**Computer Network question**

**Q1.What is the backbone network?**

**Answer** A backbone network is a centralized infrastructure that is designed to distribute different routes and data to various networks. It also handles the management of bandwidth and multiple channels.

**Q2 What is a subnet mask?**

**Answer** A subnet mask is combined with an IP address to identify two parts: the extended network address and the host address. Like an IP address, a subnet mask is made up of 32 bits**.**

### Q3. What is a VPN?

**Answer** VPN means Virtual Private Network, a technology that allows a secure tunnel to be created across a network such as the Internet. For example, VPNs allow you to establish a secure dial-up connection to a remote server.

### Q4. What are proxy servers, and how do they protect computer networks?

**Answer** Proxy servers primarily prevent external users who are identifying the IP addresses of an internal network. Without knowledge of the correct IP address, even the physical location of the network cannot be identified. Proxy servers can make a network virtually invisible to external users.

### Q5. What is Ping?

**Answer** Ping is a utility program that allows you to check connectivity between network devices on the network. You can ping a device by using its IP address or device name, such as a computer name.

### Q6. What is ipconfig?

**Answer** Ipconfig is a utility program that is commonly used to identify the addresses information of a computer on a network. It can show the physical address as well as the IP address.

### Q7 What is multicast routing?

**Answer** Multicast routing is a targeted form of broadcasting that sends a message to a selected group of the user instead of sending it to all users on a subnet.

### Q8. What is an IPv4 address? What are the different classes of IPv4?

**Answer** An IP address is a 32-bit dynamic address of a node in the network. An IPv4 address has 4 octets of 8-bit each with each number with a value up to 255.

IPv4 classes are differentiated based on the number of hosts it supports on the network. There are five types of IPv4 classes and are based on the first octet of IP addresses which are classified as Class A, B, C, D, or E.

| **IPv4 Class** | **IPv4 Start Address** | **IPv4 End Address** | **Usage** |
| --- | --- | --- | --- |
| A | 0.0.0.0 | 127.255.255.255 | Used for Large Network |
| B | 128.0.0.0 | 191.255.255.255 | Used for Medium Size Network |
| C | 192.0.0.0 | 223.255.255.255 | Used for Local Area Network |
| D | 224.0.0.0 | 239.255.255.255 | Reserved for Multicasting |
| E | 240.0.0.0 | 255.255.255.254 | Study and R&D |

### Q9. Name two technologies by which you would connect two offices in remote locations.

### Answer Two technologies that would connect two offices in remote locations are [VPN](https://www.geeksforgeeks.org/virtual-private-network-vpn-introduction/) and [Cloud computing](https://www.geeksforgeeks.org/cloud-computing/).

### Q10. What is the meaning of threat, vulnerability, and risk?

**Answer Threats** are anything that can exploit a vulnerability accidentally or intentionally and destroy or damage an **asset**. An asset can be anything people, property, or information. The asset is what we are trying to protect and a threat is what we are trying to protect against. **Vulnerability** means a gap or weakness in our protection efforts.

Risk is nothing but an intersection of assets, threats, and vulnerability.

### Q11 . Why do we need the pop3 protocol for e-mail?

**Answer Need of POP3:**The [Post Office Protocol (POP3)](https://www.geeksforgeeks.org/pop-full-form/) is the most widely used protocol and is supported by most email clients. It provides a convenient and standard way for users to access mailboxes and download messages. An important advantage of this is that the mail messages get delivered to the client’s PC and they can be read with or without accessing the web.

### Q12 What is the RSA algorithm?

**Answer** RSA is short for the Rivest-Shamir-Adleman algorithm. It is the most commonly used public-key encryption algorithm in use today.

### Q13 What is a Hamming code?

**Answer** [Hamming code](https://www.guru99.com/hamming-code-error-correction-example.html) is a liner code that is useful for error detection up to two immediate bit errors. It is capable of single-bit errors.

### Q14 What is the RSA algo?

**Answer** RSA is short for the Rivest-Shamir-Adleman algorithm. It is the most commonly used public-key encryption algorithm in use today

### Q15 What is multiplexing in networking?

**Answer** In Networking, multiplexing is the set of techniques that is used to allow the simultaneous transmission of multiple signals across a single data link.

### Q16 What is NIC?

**Answer** NIC stands for Network Interface Card. It is a peripheral card **attached to the PC to connect to a network. Every NIC has its own MAC** address that identifies the PC on the network.

### Q17 What is anonymous FTP?

**Answer** Anonymous FTP is used to grant users access to files in public servers. Users which are allowed access to data in these servers do not need to identify themselves, but instead log in as an anonymous guest.

### Q18 Explain the term Pipelining

**Answer** Pipelining describes the sequencing of processes. When any new task begins before an ongoing task is finished, it is called sequencing.

### Q19 What are the advantages of a Modem?

**Answer** Here, are pros/advantage of Modem:

* More useful in connecting LAN with the Internet
* Speed depends on the cost
* The Modem is the most widely used data communication roadway.

### Q20 What is a Digital Signal?

**Answer** A digital signal is a signal that is used to represent data as a sequence of separate values at any point in time. It can only take on one of a fixed number of values. This type of signal represents a real number within a constant range of values.

**QUESTIONS OF DBMS**

**Q1) What is RDBMS?**

RDBMS stands for Relational Database Management Systems. It is used to maintain the data records and indices in tables. RDBMS is the form of DBMS which uses the structure to identify and access data concerning the other piece of data in the database.

**Q2) What is a checkpoint in DBMS?**

The Checkpoint is a type of mechanism where all the previous logs are removed from the system and permanently stored in the storage disk.

**Q3) What do you mean by transparent DBMS?**

The transparent DBMS is a type of DBMS which keeps its physical structure hidden from users. Physical structure or physical storage structure implies to the memory manager of the DBMS, and it describes how the data stored on disk.

**Q4) How many types of database languages are?**

There are four types of database languages:

* **Data Definition Language (DDL)** e.g., CREATE, ALTER, DROP, TRUNCATE, RENAME, etc.
* **Data Manipulation Language (DML)** e.g., SELECT, UPDATE, INSERT, DELETE, etc. These commands are used for the manipulation of already updated data that's why they are the part of Data Manipulation Language.
* **DATA Control Language (DCL)** e.g., GRANT and REVOKE.
* **Transaction Control Language (TCL)** e.g., COMMIT, ROLLBACK, and SAVEPOINT.

**Q5) What is a degree of Relation?**

The degree of relation is a number of attribute of its relation schema. A degree of relation is also known as Cardinality it is defined as the number of occurrence of one entity which is connected to the number of occurrence of other entity. There are three degree of relation they are one-to-one(1:1), one-to-many(1:M), many-to-one(M:M).

**Q6) What do you understand by query optimization with example?**

The term query optimization specifies an efficient execution plan for evaluating a query that has the least estimated cost

**Q7) What do you mean by extension and intension?**

**Extension:** The Extension is the number of tuples present in a table at any instance. It changes as the tuples are created, updated and destroyed. The actual data in the database change quite frequently. So, the data in the database at a particular moment in time is known as extension or database state or snapshot. It is time dependent.

**Intension:** Intension is also known as Data Schema and defined as the description of the database, which is specified during database design and is expected to remain unchanged.

**Q8) What is System R? How many of its two major subsystems?**

System R was designed and developed from 1974 to 1979 at IBM San Jose Research Centre. System R is the first implementation of SQL, which is the standard relational data query language, and it was also the first to demonstrate that RDBMS could provide better transaction processing performance. It is a prototype which is formed to show that it is possible to build a Relational System that can be used in a real-life environment to solve real-life problems.

Following are two major subsystems of System R:

* Research Storage
* System Relational Data System

**Q9) What is BCNF?**

**BCMF** stands for **Boyce-Codd Normal Form**. It is an advanced version of 3NF, so it is also referred to as 3.5NF. BCNF is stricter than 3NF.

