Database Management System (DBMS)

Notes for Grade 10 Computer Science - SEE/NEB Preparation

Prepared for Distribution

Key Focus: Concepts, Definitions, Examples, and Practice Questions

1. Database [SEE 2074] [SEE 2073] [SEE 2073 U] [SLC 2072] [SEE 2071 S] [SLC 2064] [SLC 2065]

A database is an organized collection of related information so that it is easily accessible, manageable, and updated.

Examples: Dictionary (words and meanings), Marks Ledger (student roll nos., names, scores), Telephone Directory (names and phone numbers).

2. Electronic Database [SQE 2075K]

An electronic database refers to an organized collection of data stored in a computer storage in such a way that its content is accessible.

Example: A digital phone book app where you can search names instantly.

3. Computerized Database [SQE 2075K]

Advantages:

a) It can store a large volume of data and is very fast to find a specific record.

b) Data is sorted into ascending or descending order on multiple criteria.

c) The database is secured by use of passwords.

d) We can search data very easily.

e) Modification is very easy in comparison to manual database.

Example: Using MS-Access to quickly sort student marks by name and grade.

4. Non-Computerized Database

Limitations:

It is limited by physical storage availability (e.g., paper files fill up space).

It takes more time to manually search through all of the records.

Difficult for sorting data on more than one criteria (e.g., sort by name then marks manually).

The only security would be locking up the records (e.g., filing cabinet key).

Example: A handwritten ledger book where finding one student's marks requires flipping pages.

Comparison Table: Computerized vs. Non-Computerized Database

Aspect	Computerized Database	Non-Computerized
Storage	Large volume, digital	Limited by physical
Search Speed	Fast, automated	Slow, manual
Sorting	Multiple criteria, easy	Single criteria, difficult
Security	Passwords, encryption	Physical locks only
Modification	Quick edits	Time-consuming rewriting

5. Data [SEE 2073] [SLC 2064] [SLC 2070] [SLC 2065 S] [SLC 2069 S]

Data can be numbers, letters, or symbols representing raw facts and figures about any context, subject matter, or entity. It may or may not give complete sense.

Examples: "Ram" (name), "student" (role), "20" (age), "87" (marks), "Kopila" (single word).

6. Information [SLC 2070]

Information is an organized collection of related data about a specific topic, context, or subject matter, which gives a complete sense.

Example: "Ram is a student. He is 20 years old and scored 87 marks." (Combines raw data into meaningful sentence).

Key Difference: Data is raw (e.g., isolated numbers); Information is processed (e.g., analyzed report).

7. DBMS (Database Management System) [SEE 2075 U] [SEE 2074 U] [SLC 2066] [SLC 2067] [SLC 2067 S] [SLC 2069 S] [SQC 2075K]

DBMS is a software tool which helps to store, extract, view, and manipulate data in an organized way. In DBMS, data can be accessed, managed, and updated easily.

Examples: MS-Access (for small databases), Oracle (for large enterprises), FoxPro, DBase.

Updated Note: DBMS acts like a librarian for digital data—organizes, retrieves, and protects it efficiently.

8. RDBMS (Relational Database Management System) [SQE 2074]

RDBMS is a database management system that is based on the relational model in which data is stored in the form of tables and the relationships among the data are also stored in the form of tables.

Examples: SQL Server, MS-Access, Oracle.

Example: In a school database, one table for students (ID, Name) links to another for marks (Student ID, Subject, Score) via shared ID.

9. Importance/Advantages of DBMS/Computerized Database [SEE 2075] [SLC 2071]

a) It controls data redundancy (avoids duplicates).

b) Large volume of data can be stored and updated easily.

c) It allows sharing the existing data by different programs.

d) It provides high security of data (e.g., user permissions).

Additional Example: In a bank DBMS, customer details aren't repeated in every transaction record, saving space and reducing errors.

10. MS-Access

MS-Access is a relational database management system developed by Microsoft Corporation which is used to store and manipulate large volumes of data in the form of tables.

Updated Note: Ideal for small-scale applications like school record-keeping; includes tools for forms, queries, and reports.

