Data models.

(ii)   Oracle database structure.

(iii)   Group By clause in SQL.

(iv)   Retrieval in QBE.

Q.30

a. What is completeness constraint on generalization? Explain the difference between total and partial design constraint. Give an example each.

b. Design a generalization-specialization hierarchy for a motor-vehicle sales company. The company sells motorcycles which have an engine number and cost; cars which have a chassis number, an engine number, seating capacity and cost; trucks which have chassis number, an engine number and cost.

Q.31

a. Define the following operations of relational algebra and give an example each
   - (i)   Division.
   - (ii)   Cartesian product.

b. Let R(A, B) and S(A, C) be two relations. Give relational algebra expressions for the following domain calculus expressions.

(i) $\{<a>|\ \exists b\ (<a,b>\in r \wedge b=17)\}$

(ii) $\{<a,b,c>|\ <a,b>\in r \wedge <a,c>\in s\}$

(iii) $\{<a>|\ \exists b\ (\exists c\ (<a,b>\in r) \wedge <a,c>\in s))\}$

Q.32

Consider the following relations with key underlined

lives (<u>person_name</u>, street, city)
works (<u>person_name</u>, company_name, salary)
located (<u>company_name</u>, city)
manages (<u>person_name</u>, manager_name)

Answer the following using SQL:
- (i)   Find the names and city of persons who work for manager John.
- (ii)   Find the names of persons who live in the same city as the company they work for.
- (iii)   John's manager has changed. The new manager is Anna.
- (iv)   Susan doesn't work anymore.
- (v)   Create a view BangWork (person_name, company_name, manager_name) of all people who work in Bangalore in ascending order of person name.

Q.33

a.   What are the problems if one were not to normalize? When do these problems surface?

b.   Consider the relation

Book (accno, author, author_address, title, borrower_no, borrower_name, pubyear)
with the following functional dependencies

accno	title	accno	pubyear
author	accno		
accno	author	author	author_address
accno	borrower_no	borrower_no	borrower_name

(i) Normalize the relation. Clearly show the steps.
(ii) For each decomposed relation identify the functional dependencies that apply and identify the candidate key.

Q.34

a. Describe sequential file organization. Explain the rules for
(i)   inserting a new record.
(ii)   Deleting an existing record.
b. Define and differentiate between ordered indexing and hashing.

Q.35

a. How do you compute the query cost for the following:
(i) Selection with linear search.
(ii) Negation.
b. Explain the statement 'Projection operation distributes over the union operation'. Give an example.
c. Explain pipelining.

Q.36

a. Explain the rules for creating a labelled precedence graph for testing view serializability.
b. Explain the difference between the three storage types – volatile, non volatile and stable.

Q.37

a. How does the system recover from a crash?
b. Write short notes on

(i)   Structure of   tree.
(ii)   ACID properties of a transaction.

Q.38   Define the following terms
(i)   Catalog and meta data   (ii)   Parametric end users
(iii) DBA   (iv) Controlled redundancy
(v) Snapshot   (vi) Data sublanguage
(vii) High level DML   (viii) Data abstraction

Q.39   Differentiate between
(i)   Procedural and non procedural DML
(ii)   Logical and physical data independence
(iii)   Forms based and graphical interface
(iv)   Internal and external schema

Q.40

a. Explain the conventions for displaying an ER schema as an ER diagram.
b. Describe the two alternatives for specifying structural constraints on relationship types. What are their advantages and disadvantages?

Q.41

a. Discuss the techniques for a hash file to expand and shrink dynamically. What are the advantages and disadvantages of each?

b. What are the reasons for having variable length records? What are the various ways to store variable length records?

c. Discuss the mechanism to read data from and write to a disk.

Q.42

a. Define the following operations of the relational algebra in terms of the basic operations:

        (i) Intersection   (ii) Join
        (iii) Division

b. Consider the relations
        City (city_name, state)
        Hotel (name, address)
        City_hotel (hotel_name, city_name, owner)
        Answer the following queries in relational algebra
        (i)   Find the names and address of hotels in Agra.
        (ii)   List the names of cities which have no hotel.
        (iii)   List the names of the hotels owned by 'Taj Group'.