A table complies with BCNF if it satisfies the following conditions:

* It is in 3NF.

**Q10) What is the difference between a DELETE command and TRUNCATE command?**

**DELETE command**: DELETE command is used to delete rows from a table based on the condition that we provide in a WHERE clause.

* DELETE command delete only those rows which are specified with the WHERE clause.
* DELETE command can be rolled back.
* DELETE command maintain a log, that's why it is slow.
* DELETE use row lock while performing DELETE function.

**TRUNCATE command**: TRUNCATE command is used to remove all rows (complete data) from a table. It is similar to the DELETE command with no WHERE clause.

* It merely means that X cannot be a non-prime attribute if Y is a prime attribute.

**Q11) What is a stored procedure?**   
A stored procedure is like a function that contains a set of operations compiled together. It contains a set of operations that are commonly used in an application to do some common database tasks.

**Q12) What is the difference between Trigger and Stored Procedure?**   
 Unlike Stored Procedures, Triggers cannot be called directly. They can only be associated with queries.

**Q13) What is a transaction? What are ACID properties?**   
A Database Transaction is a set of database operations that must be treated as a whole, which means either all operations are executed or none of them. An example can be a bank transaction from one account to another account. Either both debit and credit operations must be executed or none of them. ACID(Atomicity, Consistency, Isolation, Durability) is a set of properties that guarantee that database transactions are processed reliably.

**Q14) What are indexes?**  
A database index is a data structure that improves the speed of data retrieval operations on a database table at the cost of additional writes and the use of more storage space to maintain the extra copy of data.

**Q15) What are indexes?**  
A database index is a data structure that improves the speed of data retrieval operations on a database table at the cost of additional writes and the use of more storage space to maintain the extra copy of data. Data can be stored only in one order on a disk. To support faster access according to different values, faster search like binary search for different values is desired, For this purpose, indexes are created on tables. These indexes need extra space on the disk, but they allow faster search according to different frequently searched values.

**Q16) What are clustered and non-clustered Indexes?**   
Clustered indexes are the index according to which data is physically stored on a disk. Therefore, only one clustered index can be created on a given database table.   
Non-clustered indexes don’t define the physical ordering of data, but logical ordering. Typically, a tree is created whose leaf point to disk records. B-Tree or B+ tree are used for this purpose.

**Q17) What is a Live Lock?**

Livelock situation can be defined as when two or more processes continually repeat the same interaction in response to changes in the other processes without doing any useful work These processes are not in the waiting state, and they are running concurrently. This is different from a deadlock because in a deadlock all processes are in the waiting state.

**Q18) What is QBE?**

Query-by-example represents a visual/graphical approach for accessing information in a database through the use of query templates called skeleton tables. It is used by entering example values directly into a query template to represent what is to be achieved. QBE is used by many database systems for personal computers.

**Q19) Why are cursors necessary in embedded SQL?**

A cursor is an object used to store the output of a query for row-by-row processing by the application programs. SQL statements operate on a set of data and return a set of data. On other hand, host language programs operate on a row at a time. The cursors are used to navigate through a set of rows returned by an embedded SQL SELECT statement. A cursor can be compared to a pointer.

**Q20) What is Correlated Subquery in DBMS?**

A Subquery is also known as a nested query i.e. a query written inside some query. When a Subquery is executed for each of the rows of the outer query then it is termed as a Correlated Subquery.

An example of Non-Correlated Subquery is:

| SELECT \* from EMP WHERE ‘RIYA’ IN (SELECT Name from DEPT WHERE EMP.EMPID=DEPT.EMPID); |
| --- |

Here, the inner query is not executed for each of the rows of the outer query.

**Q21) What integrity rules exist in the DBMS?**

There are two major integrity rules that exist in the DBMS.

**Entity Integrity:** This states a very important rule that the value of a Primary key can never have a NULL value.

**Referential Integrity:** This rule is related to the Foreign key which states that either the value of a Foreign key is a NULL value or it should be the primary key of any other relation.

**Q22) How can you get the alternate records from the table in the SQL?**

 If you want to fetch the odd numbers then the following query can be used:

| SELECT EmpId from (SELECT rowno,EmpId from Emp) WHERE mod(rowno,2)=1; |
| --- |

If you want to fetch the even numbers, then the following query can be used:

| SELECT EmpId from (SELECT rowno,EmpId from Emp) WHERE mod(rowno,2)=0; |
| --- |

**Q23) What is a join in the SQL?**

A Join is one of the SQL statements which is used to join the data or the rows from 2 or more tables on the basis of a common field/column among them.

**Q24). What are temporary tables? When are they useful?**  
 Temporary tables exist solely for a particular session, or whose data persists for the duration of the transaction. The temporary tables are generally used to support specialized rollups or specific application processing requirements. Unlike a permanent table, space is not allocated to a temporary table when it is created. Space will be dynamically allocated for the table as rows are inserted. The CREATE GLOBAL TEMPORARY TABLE command is used to create a temporary table in Oracle.

**Q25) Explain different types of failures that occur in the** **Oracle database.**  
**Types of Failures –**In the Oracle database following types of failures can occur:

* **Statement Failure·**
* **Bad data type**
  + Insufficient space
* **Insufficient Privileges** (e.g., object privileges to a role)
* **User Process Failure**
  + The user performed an abnormal disconnect
  + The user’s session was abnormally terminated
  + The user’s program raised an address exception
* **User Error**
  + The user drops a table
  + User damages data by modification
* **Instance Failure**
* **Media Failure**
  + The user drops a table
  + User damages data by modification
* **Alert Logs**
  + Records informational and error messages
  + All Instance startups and shutdowns are recorded in the log

**Q26) What is the main goal of RAID technology?**

**RAID**stands for **R**edundant **A**rray of **I**nexpensive (or sometimes “Independent”)**D**isks.

RAID is a method of combining several hard disk drives into one logical unit (two or more disks grouped together to appear as a single device to the host system). RAID technology was developed to address the fault-tolerance and performance limitations of conventional disk storage. It can offer fault tolerance and higher throughput levels than a single hard drive or group of independent hard drives. While arrays were once considered complex and relatively specialized storage solutions, today they are easy to use and essential for a broad spectrum of client/server applications.

### Q27) What is a Self-Join?

A self-join is a type of join that can be used to connect two tables. As a result, it is a unary relationship. Each row of the table is attached to itself and all other rows of the same table in a self-join. As a result, a self-join is mostly used to combine and compare rows from the same database table.

### Q28) What is Cursor? How to use a Cursor?

After any variable declaration, DECLARE a cursor. A SELECT Statement must always be coupled with the cursor definition.

To start the result set, move the cursor over it. Before obtaining rows from the result set, the OPEN statement must be executed.

To retrieve and go to the next row in the result set, use the FETCH command.

To disable the cursor, use the CLOSE command.

Finally, use the DEALLOCATE command to remove the cursor definition and free up the resources connected with it.

### Q 29) What is OLTP?

OLTP, or online transactional processing, allows huge groups of people to execute massive amounts of database transactions in real time, usually via the internet. A database transaction occurs when data in a database is changed, inserted, deleted, or queried.

### Q30) What are the differences between OLTP and OLAP?

OLTP stands for online transaction processing, whereas OLAP stands for online analytical processing. OLTP is an online database modification system, whereas OLAP is an online database query response system.

### Q 31) What is the usage of the NVL() function?

You may use the NVL function to replace null values with a default value. The function returns the value of the second parameter if the first parameter is null. If the first parameter is anything other than null, it is left alone.

### Q 32) How to create a temp table in SQL Server?

Temporary tables are created in TempDB and are erased automatically after the last connection is closed. We may use Temporary Tables to store and process interim results. When we need to store temporary data, temporary tables come in handy.  
  