11. Objects of MS-Access [SEE 2074 U] [SLC 2071]

a) Table

b) Form

c) Query

d) Report

Visual Aid: Imagine MS-Access as a toolbox: Table (storage box), Form (entry form), Query (search tool), Report (printout generator).

12. Define Table

Table is an object of MS-Access that stores large volumes of data in the form of rows and columns.

Creation Methods:

i) Design View (custom fields).

ii) Using Wizard (guided setup).

iii) Datasheet View (direct entry).

Example Table: Student Marks

Roll	Name	Marks
1	Kopila	87
2	Rabin Rana	56

13. Form [SEE 2073 U] [SLC 2064] [SLC 2066] [SLC 2068] [SLC 2065 S] [SLC 2069 S] [SQE 2075K] [SQE 2074]

Form is an object of MS-Access which provides a graphical user interface (GUI) to enter data into the table.

Creation Methods:

i) By using Auto Forms features (quick one-click).

ii) By using the Form Wizard features (step-by-step).

iii) By using your own in Design View (custom layout).

Example: A form with labeled boxes for "Roll No.," "Name," and "Marks" makes data entry like filling a printed application.

14. Importance/Function/Advantages of Form [SEE 2075] [SLC 2064] [SLC 2066] [SLC 2065 S] [SLC 2070 S] [SQE 2074]

a) It provides an interactive platform for input of data into the database.

b) It helps to display data in a more presentable form than a datasheet.

Additional: Reduces errors by guiding input (e.g., drop-down for gender).

15. Advantages of Form Over Table [SLC 2066] [SLC 2070]

a) It prevents wrong entry of data (e.g., validation for numbers only).

b) It uses graphical interfaces to present fields in any arrangement.

c) It shows only the information we want to see (e.g., hide sensitive fields).

d) It can display one complete record at a time (user-friendly view).

Example: Table shows all 100 students at once (overwhelming); Form shows one student's details with photos/buttons.

16. Query [SEE 2075 U] [SEE 2075 S2] [SLC 2072] [SLC 2065] [SLC 2069] [SEE 2066 S] [SLC 2068 S] [MM 2076] [PMT 2075K]

Query is an object of MS-Access which extracts, updates, and modifies records from the table and/or query meeting the set criteria.

Types:

i) Select Query.

ii) Action Query (Sub-types: Update Query, Append Query, Delete Query, Make-Table Query).

Example: Query to find "all students with marks > 80" from the table.

17. Purposes of Query in MS-Access [PMT 2075K]

a) To view records including some fields or all fields of a table or multiple linked tables.

b) To perform mathematical calculations (e.g., average marks).

c) To sort the records on the basis of one or more key fields.

d) To perform mass update, delete, or append new records to a table.

Additional Example: Calculate total class average or update all "pass" statuses automatically.

18. Select Query

A select query extracts specific records from one or more tables/queries in a database. It cannot make changes in records of the table.

Example: "SELECT Name, Marks FROM Students WHERE Marks > 70" – views qualifying students without altering data.

19. Action Query

Action query makes changes to many records in just one operation like update, add, modify, and delete records.

Example: Bulk-change all failing marks to "Retake" in one click.

20. Update Query

Update query makes global changes to a group of records in one or more tables.

Example: Increase all salaries by 10% in an employee table.

21. Append Query

The use of append query is to add a group of records at the end of existing tables.

Example: Add new semester results from one table to the main archive table.

22. Delete Query

Delete query removes a group of records meeting criteria from a table.

Example: Delete old inactive student records (e.g., graduated before 2070).

23. Make-Table Query

Make-Table query creates a new table from selected records or calculations.

Example: Create a "Top Performers" table from students with marks > 90.

24. Report [SEE 2074 U] [SEE 2071 S] [SLC 2070] [SLC 2067 S]

Report is an object of MS-Access. It displays the output in a structured format to present the data in a print format.

Creation Methods:

i) Using Design View.

ii) Using Report Wizard.

Example: A formatted marksheet with headers, totals, and borders for printing.