Q.44

a. Explain the difference between using functions with and without grouping attributes in relational algebra. Give examples.

b. Define the following with respect to SQL
        (i)   Specifying alias   (ii) UNIQUE function
        (iii)   ORDER BY clause   (iv) LIKE predicate
        (v)   Asterisk (*)

Q.45   Consider the relations given below
        Borrower (id-no, name)
        Book (accno., title, author, borrower-idno)
        (a) Define the above relations as tables in SQL making real world assumptions about the type of the fields. Define the primary keys and the foreign keys.
        (b)   For the above relations answer the following queries in SQL
          (i) What are the titles of the books borrowed by the borrower whose id-no in 365.
          (ii) Find the numbers and names of borrowers who have borrowed books on DBMS in ascending order in id-no.
          (iii) List the names of borrowers who have borrowed at least two books.

Q.46

a. Describe the structure of Oracle data dictionary.

b. In Oracle what is system global area and how is it organized?

c. Write a short note on QBE.

Q.47

a. Explain the recovery process of a checkpoint mechanism. How does the frequency of checkpoints affect
   (i)   system performance when no failure occurs.
   (ii)   the time it takes to recover from a system crash.
b. Write short notes on
   (i)   hash file organization.
 (ii)   physical and logical independence

Q.48

a. Explain the difference between physical and logical data independence.
b. Explain the difference between a file-oriented system and a database oriented system.

Q.49

a. Consider the relations
                Person (name, address)
               Car (reg_no, cost, model)
               Own (pname, reg_no)
          Write SQL Queries for the following :-
          (i)   Get the names of persons who live in 'Delhi'.
          (ii)   Get the models of cars which cost more than Rs.2,00,000/-.
          (iii)   Get the names of persons who do not own cars.
          (iv)   Get the names of persons, the reg_no of cars they own and the models of the
                   cars.
b. For the relation Car in (a) above express the constraint in SQL that cars cannot cost more than
   Rs.20,00,000/- as a **check** clause.

Q.50

a. What is locking? Explain the advantages and disadvantages of two phase locking.
b. What is a deadlock? What is wait-for graph and how can it be used for deadlock detection.

Q.51

a. Discuss the ACID properties of a database transaction.
 b. Define primary key, candidate key, foreign key and super key with an example.

Q.52

a. Explain serial, serializable and non-serializable schedule with the help of an example.
 b. What is relation algebra? Explain the set operations with an example each.

Q.53

a. Given the relations
               Supplier (S#, SNAME, STATUS, CITY)
               Part (P#, PNAME, COLOR, WEIGHT, CITY)
               Supply (S#, P#, CITY)
               Write QBE for the following :
                    (i) Get the supplier numbers of suppliers who supply both part P1 and P2.

(ii) Get the supplier numbers of suppliers who are located in Delhi or have status > 20 (or both).

(iii) Get the supplier names of suppliers who supply at least one blue part.

b. What is a Data Dictionary? Explain how this concept is useful.

Q.54
a. Describe the three level architecture of DBMS. Explain how it is useful for achieving data independence.

b. What are the responsibilities of DBA? Explain briefly.

Q.55
a. Explain the search algorithm for index sequential access method.

b. Compare the relational model with the network model.

Q.56 Write short notes on any **FOUR** of the following :
(i)   Triggers.
(ii)   DBTG data structures.
(iii)   Multivalued - dependency.
(iv)   **Group by** clause in SQL.
(v)   Advantages and disadvantages of a DBMS.

Q.57
a. Discuss the main advantages of using a DBMS.

b. What are the different types of database end users? Discuss the main activities of each.

Q.58
a. Describe the three-schema architecture.

b. Discuss the typical user friendly interfaces and the types of users who use each.

Q.59
a. Differentiate between
(i)   Procedural and non procedural languages.
(ii)   Key and superkey.
(iii)   Primary and secondary storage.

b. With the help of an example show how records can be deleted and updated in QBE.

Q.60
a. Describe cardinality ratios and participation constraints for relationship types.

b. Information about a bank is about customers and their account. Customer has a name, address which consists of house number, area and city, and one or more phone numbers. Account has number, type and balance. We need to record customers who own an account. Account can be held individually or jointly. An account cannot exist without a customer.