The following is the syntax for creating a Temporary Table:  
  
CREATE TABLE #Employee (id INT, name VARCHAR(25))  
INSERT INTO #Employee VALUES (01, ‘Ashish’), (02, ‘Atul’)

**Q33) NoSQL vs SQL**

In summary, the following are the five major distinctions between SQL and NoSQL:

Relational databases are SQL, while non-relational databases are NoSQL.

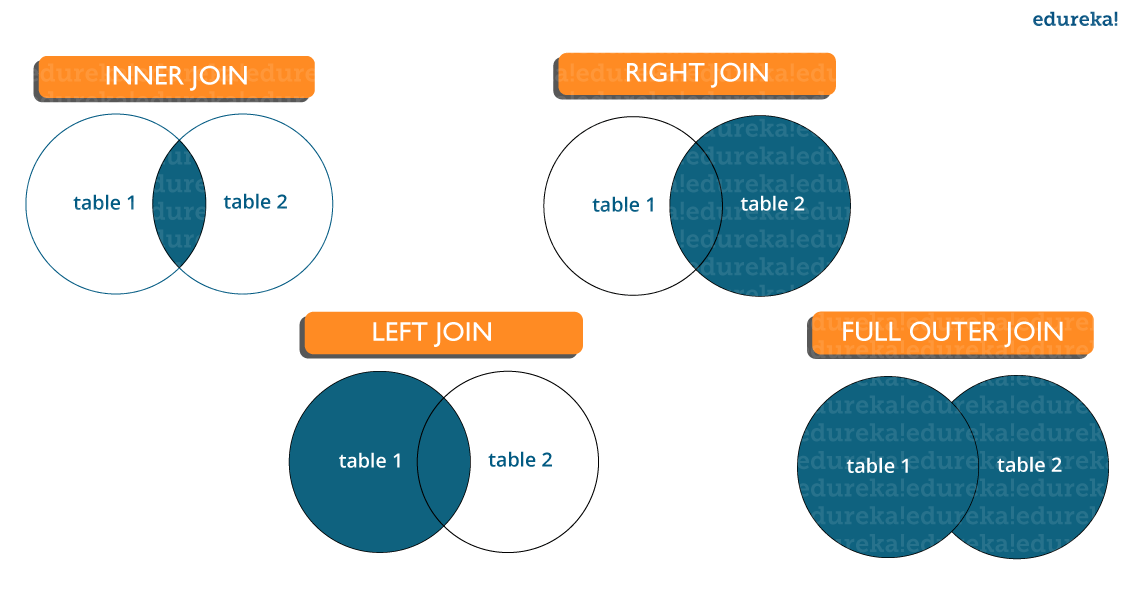
SQL databases have a specified schema and employ structured query language. For unstructured data, NoSQL databases use dynamic schemas.

SQL databases scale vertically, but NoSQL databases scale horizontally.

**Q34) What is the difference between NOW() and CURRENT\_DATE()?**  
NOW() returns a constant time that indicates the time at which the statement began to execute. (Within a stored function or trigger, NOW() returns the time at which the function or triggering statement began to execute.  
The simple difference between NOW() and CURRENT\_DATE() is that NOW() will fetch the current date and time both in format ‘YYYY-MM\_DD HH:MM:SS’ while CURRENT\_DATE() will fetch the date of the current day ‘YYYY-MM\_DD’.

### ****Q 35) What are joins in SQL?****

A JOIN clause is used to combine rows from two or more tables, based on a related column between them. It is used to merge two tables or retrieve data from there. There are 4 types of joins, as you can refer to below:

****

### ****Q 36)**** ****What is the difference between CHAR and VARCHAR2 datatype in SQL?****

Both Char and Varchar2 are used for characters datatype but varchar2 is used for character strings of variable length whereas Char is used for strings of fixed length. For example, char(10) can only store 10 characters and will not be able to store a string of any other length whereas varchar2(10) can store any length i.e 6,8,2 in this variable.

**Q 37) What is SQL Injection?**

SQL injection is a sort of flaw in website and web app code that allows attackers to take control of back-end processes and access, retrieve, and delete sensitive data stored in databases. In this approach, malicious SQL statements are entered into a database entry field, and the database becomes exposed to an attacker once they are executed. By utilising data-driven apps, this strategy is widely utilised to get access to sensitive data and execute administrative tasks on databases. SQLi attack is another name for it.

The following are some examples of SQL injection:

* Getting access to secret data in order to change a SQL query to acquire the desired results.
* UNION attacks are designed to steal data from several database tables.
* Examine the database to get information about the database’s version and structure

### ****Q 38)  Are NULL values same as that of zero or a blank space?****

A NULL value is not at all same as that of zero or a blank space. NULL value represents a value which is unavailable, unknown, assigned or not applicable whereas a zero is a number and blank space is a character.

### ****Q 39) What is the difference between cross join and natural join?****

The cross join produces the cross product or Cartesian product of two tables whereas the natural join is based on all the columns having the same name and data types in both the tables.

**Q 40) Write a SQL query to get the third-highest salary of an employee from employee\_table?**

|  |  |
| --- | --- |
| 1  2  3  4  5  6 | SELECT TOP 1 salary  FROM(  SELECT TOP 3 salary  FROM employee\_table  ORDER BY salary DESC) AS emp  ORDER BY salary ASC; |

**Q 41) List the ways in which  Dynamic SQL can be executed?**

Following are the ways in which dynamic SQL can be executed:

* Write a query with parameters.
* Using EXEC.
* Using sp\_executesql.

### ****Q 42)**** What is the main difference between SQL and PL/SQL?

SQL is a query language that allows you to issue a single query or execute a single insert/update/delete whereas PL/SQL is Oracle’s “Procedural Language” SQL, which allows you to write a full program (loops, variables, etc.) to accomplish multiple operations such as selects/inserts/updates/deletes.

### ****Q 43) What is a View?****

A view is a virtual table which consists of a subset of data contained in a table. Since views are not present, it takes less space to store. View can have data of one or more tables combined and it depends on the relationship.

### ****Q 44)  What is the difference between COALESCE() & ISNULL()?****

COALESCE(): COALESCE function in SQL returns the first non-NULL expression among its arguments. If all the expressions evaluate to null, then the COALESCE function will return null.  
Syntax:

SELECT column(s), CAOLESCE(expression\_1,....,expression\_n)

FROM table\_name;

ISNULL(): The ISNULL function has different uses in SQL Server and MySQL. In SQL Server, ISNULL() function is used to replace NULL values.  
Syntax:

SELECT column(s), ISNULL(column\_name, value\_to\_replace)

FROM table\_name;

### Q 45) How will you change the datatype of a column?

This can be done by using the ALTER TABLE statement as shown below:

**Syntax:**

ALTER TABLE tname

ALTER COLUMN col\_name [SET DATA] TYPE new\_data\_type;

Q 46) What are the different types of indexes in SQL?

SQL indexes are nothing more than a technique of minimizing the query's cost. The higher the query's cost, the worse the query's performance. The following are the different types of Indexes supported in SQL:

* Unique Index
* Clustered Index
* Non-Clustered Index
* Bit-Map Index
* Normal Index
* Composite Index
* B-Tree Index
* Function-Based Index

### Q 47) What is the default ordering of data using the ORDER BY clause? How could it be changed?

The ORDER BY clause is used to sort the table data either in ascending or descending order. By default, it will sort the table in ascending order. If we want to change its default behavior, we need to use the DESC keyword after the column name in the ORDER BY clause.

Q 48) Is the following query returns the output?

1. SELECT subject\_code, AVG (marks)
2. FROM Students
3. WHERE AVG(marks) **>** 70
4. GROUP BY subject\_code;

### 49) What is the difference between the RANK() and DENSE\_RANK() functions?

The **RANK function** determines the rank for each row within your ordered partition in the result set. If the two rows are assigned the same rank, then the next number in the ranking will be its previous rank plus a number of duplicate numbers. For example, if we have three records at rank 4, the next rank listed would be ranked 7.