25. Why is Report Created? [SEE 2075 U] [SLC 2067]

Report is created to print documents according to user's specifications. It summarizes information through query or table.

Example: Annual school report summarizing pass/fail rates with charts.

26. Data Type [SEE 2075 S2] [SEE 2074] [SEE 2073] [SLC 2072] [SLC 2064] [SLC 2066] [SLC 2070]

Data type is an attribute of a field that determines what type of data it can contain. Any four data types of MS-Access are:

i) Text

ii) Number

iii) Memo

iv) Currency

27. Suitable Data Types for Teacher Information [SLC 2065] [SLC 2068 S]

- Teacher's Name: Text

- Address: Text (or Memo for long addresses)

- Salary: Currency

- Date of Birth: Date/Time

Example Table:

Field	Data Type	Example Value
Name	Text	"Pitambar"
Address	Text	"Lagankhel"
Salary	Currency	NPR 50,000
DOB	Date/Time	15/05/1980

28. Identify Record, Field, and Value [SQE 2074]

From Table:

Roll	Name	Marks
1	Kopila	87
2	Rabin Rana	56

- Record: Complete row, e.g., Record 1 = (1, Kopila, 87); Record 2 = (2, Rabin Rana, 56).

- Field: Column, e.g., Roll, Name, Marks.

- Value: Specific entry, e.g., "Kopila" (in Name field), 87 (in Marks field).

29. What Happens When Text is Entered in a Numeric Field?

If we enter text in a numeric field, then it displays an error (e.g., "Data type mismatch").

Example: Typing "ABC" in Marks field shows error; must enter numbers like 87.

30. Text Data Type

Stores text or combination of text and numbers. It can store up to 255 characters.

Example: Phone number "9841000000" or name "Rabin Rana".

31. Memo Data Type

Stores lengthy text and numbers. It can store up to 65,535 characters.

Example: Student bio or long address description.

32. Field Properties

The four types of field properties of MS-Access are:

i) Caption

ii) Format

iii) Validation Rule

iv) Input Mask

33. Input Mask

Input mask is a field property that controls the value of a record and sets it in a specific format.

Example: For phone: () - forces entry like (984) 100-0000.

34. Caption

Caption is a field property and displays an alternate name for the field to make the field name more explanatory. It can contain up to 2048 characters.

Example: Field "DOB" caption: "Date of Birth (DD/MM/YYYY)".

35. Validation Rule

Validation rule limits values that can be accepted into a field.

Example: For age: >18 AND <65 (rejects invalid entries).

36. Validation Text

Validation text is the error message displayed when the validation rule is violated.

Example: "Age must be between 18 and 65!"

37. Field Size

Field size is a field property that specifies the maximum number of characters allowed in the field.

Example: Text field size=10 limits to 10 chars (e.g., short codes).

38. Format

The use of 'Format' field property is to display data in a different format.

Example: Date format: dd/mm/yyyy (displays 15/05/1980 instead of serial number).

39. Lookup Wizard

It allows choosing a value from another table or from a list of values by using a list box or combo box.

Example: Drop-down for "Class" from a Classes table (Grade 10, 11).

40. Hyperlink

It stores hyperlink addresses like email addresses, websites, database objects, or other fields.

Example: Field with "www.example.com" clickable to open browser.

41. Indexing

Indexing speeds up searching and storing of records using a field.

Example: Index on "Name" field makes name searches 10x faster in large tables.

42. Relationship

Relationship is an association among several entities (tables). Its types are:

i) One-to-One (e.g., Student ID links to unique Profile).

ii) One-to-Many (e.g., One Teacher to Many Students).

iii) Many-to-Many (e.g., Students to Multiple Subjects via junction table).

43. Referential Integrity

Referential integrity is a set of rules used by RDBMS to make sure that the relationships between tables are valid and that the related data is not accidentally changed or deleted.

Example: Can't delete a teacher if students still reference them (prevents orphans).

44. Record [SEE 2075 S2]

Record is a complete set of related data about an entity. It is a collection of multiple related fields in a row and gives complete information about a person or thing.