Arrive at an E-R diagram. Clearly indicate attributes, keys, the cardinality ratios and participation constraints.

Q.61

a. Describe the static hash file with buckets and chaining and show how insertion, deletion and modification of a record can be performed.

b. What are the reasons for having variable length records? What types of separator characters are needed for each?

Q.62   Define the following terms

       (i)   Derived and stored attribute.
       (ii)   Distributed system.
       (iii)   Interblock gap.
       (iv)   Degree of a relation.
       (v)   Catalog.
       (vi)   Conceptual schema.
       (vii)   DDL and SDL.

Q.63

a. Define a relation.

b. Describe entity integrity and referential integrity. Give an example of each.

c. Consider the two relations given below

R   S

A	B	C
a1	b1	c1
null	b2	null
a1	b1	c1

D	A	F
		f1
d1	a2	null

Given that A is the primary key of R, D is the primary key of S and there is a referential integrity between S.A and R.A, discuss all integrity constraints that are violated.

Q.64 Given the following relations

     TRAIN (NAME, START, DEST)
     TICKET (PNRNO., START, DEST, FARE)
             PASSENGER (NAME, ADDRESS, PNRNO.)

     Write SQL expressions for the following queries:

     (i) List the names of passengers who are travelling from the start to the destination station of the train.

     (ii) List the names of passengers who have a return journey ticket.

     (iii) Insert a new Shatabdi train from Delhi to Bangalore.

     (iv) Cancel the ticket of Tintin.

Q.65

a. Define outer union operation of the relational algebra. Compute the outer union for the relations R ans S given below.

R

A	B	C
a1	b1	c1
a3	b2	c2

S

D	A	F
d1	a1	f1
d1	a2	null

b.Given the following relations

        Vehicle (Reg_no, make, colour)
        Person(eno, name, address)
        Owner(eno, reg_no)
        Write expressions in the relational algebra to answer the following queries:-
        (i)   List the reg_no of vehicles owned by John.
        (ii)   List the names of persons who own maruti cars.
        (iii)   List all the red coloured vehicles.

Q.66

a. Describe DROP TABLE command of SQL with both the options CASCADE and RESTRICT
b. With respect to Oracle describe the following:
        (i)   Data Block.
      (ii)   Data dictionary.
      (iii)   Segments.

Q.67

a. Briefly describe the different kinds of users of a DBMS.
b. Define the concept of aggregation. Give two examples where this concept is useful.
c. Explain the following. Give an example
       (i) Superkey
       (ii) Weak entity set
       (iii) Attribute inheritance

Q.68

a. Define the following
        (i)   A relation.
        (ii)   Atom of domain relational calculus.
b. Given the relations R(A, B, C) and S(C,D,E,F) give an expression in tuple relational calculus that is equivalent to each of the following
   (i) $\Pi_{A,B,C}(R)$ (ii) $\sigma_{E=10}(S)$
   (iii)   (iv)

  Q.69 Given the relations Staff (staffNo, position, salary) and Property (number, rent, staffNo) given below. The staff looks after a given property.

Staff

staffNo	position	salary
SL21	Manager	50000.00
SL37	Assistant	15000.00
SG14	Supervisor	25000.00
SG5	Manager	45000.00

Property

Number	Rent	Staffno
PA14	5000.00	SL21
PG4	6000.00	SG5
PL94	10000.00	SL21

Give the result table for the following SQL queries

(i) SELECT   position, COUNT(staffNo) AS POS, my count
     FROM   Staff

(ii) SELECT   staffNo
     FROM   Staff
     WHERE   salary > (SELECT AVG(salary) FROM Staff)

(iii) SELECT   staffNo
      FROM   Property
      GROUP By   staffNo
      HAVING   COUNT(*) > 1

(iv) INSERT INTO   Staff
     VALUES   ('SG33', 'Assistant')

Q.70

a. Derive the union rule, decomposition rule and the pseudotransitvity rule using the three Armstrong's axioms.
b. Define multivalued dependency. What do understand by trivial multivalued dependency?
c. Given R(A, B, C, D, E) and M the set of multivalued dependencies

       (i)

       (ii)

       (iii)

       Is R in 4NF? Justify your answer. If it is not, decompose R into 4NF.