The **DENSE\_RANK** function assigns a unique rank for each row within a partition as per the specified column value without any gaps. It always specifies ranking in consecutive order. If the two rows are assigned the same rank, this function will assign it with the same rank, and the next rank being the next sequential number. For example, if we have 3 records at rank 4, the next rank listed would be ranked 5.

**50) Name the operator which is used in the query for appending two strings?**

In SQL for appending two strings, the ” Concentration operator”  is used and its symbol is ” || “.

**QUESTIONS-C**

**1) How do you construct an increment statement or decrement statement in C?**

There are actually two ways you can do this. One is to use the increment operator ++ and decrement operator –. For example, the statement “x++” means to increment the value of x by 1. Likewise, the statement “x –” means to decrement the value of x by 1. Another way of writing increment statements is to use the conventional + plus sign or – minus sign. In the case of “x++”, another way to write it is “x = x +1”.

### 2) What is the difference between Call by Value and Call by Reference?

When using Call by Value, you are sending the value of a variable as parameter to a function, whereas Call by Reference sends the address of the variable.

### 3) What is variable initialization and why is it important?

This refers to the process wherein a variable is assigned an initial value before it is used in the program. Without initialization, a variable would have an unknown value, which can lead to unpredictable outputs when used in computations or other operations.

### 4) Differentiate Source Codes from Object Codes

Source codes are codes that were written by the programmer. It is made up of the commands and other English-like keywords that are supposed to instruct the computer what to do. However, computers would not be able to understand source codes. Therefore, source codes are compiled using a compiler. The resulting outputs are object codes, which are in a format that can be understood by the computer processor. In [C programming](https://www.guru99.com/c-programming-language.html), source codes are saved with the file extension .C, while object codes are saved with the file extension .OBJ

### 5) What is the use of a ‘\0’ character?

It is referred to as a terminating null character, and is used primarily to show the end of a string value.

### 6) Name some different storage class specifiers in C?

Ans.  Storage classes represent the storage of any variable. There are four storage classes in C:

* Auto
* Register
* Extern
* Static

### 7) What happens when you compile a program in C?

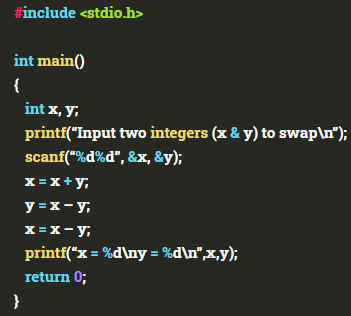
Ans.  At the time of compilation, the compiler generates a file with the same name as the C program file with different extensions.

### 8) How can a negative integer be stored in C?

### Ans. If the number is with a negative sign, then at the time of memory allocation, the number (ignoring the minus sign) is converted into the binary equivalent. Then the two’s complement of the number is calculated.

### 9) How to write a program in C for swapping two numbers without the use of the third variable?

### Ans.



### 10) What is the length of an identifier?

### Ans. Its length is 32 characters in C.

### 11) Explain the difference between = and == symbols in C programming?

### Ans. The assignment operator (=): It is a binary operator used to operate two operands. It is used to assign the value to the variable.

Example: x=(a+b);

  y=x;

Equal to operator (==): It is also a binary operator used to compare the left-hand side and right-hand side value, if it is the same, it returns 1 else 0.

### 12) What happens if a header file is included twice?

### Ans. If a header file is included twice, the compiler will process its contents twice, resulting in an error. You can use a guard(#) to prevent a header file from being included multiple times during the compilation process. Thus, even if a header file with proper syntax is included twice, the second one will get ignored.

### 13) Can a C program compile without the main() function?

### Ans. Yes, a C program can be compiled without the main() function. However, it will not execute without the main() function.

### 14) What do you mean by a memory leak in C?

### Ans. A memory leak is a kind of resource leak that happens when programmers create a memory in heap and forget to delete it. Thus, the memory which is no longer needed remains undeleted. It may also occur when an object is inaccessible by running code but it is still stored in memory. A memory leak can result in additional memory usage and can affect the performance of a program.

### 15) Can we use the ‘if’ function to compare strings?

### Ans. No, we cannot use the ‘if’ function to compare two strings. The ‘if’ function compares numerical and single character values. We can use the ‘strcmp’ function to compare two strings character by character.

### 16)  What are the valid places where the programmer can apply Break Control Statement?

Ans: Break Control statement is valid to be used inside a loop and [Switch control statements.](https://www.edureka.co/blog/switch-case-in-c/" \t "_blank)

### 17) Can I use int datatype to store 32768 value?

Ans: No, Integer datatype will support the range between -32768 and 32767. Any value exceeding that will not be stored. We can either use float or long int.

### 18)  Differentiate between getch() and getche().

Ans: Both the functions are designed to read characters from the keyboard and the only difference is that

getch(): reads characters from the keyboard but it does not use any buffers. Hence, data is not displayed on the screen.

getche(): reads characters from the keyboard and it uses a buffer. Hence, data is displayed on the screen.

### 19) When should we use the register storage specifier?

Ans: We use Register Storage Specifier if a certain variable is used very frequently. This helps the compiler to locate the variable as the variable will be declared in one of the CPU registers.

### 20) Can the curly brackets { } be used to enclose a single line of code?

While curly brackets are mainly used to group several lines of codes, it will still work without error if you used it for a single line. Some programmers prefer this method as a way of organizing codes to make it look clearer, especially in conditional statements.

### 21) How do you construct an increment statement or decrement statement in C?

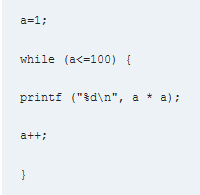
### There are actually two ways you can do this. One is to use the increment operator ++ and decrement operator –. For example, the statement “x++” means to increment the value of x by 1. Likewise, the statement “x –” means to decrement the value of x by 1. Another way of writing increment statements is to use the conventional + plus sign or – minus sign. In the case of “x++”, another way to write it is “x = x +1”.

### 22) What is the equivalent code of the following statement in WHILE LOOP format?

for (a=1; a<=100; a++)

printf ("%d\n", a \* a);

Answers:



### 23) What is variable initialization and why is it important?

### This refers to the process wherein a variable is assigned an initial value before it is used in the program. Without initialization, a variable would have an unknown value, which can lead to unpredictable outputs when used in computations or other operations.

### 24) In C programming, how do you insert quote characters (‘ and “) into the output screen?

This is a common problem for beginners because quotes are normally part of a printf statement. To insert the quote character as part of the output, use the format specifiers \’ (for single quote), and \” (for double quote).

### 25) What is the difference between the = symbol and == symbol?

The = symbol is often used in mathematical operations. It is used to assign a value to a given variable. On the other hand, the == symbol, also known as “equal to” or “equivalent to”, is a relational operator that is used to compare two values.

### 26) What is the modulus operator?

The modulus operator outputs the remainder of a division. It makes use of the percentage (%) symbol. For example: 10 % 3 = 1, meaning when you divide 10 by 3, the remainder is 1.

### 27) Which of the following operators is incorrect and why? ( >=, <=, <>, ==)

<> is incorrect. While this operator is correctly interpreted as “not equal to” in writing conditional statements, it is not the proper operator to be used in [C programming](https://www.guru99.com/c-programming-tutorial.html). Instead, the operator != must be used to indicate “not equal to” condition.

### 28) How do you declare a variable that will hold string values?

The char keyword can only hold 1 character value at a time. By creating an array of characters, you can store string values in it. Example: “char MyName[50]; ” declares a string variable named MyName that can hold a maximum of 50 characters.

### 29) Can I use “int” data type to store the value 32768? Why?

No. “int” data type is capable of storing values from -32768 to 32767. To store 32768, you can use “long int” instead. You can also use “unsigned int”, assuming you don’t intend to store negative values.