Example:

| Name | Address | Mobile |

|----------|----------|-----------|
| Pitambar | Lagankhel| 9841000000 |

(This full row is one record for Pitambar.)

45. Field [SEE 2075 S2]

Field is a small unit of information. A column in a table is a field. It contains a specific piece of information within a record.

Examples: Name, Address, Mobile Number.

46. Sorting [SEE 2073 U] [SLC 2068]

Sorting is the process of arranging records in ascending or descending order according to a given field or fields. Sorted data is easier to handle than unsorted data.

Advantages:

i) It helps to find specific information quickly.

ii) It helps to arrange data in order.

Example: Sort students by Marks (ascending: 56, 87) or Name (A-Z: Kopila, Rabin).

47. Filtering

Filtering is an option that selects the records and displays the result.

Example: Filter table to show only "Marks > 60" – hides low scorers.

48. Primary Key [SEE 2075] [SEE 2073] [SEE 2071 S] [SLC 2067] [MM 2076] [PMT 2075K]

A key field that uniquely identifies each record in a database is a primary key. It accepts neither duplicate values nor null values.

Example: Student Roll No. (unique, no blanks/duplicates).

49. Uses of Primary Key [SLC 2069]

i) Reduces and controls duplication (redundancy) of records in a table.

ii) Used to create relationships between tables.

Example: Roll No. as primary key links Students table to Marks table.

50. Composite Key

The group of primary key that consists of two or more attributes is a composite key.

Example: (Student ID + Subject) uniquely identifies a mark entry.

51. Foreign Key

Foreign key is a unique field or combination of fields in a referenced/linked table whose value matches with a primary key of another table.

Example: Marks table has "Student ID" as foreign key matching primary in Students table.

52. Data Redundancy [SEE 2074]

Data redundancy means repetition of the same piece of data in a database in more than one location. Use of primary key and foreign key shared by tables reduces data redundancy. In addition, database normalization also reduces data redundancy.

Example: Without keys: Name repeated in every transaction. With keys: Store name once, reference by ID.

53. Data Types Table (Full Syllabus)

Type of Data	Description	Size

Data Type	Description	Size
Text	Text or combinations of text and numbers, including numbers that do not require calculating (e.g., phone numbers).	Up to 255 characters.
Memo	Lengthy text or combinations of text and numbers.	Up to 65,535 characters.
Number	Numeric data used in mathematical calculations.	1(Byte), 2(Integer), 4(Long Integer or Single), or 8(double) bytes (16 bytes if set to Replication ID).
Date/Time	Date and time values for the years 100 through 9999.	8 bytes.
Currency	Currency values and numeric data used in mathematical calculations involving data with one to four decimal places.	8 bytes.
AutoNumber	A unique sequential (incremented by 1) number or random number assigned by Microsoft Access whenever a new record is added to a table.	4 bytes (16 bytes if set to Replication ID).
Yes/No	Yes and No values and fields that contain only one of two values (Yes/No, True/False, or On/Off).	1 byte.
Attachment	Files, such as digital photos. Multiple files can be attached per record. This data type is not available in earlier versions of Access.	Up to about 2 GB.
OLE Objects	OLE objects can store pictures, audio, video, or other BLOBs (Binary Large Objects).	Up to about 2 GB.
Hyperlink	Text or combinations of text and numbers stored as text and used as a hyperlink address.	Up to 2048 characters.
Lookup Wizard	The Lookup Wizard entry in the Data Type column in the Design view is not actually a data type. When you choose this entry, a wizard starts to help you define either a simple or complex lookup field. A simple lookup field uses the contents of another table or a value list to validate the contents of a single value per row. A complex lookup field allows you to store multiple values of the same data type in each row.	Dependent on the data type of the lookup field.

| Calculated | You can create an expression that uses data from one or more fields. You can designate different result data types from the expression. | Calculated (size based on result type). |

Note: In Access 2013+, Text is "Short Text" and Memo is "Long Text."

Practice Questions with Answers

Instructions: These cover all topics. Use for self-assessment. Answers include explanations for concept clarity.