Q.71

a. Describe the four main ways of optimising disk block access.
b. Describe the algorithm for updating indices for a single level index when a record is
       (i) inserted   (ii) deleted

What will be the modification if there are multilevel indices.

Q.72
a. How do you estimate the query cost for natural join when
(i)
(ii)   is a foreign key
b. Given two relations R (A,B) and S (B,C) with number of tuples in R and S equal to 500 and 1000 respectively and B is the foreign key in R, what is the number of tuples in
.
c. Explain Thomas' Write rule. Show how it is different from timestamp ordering protocol.

Q.73
a. Explain
(i) recoverable schedule.   (ii) cascadeless schedule.
b. Define two-phase locking protocol.
c. Consider the following two transactions
T1 : read (A);
read (B);
B = A + B;
write (B)
T2 : write (A)
read (B)
Add lock and unlock instructions so that the transaction T1 and T2 observe two-phase locking protocol. Is it deadlock free?

Q.74
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SQL Queries

Answer all Questions

Vacation Database
The vacation database has 4 tables. The main table is the Employee table. Every employee is identified by an employee id. Each employee belongs to a department. An employee can request Vacation Days and they go into the Request Dates.
Not all request dates are accepted, and sometimes employees take vacation days with out requesting them. There are two types of vacation days either a full day or half a day. This information is stored in the column 'type' of the tables RequestDays and DaysTaken
Vacation type field can have two values, either SickDay or VacationDay
Using the information above, perform the following Queries
1. Get the names of all employees
2. Get the names of all employees who never took a vacation day
3. Get the employee information who are in the 'Marketing' department
4. Which of the employees took vacation days with out requesting them
5. How many vacation days did 'John Smith' take?
6. Which department took most vacation days
7. Get the names of all employees whose name has an 'm' in their middle names
8. How many employees live in NY state
9. Get the employees who have requested one or more sick days in their 30 days of employment -
(HINT: you can use a function called DateAdd(data,days) .You could do DateAdd(StartDate,30) to get the day which is 30 days from the Start date. Using this find out the sickdays that are in that range)
10. Delete 'John Smith' from our database

Student Database
The Student database has three tables. The Student table holds information about a student. The Offerings table has information about an offering of a course for a particular semester/year. Semester can contain 3 values – Fall, Spring , Summer. ST_REG table contains information on which student has registered for what course and what is the grade he has obtained
Using the above information answer the following queries
11. What courses did 'Sam Fisher' take?
12. Get the names of the courses that were offered in 2004
13. Get the names of students who got an A in all the courses they have taken
14. Get the total number of courses that were offered ever
15. Which courses have more than one section in 2004
16. What is the enrollment for CS 649 001
17. Get the names of students who enrolled for CS 649 001
18. Get instructor Id's and the total number of students they have ever thought in descending order
19. How many departments are in our database?
20. How many students are enrolled for the Fall 2004 semester?

<u>Answer all queries</u>
1. Get the names of all antique owners
2. Who desired a table?
3. Who purchased a 'Table'?
4. Which users purchased the items they desired?
5. What items did Sam flower buy?
6. Who sold what items to whom?
7. Get the buyer id's who aren't antique owners before
8. Get names of Antique Owners whose owner Id lies between 2 and 21
9. Who Desired a Table and a Desk?
10. Get sum of all OwerIds

AntiqueOwners

OwnerID	OwnerLastName	OwnerFirstName
01	Jones	Bill
02	Smith	Bob
15	Lawson	Patricia
21	Akins	Jane
50	Fowler	Sam

Orders

OwnerID	ItemDesired
02	Table
02	Desk
21	Chair
15	Mirror

Antiques

SellerID	BuyerID	Item

01	50	Bed
02	15	Table
15	02	Chair
21	50	Mirror
50	01	Desk
01	21	Cabinet
02	21	Coffee Table
15	50	Chair
01	15	Jewelry Box
02	21	Pottery
21	02	Bookcase
50	01	Plant Stand