### 30) When is the “void” keyword used in a function?

When declaring functions, you will decide whether that function would be returning a value or not. If that function will not return a value, such as when the purpose of a function is to display some outputs on the screen, then “void” is to be placed at the leftmost part of the function header. When a return value is expected after the function execution, the data type of the return value is placed instead of “void”.

### 31) Write a loop statement that will show the following output:

1

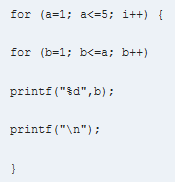
12

123

1234

12345

Answer:

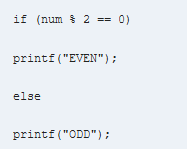


### 32) What does the && operator do in a program code?

The && is also referred to as AND operator. When using this operator, all conditions specified must be TRUE before the next action can be performed. If you have 10 conditions and all but 1 fails to evaluate as TRUE, the entire condition statement is already evaluated as FALSE

### 33) In C programming, what command or code can be used to determine if a number of odd or even?

There is no single command or function in C that can check if a number is odd or even. However, this can be accomplished by dividing that number by 2, then checking the remainder. If the remainder is 0, then that number is even, otherwise, it is odd. You can write it in code as:



### 34) What are logical errors and how does it differ from syntax errors?

Program that contains logical errors tend to pass the compilation process, but the resulting output may not be the expected one. This happens when a wrong formula was inserted into the code, or a wrong sequence of commands was performed. Syntax errors, on the other hand, deal with incorrect commands that are misspelled or not recognized by the compiler.

### 35) Can the “if” function be used in comparing strings?

No. “if” command can only be used to compare numerical values and single character values. For comparing string values, there is another function called strcmp that deals specifically with strings.

### 36) What are preprocessor directives?

Preprocessor directives are placed at the beginning of every C program. This is where library files are specified, which would depend on what functions are to be used in the program. Another use of preprocessor directives is the declaration of constants.Preprocessor directives begin with the # symbol.

### 37) What is wrong with this statement? myName = “Robin”;

You cannot use the = sign to assign values to a string variable. Instead, use the strcpy function. The correct statement would be: strcpy(myName, “Robin”);

### 38) What are the different file extensions involved when programming in C?

Source codes in C are saved with .C file extension. Header files or library files have the .H file extension. Every time a program source code is successfully compiled, it creates an .OBJ object file, and an executable .EXE file.

### 39) What is the difference between the expression “++a” and “a++”?

In the first expression, the increment would happen first on variable a, and the resulting value will be the one to be used. This is also known as a prefix increment. In the second expression, the current value of variable a would the one to be used in an operation, before the value of a itself is incremented. This is also known as postfix increment.

### 40) When is a “switch” statement preferable over an “if” statement?

The [switch statement](https://www.guru99.com/c-switch-case-statement.html) is best used when dealing with selections based on a single variable or expression. However, switch statements can only evaluate integer and character data types.

**QUESTIONS-DSA**

1. **Can we apply Binary search algorithm to a sorted Linked list?**

No, we cannot apply the binary search algorithm to a sorted linked list because finding the index of the middle element is difficult.

### Which data structure is ideal to perform recursion operation and why?

Stack is the most ideal for recursion operation. This is mainly because of its LIFO (Last In First Out) property, it remembers the elements & their positions, so it exactly knows which one to return when a function is called.

### How quick sort works?

Quick sort uses divide and conquer approach. It divides the list in smaller ‘Partitions’ using pivot. The values which are smaller than the pivot are arranged in the left partition and greater values are arranged in the right partition. Each partition is recursively sorted using quick sort.

### Why Create Data Structures?

### Data structures serve a number of important functions in a program. They ensure that each line of code performs its function correctly and efficiently, they help the programmer identify and fix problems with his/her code, and they help to create a clear and organized code base.

1. **Can you explain the difference between file structure and storage structure?**

File Structure: Representation of data into secondary or auxiliary memory say any device such as a hard disk or pen drives that stores data which remains intact until manually deleted is known as a file structure representation.

Storage Structure: In this type, data is stored in the main memory i.e RAM, and is deleted once the function that uses this data gets completely executed.

The difference is that the storage structure has data stored in the memory of the computer system, whereas the file structure has the data stored in the auxiliary memory.

1. **What is hashmap in data structure?**

Hashmap is a data structure that uses an implementation of a hash table data structure which allows access to data in constant time (O(1)) complexity if you have the key.

1. **What are some applications of Data structures?**

Following are some real-time applications of data structures:

Decision Making

Genetics

Image Processing

Blockchain

Numerical and Statistical Analysis

Compiler Design

Database Design and many more

1. What are different operations available in stack data structure?

Some of the main operations provided in the stack data structure are:

push: This adds an item to the top of the stack. The overflow condition occurs if the stack is full.

pop: This removes the top item of the stack. Underflow condition occurs if the stack is empty.

top: This returns the top item from the stack.

isEmpty: This returns true if the stack is empty else false.

size:  This returns the size of the stack

1. What are Infix, prefix, Postfix notations?
   1. Infix notation: X + Y – Operators are written in between their operands. This is the usual way we write expressions. An expression such as A \* ( B + C ) / D
   2. Postfix notation (also known as “Reverse Polish notation”): X Y + Operators are written after their operands. The infix expression given above is equivalent to A B C + \* D/
   3. Prefix notation (also known as “Polish notation”): + X Y Operators are written before their operands. The expressions given above are equivalent to / \* A + B C D
2. Are linked lists considered linear or non-linear Data Structures?

Linked lists are considered both linear and non-linear data structures depending upon the application they are used for. When used for access strategies, it is considered as a linear data-structure. When used for data storage, it is considered a non-linear data structure.

1. How do you reference all of the elements in a one-dimension array?

Using an indexed loop, we may access all of the elements in a one-dimensional array. The counter counts down from 0 to the maximum array size, n, minus one. The loop counter is used as the array subscript to refer to all items of the one-dimensional array in succession.

1. Why do we need to do an algorithm analysis?

A problem can be solved in more than one way using several solution algorithms. Algorithm analysis provides an estimation of the required resources of an algorithm to solve a specific computational problem. The amount of time and space resources required to execute is also determined.

### Which sorting algorithm is considered the fastest? Why?

### A single sorting algorithm can’t be considered best, as each algorithm is designed for a particular data structure and data set. However, the [QuickSort](https://www.simplilearn.com/tutorials/c-tutorial/quick-sort-in-c" \t "_blank" \o "QuickSort) algorithm is generally considered the fastest because it has the best performance for most inputs.

14. Differentiate NULL and VOID

* 1. Null is a value, whereas Void is a data type identifier
  2. Null indicates an empty value for a variable, whereas void indicates pointers that have no initial size
  3. Null means it never existed; Void means it existed but is not in effect

15. Name the ways to determine whether a linked list has a loop.

1. Using hashing
2. Using the visited nodes method (with or without modifying the basic linked list data structure)
3. Floyd’s cycle-finding algorithm

16. Name different types of data structures?

Data structures are of two types: 

17) What is the LIFO and FIFO principle?

LIFO: (Last-In-First-Out) Last inserted element is removed first in the LIFO principle. Example: Stack follows LIFO.

FIFO: (First-In-First-Out) First Element (first to be inserted) is taken out first.

Example: Queue follows FIFO

## 18) Which data structures are used for the BFS and DFS of a graph?

* 1. For BFS - Queue Data Structure
  2. For DFS - Stack Data Structure

19. What is the meaning of the stack overflow condition?

When a stack is completely full and we try to insert more elements onto the stack then this condition is called stack overflow condition. Here, top=maxsize-1, and no further elements can be inserted.

20) What is merge sort time complexity?

The time complexity of MergeSort is O(n\*log n)

21) How insertion sort and selection sorts are different?