MCQs (1 Mark Each)

1. What is a database?

   a) Random collection of files

   b) Organized collection of related information

   c) Only numbers and symbols

   d) Manual ledger only

   Answer: b) Organized for easy access/update (e.g., Telephone Directory).

2. Which is NOT an advantage of computerized database?

   a) Fast search

   b) Multi-criteria sorting

   c) Limited by physical storage

   d) Password security

   Answer: c) This is a limitation of non-computerized (manual) databases.

3. Data vs. Information: "Ram, 20" is:

   a) Information

   b) Data

   c) Both

d) Neither

Answer: b) Raw facts; becomes info as "Ram is 20 years old."

4. DBMS Example:

a) MS-Word

b) MS-Access

c) MS-Excel (only spreadsheets)

d) Paint

Answer: b) Software for organized data management.

5. RDBMS stores data in:

a) Files

b) Tables with relationships

c) Images

d) Audio

Answer: b) E.g., SQL uses tables for links.

6. MS-Access Object for data entry GUI:

a) Table

b) Query

c) Form

d) Report

Answer: c) Interactive like a form.

7. Query type that changes data:

a) Select

b) Action (Update/Append)

c) Both

d) Neither

Answer: b) Select only views; Action modifies.

8. Primary Key property:

   a) Allows duplicates

   b) No nulls/duplicates

   c) Text only

   d) Long text

   Answer: b) Unique identifier (e.g., Roll No.).

9. Data Type for Salary:

   a) Text

   b) Number

   c) Currency

   d) Memo

   Answer: c) Handles decimals (e.g., NPR 25,500.50).

10. Sorting arranges data in:

    a) Random order

    b) Ascending/Descending

    c) Only ascending

    d) No order

    Answer: b) E.g., A-Z names.

 Short Answer Questions (2-3 Marks Each)

11. Differentiate Data and Information with examples.

Answer: Data: Raw facts (e.g., "87", "Kopila"). Information: Organized data with meaning (e.g., "Kopila scored 87 in Math"). Data lacks context; info provides complete sense.

12. List 3 advantages of DBMS.

Answer: a) Controls redundancy (no duplicates). b) Easy storage/update of large data. c) High security (passwords). Example: Shared school database avoids re-entering student info.

13. Explain Form vs. Table advantages.

Answer: Forms prevent errors, use GUI for arrangement, show selective info, display one record. Tables are grid-like, less user-friendly for input. Example: Form for teacher salary entry with validation.

14. What is a Select Query? Give purpose.

Answer: Extracts records without changes. Purposes: View fields, calculations (e.g., average), sorting. Example: "Show names with marks >80."

15. Define Primary and Foreign Key with example.

Answer: Primary: Unique ID (e.g., Student Roll). Foreign: Matches primary in another table (e.g., Roll in Marks table). Reduces redundancy.

 Identification/Practical Questions (3-5 Marks Each)

16. From Table, Identify Record/Field/Value:

Roll	Name	Marks
3	Sita	92

Answer: Record: (3, Sita, 92). Field: Roll, Name, Marks. Value: "Sita" (Name field).

17. Suggest Data Types for Library Book Table (Title, ISBN, Price, Publish Date).

Answer: Title: Text. ISBN: Text (alphanumeric). Price: Currency. Publish Date: Date/Time. Explanation: Text for non-calc, Currency for money.

18. What error if text in Number field? Example.

Answer: "Data type mismatch" error. Example: Entering "Fail" in Marks shows error; enter 56 instead.

19. Explain Referential Integrity with example.

Answer: Rules ensure valid links (no orphans). Example: Can't delete Student ID if Marks table references it—prevents lost data.

20. Sort/Filter Example: Students table (Kopila-87, Rabin-56).

Answer: Sort by Marks (ascending): Rabin-56, Kopila-87. Filter >60: Only Kopila-87. Advantage: Quick analysis.

21. Why use Report? Creation method.

Answer: For printed summaries (e.g., class report card). Method: Report Wizard (guided) or Design View (custom).