Both sorting techniques maintains two sub-lists, sorted and unsorted and both take one element at a time and places it into sorted sub-list. Insertion sort works on the current element in hand and places it in the sorted array at appropriate location maintaining the properties of insertion sort. Whereas, selection sort searches the minimum from the unsorted sub-list and replaces it with the current element in hand.

### 22) What are different operations available in stack data structure?

* push: This adds an item to the top of the stack. The overflow condition occurs if the stack is full.
* pop: This removes the top item of the stack. Underflow condition occurs if the stack is empty.
* top: This returns the top item from the stack.
* isEmpty: This returns true if the stack is empty else false.
* size:  This returns the size of the stack

### 23) What are different operations available in queue data structure?

* enqueue: This adds an element to the rear end of the queue.  Overflow conditions occur if the queue is full.
* dequeue: This removes an element from the front end of the queue. Underflow conditions occur if the queue is empty.
* isEmpty: This returns true if the queue is empty or else false.
* rear: This returns the rear end element without removing it.
* front: This returns the front-end element without removing it.
* size: This returns the size of the queue.

### 24) List the data structures which are used in RDBMS, Network Data Modal, and Hierarchical Data Model.

* RDBMS uses Array data structure
* Network data model uses Graph
* Hierarchal data model uses Trees

### 25) Which data structure is used to perform recursion?

Stack data structure is used in recursion due to its last in first out nature. Operating system maintains the stack in order to save the iteration variables at each function call

### 26) Write the stack overflow condition.

Overflow occurs when top = Maxsize -1

### 27) What is a postfix expression?

An expression in which operators follow the operands is known as postfix expression. The main benefit of this form is that there is no need to group sub-expressions in parentheses or to consider operator precedence.

The expression "a + b" will be represented as "ab+" in postfix notation.

### 28) Write the postfix form of the expression: (A + B) \* (C - D)

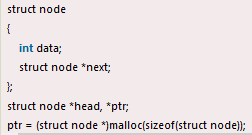
AB+CD-\*

### 29) Are linked lists considered linear or non-linear data structures?

A linked list is considered both linear and non-linear data structure depending upon the situation.

* On the basis of data storage, it is considered as a non-linear data structure.
* On the basis of the access strategy, it is considered as a linear data-structure.

### 30) Write the syntax in C to create a node in the singly linked list.



### 31) What are the drawbacks of array implementation of Queue?

* Memory Wastage: The space of the array, which is used to store queue elements, can never be reused to store the elements of that queue because the elements can only be inserted at front end and the value of front might be so high so that, all the space before that, can never be filled.
* Array Size: There might be situations in which, we may need to extend the queue to insert more elements if we use an array to implement queue, It will almost be impossible to extend the array size, therefore deciding the correct array size is always a problem in array implementation of queue.

### 32) What is a dequeue?

Dequeue (also known as double-ended queue) can be defined as an ordered set of elements in which the insertion and deletion can be performed at both the ends, i.e. front and rear.

### 33) What is the minimum number of queues that can be used to implement a priority queue?

### Two queues are needed. One queue is used to store the data elements, and another is used for storing priorities.

### 34) Which data structure suits the most in the tree construction?

Queue data structure

### 35) What is the maximum number of nodes in a binary tree of height k?

2k+1-1 where k >= 1

### 36) Which data structures are used in BFS and DFS algorithm?

* In BFS algorithm, Queue data structure is used.
* In DFS algorithm, Stack data structure is used.

### 37) In what scenario, Binary Search can be used?

Binary Search algorithm is used to search an already sorted list. The algorithm follows divide and conqer approach

### 38) How are the elements of a 2D array stored in the memory?

1. Row-Major Order: -In row-major ordering, all of the rows of a 2D array are stored in memory in a contiguous manner.

First, the first row of the array is entirely stored in memory, followed by the second row of the array, and so on until the final row.

1. Column-Major Order: In column-major ordering, all of the columns of a 2D array are stored in memory in the same order. The first column of the array is entirely saved in memory, followed by the second row of the array, and so on until the last column of the array is wholly recorded in memory.

### 39) What is the difference between a PUSH and a POP?

In terms of data structure interview questions, this is one of the most frequently asked question.

The acronyms stand for Pushing and Popping operations performed on a stack. These are ways data is stored and retrieved.

* PUSH is used to add an item to a stack, while POP is used to remove an item.
* PUSH takes two arguments, the name of the stack to add the data to and the value of the entry to be added. POP only needs the name of the stack.
* When the stack is filled and another PUSH command is issued, you get a stack overflow error, which means that the stack can no longer accommodate the last PUSH. In POP, a stack underflow error occurs when you’re trying to POP an already empty stack.

### 40) Which sorting algorithm is considered the fastest? Why?

### A single sorting algorithm can’t be considered best, as each algorithm is designed for a particular data structure and data set. However, the [QuickSort](https://www.simplilearn.com/tutorials/c-tutorial/quick-sort-in-c" \t "_blank" \o "QuickSort) algorithm is generally considered the fastest because it has the best performance for most inputs.

**IMPORTANT QUESTIONS OF OS**

**Q1) What is kernel?**

Kernel is the core and most important part of a computer operating system which provides basic services for all parts of the OS.

**Q2) What is monolithic kernel?**

A monolithic kernel is a kernel which includes all operating system code is in single executable image.

**Q3) What is demand paging?**

Demand paging is referred when not all of a process’s pages are in the RAM, then the OS brings the missing(and required) pages from the disk into the RAM.

### Q4) What is kernel?

A kernel is the core of every operating system. It connects applications to the actual processing of data. It also manages all communications between software and hardware components to ensure usability and reliability.

### Q5) What is SMP?

SMP is a short form of Symmetric Multi-Processing. It is the most common type of multiple-processor systems. In this system, each processor runs an identical copy of the operating system, and these copies communicate with one another as needed.

### Q6) What is a thread?

A thread is a basic unit of CPU utilization. In general, a thread is composed of a thread ID, program counter, register set, and the stack.

**Q7) What are necessary conditions which can lead to a deadlock situation in a system?**

Deadlock situations occur when four conditions occur simultaneously in a system: Mutual exclusion; Hold and Wait; No preemption; and Circular wait.

**Q8) Enumerate the different RAID levels.**

RAID 0 – Non-redundant striping  
RAID 1 – Mirrored Disks  
RAID 2 – Memory-style error-correcting codes  
RAID 3 – Bit-interleaved Parity  
RAID 4 – Block-interleaved Parity  
RAID 5 – Block-interleaved distributed Parity  
RAID 6 – P+Q Redundancy

### Q9) What is the basic function of paging?

Paging is a memory management scheme that permits the physical address space of a process to be noncontiguous. It avoids the considerable problem of having to fit varied sized memory chunks onto the backing store.

### Q10) What is a socket?

A socket provides a connection between two applications. Each endpoint of a communication is a socket.

### Q11) When does thrashing occur?

Thrashing refers to an instance of high paging activity. This happens when it is spending more time paging instead of executing.

### Q12) What is root partition?

Root partition is where the operating system kernel is located. It also contains other potentially important system files that are mounted during boot time.

**Q13) Explain pros and cons of a command line interface?**

A command line interface allows the user to type in commands that can immediately provide results. Many seasoned computer users are well accustomed to using the command line because they find it quicker and simpler.

However, the main problem with a command line interface is that users have to be familiar with the commands, including the switches and parameters that come with it. This is a downside for people who are not fond of memorizing commands.

**Q14) What is caching?**

Caching is the processing of utilizing a region of fast memory for a limited data and process. A cache memory is usually much efficient because of its high access speed.

**Q15) What is spooling?**

Spooling is normally associated with printing. When different applications want to send an output to the printer at the same time, spooling takes all of these print jobs into a disk file and queues them accordingly to the printer.

**Q16) What is an Assembler?**

An assembler acts as a translator for low-level language. Assembly codes written using mnemonic commands are translated by the Assembler into machine language.

### Q17) What are interrupts?

Interrupts are part of a hardware mechanism that sends a notification to the CPU when it wants to gain access to a particular resource. An interrupt handler receives this interrupt signal and “tells” the processor to take action based on the interrupt request.

**Q18) What is preemptive multitasking?**

Preemptive multitasking allows an operating system to switch between software programs. This, in turn, allows multiple programs to run without necessarily taking complete control over the processor and resulting in system crashes.

**Q19) Why partitioning and formatting is a prerequisite to installing an operating system?**

Partitioning and formatting create a preparatory environment on the drive so that the operating system can be copied and installed properly. This includes allocating space on the drive, designating a drive name, determining and creating the appropriate file system and structure.

### Q20) Differentiate internal commands from external commands.

Internal commands are built-in commands that are already part of the operating system. External commands are separate file programs that are stored in a separate folder or directory.

**Q21) How would a file name EXAMPLEFILE.TXT appear when viewed under the DOS command console operating in Windows 98?**

The filename would appear as EXAMPL~1.TXT . The reason behind this is that filenames under this operating system are limited to 8 characters when working under DOS environment.

**Q22) What is a folder in Ubuntu?**

There is no concept of Folder in Ubuntu. Everything included in your hardware is a FILE.

### Q23).  What is Banker’s algorithm?

The banker’s algorithm is a resource allocation and deadlock avoidance algorithm that tests for safety by simulating the allocation for the predetermined maximum possible amounts of all resources, then makes an “s-state” check to test for possible activities, before deciding whether allocation should be allowed to continue.

### Q24)  How does dynamic loading aid in better memory space utilization?

With dynamic loading, a routine is not loaded until it is called. This method is especially useful when large amounts of code are needed in order to handle infrequently occurring cases such as error routines.

### Q25)  What are overlays?

The concept of overlays is that whenever a process is running it will not use the complete program at the same time, it will use only some part of it. Then overlay concept says that whatever part you required, you load it and once the part is done, then you just unload it, which means just pull it back and get the new part you required and run it. Formally, “The process of transferring a block of program code or other data into internal memory, replacing what is already stored”.

### Q26).  What is fragmentation?

Processes are stored and removed from memory, which makes free memory space, which is too little to even consider utilizing by different processes.  Suppose, that process is not ready to dispense to memory blocks since its little size and memory hinder consistently staying unused is called fragmentation. This kind of issue occurs during a dynamic memory allotment framework when free blocks are small, so it can’t satisfy any request.

### Q30) When does thrashing occur?

Thrashing occurs when processes on the system frequently access pages, not available memory.

### Q31) What is the best page size when designing an operating system?

The best paging size varies from system to system, so there is no single best when it comes to page size. There are different factors to consider in order to come up with a suitable page size, such as page table, paging time, and its effect on the overall efficiency of the operating system.

### Q32)  What is multitasking?

Multitasking is a logical extension of a multiprogramming system that supports multiple programs to run concurrently. In multitasking, more than one task is executed at the same time. In this technique, the multiple tasks, also known as processes, share common processing resources such as a CPU.

**C++ question**

1) What is the difference between reference and pointer?

Following are the differences between reference and pointer:

|  |  |
| --- | --- |
| **Reference** | **Pointer** |
| Reference behaves like an alias for an existing variable, i.e., it is a temporary variable. | The pointer is a variable which stores the address of a variable. |
| Reference variable does not require any indirection operator to access the value. A reference variable can be used directly to access the value. | Pointer variable requires an indirection operator to access the value of a variable. |
| Once the reference variable is assigned, then it cannot be reassigned with different address values. | The pointer variable is an independent variable means that it can be reassigned to point to different objects. |
| A null value cannot be assigned to the reference variable. | A null value can be assigned to the reference variable. |
| It is necessary to initialize the variable at the time of declaration. | It is not necessary to initialize the variable at the time of declaration. |

2) What is a class?

The class is a user-defined data type. The class is declared with the keyword class. The class contains the data members, and member functions whose access is defined by the three modifiers are private, public and protected. The class defines the type definition of the category of things. It defines a datatype, but it does not define the data it just specifies the structure of data.

You can create N number of objects from a class.

3) What are the different types of polymorphism in C++?

Polymorphism: Polymorphism means multiple forms. It means having more than one function with the same function name but with different functionalities.

**Polymorphism is of two types:**

* **Runtime polymorphism**

Runtime polymorphism is also known as dynamic polymorphism. Function overriding is an example of runtime polymorphism. Function overriding means when the child class contains the method which is already present in the parent class. Hence, the child class overrides the method of the parent class. In case of function overriding, parent and child class both contains the same function with the different definition. The call to the function is determined at runtime is known as runtime polymorphism.

* **Compile time polymorphism**

Compile-time polymorphism is also known as static polymorphism. The polymorphism which is implemented at the compile time is known as compile-time polymorphism. Method overloading is an example of compile-time polymorphism.

**Method overloading:** Method overloading is a technique which allows you to have more than one function with the same function name but with different functionality.

Method overloading can be possible on the following basis:

* The return type of the overloaded function.
* The type of the parameters passed to the function.
* The number of parameters passed to the function.

4) Define namespace in C++.

* The namespace is a logical division of the code which is designed to stop the naming conflict.
* The namespace defines the scope where the identifiers such as variables, class, functions are declared.
* The main purpose of using namespace in C++ is to remove the ambiguity. Ambiquity occurs when the different task occurs with the same name.
* For example: if there are two functions exist with the same name such as add(). In order to prevent this ambiguity, the namespace is used. Functions are declared in different namespaces.
* C++ consists of a standard namespace, i.e., std which contains inbuilt classes and functions. So, by using the statement "using namespace std;" includes the namespace "std" in our program.

5) Define token in C++.

A token in C++ can be a keyword, identifier, literal, constant and symbol.

6) Which operations are permitted on pointers?

Following are the operations that can be performed on pointers:

* **Incrementing or decrementing a pointer**: Incrementing a pointer means that we can increment the pointer by the size of a data type to which it points.
* **Subtracting a pointer from another pointer:** When two pointers pointing to the members of an array are subtracted, then the number of elements present between the two members are returned.

7) Define 'std'.

Std is the default namespace standard used in C++.

8) How delete [] is different from delete?

Delete is used to release a unit of memory, delete[] is used to release an array.

9) What is the full form of STL in C++?

STL stands for Standard Template Library.

10) What are the C++ access specifiers?

The access specifiers are used to define how to functions and variables can be accessed outside the class.

There are three types of access specifiers:

* **Private**: Functions and variables declared as private can be accessed only within the same class, and they cannot be accessed outside the class they are declared.
* **Public**: Functions and variables declared under public can be accessed from anywhere.
* **Protected**: Functions and variables declared as protected cannot be accessed outside the class except a child class. This specifier is generally used in inheritance.

11) What is the difference between an array and a list?

* An Array is a collection of homogeneous elements while a list is a collection of heterogeneous elements.
* Array memory allocation is static and continuous while List memory allocation is dynamic and random.
* In Array, users don't need to keep in track of next memory allocation while In the list, the user has to keep in track of next location where memory is allocated.

12) What is the difference between new() and malloc()?

* new() is a preprocessor while malloc() is a function.
* There is no need to allocate the memory while using "new" but in malloc() you have to use sizeof().
* "new" initializes the new memory to 0 while malloc() gives random value in the newly allotted memory location.
* The new() operator allocates the memory and calls the constructor for the object initialization and malloc() function allocates the memory but does not call the constructor for the object initialization.
* The new() operator is faster than the malloc() function as operator is faster than the function.

13) What are the methods of exporting a function from a DLL?

There are two ways:

* By using the DLL's type library.
* Taking a reference to the function from the DLL instance.

14) Define friend function.

Friend function acts as a friend of the class. It can access the private and protected members of the class. The friend function is not a member of the class, but it must be listed in the class definition. The non-member function cannot access the private data of the class. Sometimes, it is necessary for the non-member function to access the data. The friend function is a non-member function and has the ability to access the private data of the class.

15) What is a virtual function?

* A virtual function is used to replace the implementation provided by the base class. The replacement is always called whenever the object in question is actually of the derived class, even if the object is accessed by a base pointer rather than a derived pointer.
* A virtual function is a member function which is present in the base class and redefined by the derived class.
* When we use the same function name in both base and derived class, the function in base class is declared with a keyword virtual.
* When the function is made virtual, then C++ determines at run-time which function is to be called based on the type of the object pointed by the base class pointer. Thus, by making the base class pointer to point different objects, we can execute different versions of the virtual functions.

**Rules of a virtual function:**

* The virtual functions should be a member of some class.
* The virtual function cannot be a static member.
* Virtual functions are called by using the object pointer.
* It can be a friend of another class.
* C++ does not contain virtual constructors but can have a virtual destructor.

16) When should we use multiple inheritance?

You can answer this question in three manners:

1. Never
2. Rarely
3. If you find that the problem domain cannot be accurately modeled any other way.

17) What is a destructor?

A Destructor is used to delete any extra resources allocated by the object. A destructor function is called automatically once the object goes out of the scope.

**Rules of destructor:**

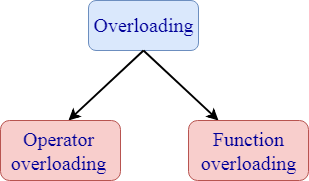
* Destructors have the same name as class name and it is preceded by tilde.
* It does not contain any argument and no return type.

18) What is an overflow error?

It is a type of arithmetical error. It happens when the result of an arithmetical operation been greater than the actual space provided by the system.

19) What is overloading?

* When a single object behaves in many ways is known as overloading. A single object has the same name, but it provides different versions of the same function.
* C++ facilitates you to specify more than one definition for a function name or an operator in the same scope. It is called function overloading and operator overloading respectively.
* **Overloading is of two types:**



**1. Operator overloading:** Operator overloading is a compile-time polymorphism in which a standard operator is overloaded to provide a user-defined definition to it. For example, '+' operator is overloaded to perform the addition operation on data types such as int, float, etc.

**Operator overloading can be implemented in the following functions:**

* Member function
* Non-member function
* Friend function

**2. Function overloading:** Function overloading is also a type of compile-time polymorphism which can define a family of functions with the same name. The function would perform different operations based on the argument list in the function call. The function to be invoked depends on the number of arguments and the type of the arguments in the argument list.

20) What is function overriding?

If you inherit a class into a derived class and provide a definition for one of the base class's function again inside the derived class, then this function is called overridden function, and this mechanism is known as function overriding.

21) What is virtual inheritance?

Virtual inheritance facilitates you to create only one copy of each object even if the object appears more than one in the hierarchy.

22) What is the purpose of the "delete" operator?

The "delete" operator is used to release the dynamic memory created by "new" operator.

23) Explain this pointer?

This pointer holds the address of the current object.

24) What does Scope Resolution operator do?

A scope resolution operator(::) is used to define the member function outside the class.

25) What is the difference between delete and delete[]?

Delete [] is used to release the array of allocated memory which was allocated using new[] whereas delete is used to release one chunk of memory which was allocated using new.

26) What is a pure virtual function?

The pure virtual function is a virtual function which does not contain any definition. The normal function is preceded with a keyword virtual. The pure virtual function ends with 0.

27) What is the difference between struct and class?

|  |  |
| --- | --- |
| **Structures** | **class** |
| A structure is a user-defined data type which contains variables of dissimilar data types. | The class is a user-defined data type which contains member variables and member functions. |
| The variables of a structure are stored in the stack memory. | The variables of a class are stored in the heap memory. |
| We cannot initialize the variables directly. | We can initialize the member variables directly. |
| If access specifier is not specified, then by default the access specifier of the variable is "public". | If access specifier is not specified, then by default the access specifier of a variable is "private". |
| The instance of a structure is a "structure variable". |  |
| **Declaration of a structure:**  struct structure\_name  {  // body of structure;  } ; | **Declaration of class:**  class class\_name  {  // body of class;  } |
| A structure is declared by using a struct keyword. | The class is declared by using a class keyword. |
| The structure does not support the inheritance. | The class supports the concept of inheritance. |
| The type of a structure is a value type. | The type of a class is a reference type. |

28) What is a class template?

A class template is used to create a family of classes and functions. For example, we can create a template of an array class which will enable us to create an array of various types such as int, float, char, etc. Similarly, we can create a template for a function, suppose we have a function add(), then we can create multiple versions of add().

29) What is the difference between function overloading and operator overloading?

**Function overloading:** Function overloading is defined as we can have more than one version of the same function. The versions of a function will have different signature means that they have a different set of parameters.

**Operator overloading:** Operator overloading is defined as the standard operator can be redefined so that it has a different meaning when applied to the instances of a class.

30) What is a virtual destructor?

A virtual destructor in C++ is used in the base class so that the derived class object can also be destroyed. A virtual destructor is declared by using the ~ tilde operator and then virtual keyword before the constructor.

### What is an abstract class and when do you use it?

An abstract class is one that has no objects that can be created. As a parent for the derived classes, such a class exists. By including a pure virtual function in a class, we can make it abstract.

### 31. What is an overflow error?

Whenever a program is provided a number, value, or variable that it cannot manage, an overflow error occurs. This is a common programming mistake, collaborating with integer or even other numerals.

### 32. Explain inheritance

The act of creating new classes, known as derived classes, from existing classes is referred to as inheritance. Base classes refer to the pre-existing classes. Derived classes inherit all of the capabilities of the base class, but they can add their own features and enhancements.

33. What is overloading?

When a single object behaves in multiple ways, it is called overloading. Even if two objects have the same name, they execute different functions.

C++ allows you to define multiple definitions for the same function name or operator within the same scope. Overloading is a term that refers to the same thing as function overloading.

33. What is STL?

The Standard Template Library (STL) is a set of C++ template classes that would provide commonly used programming data structures and operations, such as lists, stacks, and arrays. It's an algorithm, iterator, and container class library.

### 34. What are the methods of exporting a function from a DLL?

There are two approaches:

* By Using the type library in the DLL.
* By Using the DLL instance to get a reference to the function.

### 35. Explain what is C++ exceptional handling?

The practice of handling runtime faults in C++ is known as exception handling. We handle exceptions so that the application's usual flow can be preserved even when runtime issues occur. An exception in C++ is a run-time event or object. The std::exception class is where all exceptions are derived.

### 36. Mention what are the types of Member Functions?

The types of member functions are

* Simple functions
* Static functions
* Const functions
* Inline functions
* Friend functions

### 37. What is a copy constructor?

A copy constructor is a member function that uses another object from the same class to initialize an object. The general function prototype of a copy constructor is as follows:

ClassName (const ClassName &old\_obj);

### 38. Mention what are the decision-making statements in C++? Explain if statement with an example?

The decision-making statements in C++ are

* if statement
* switch statement
* conditional operator

### 39. Explain what is multi-threading in C++?

* Multitasking is the capability that allows your computer to execute two or more programs at the same time. Multithreading is a sophisticated form of multitasking.
* A multithreaded program is made up of two or more components that can run at the same time. A thread is a component of such a program, and each thread defines a distinct execution path.

### 40. What is the difference between virtual functions and pure virtual functions?

A virtual function is a base class member function which may modify in a derived class. The keyword virtual is used to declare it.

Example:

class base{

public:

virtual void fun(){

}

};

A pure virtual function is one that has no implementation and is declared by setting the value to 0. It doesn't have a body.

Example:

class base{

public:

virtual void fun()=0;

};

The value 0 is not allocated to anything, and the = sign has no bearing on the assignment. Its sole purpose is to inform the compiler that a function will be pure and will not contain anyone.

### 41. What are void pointers?

A void pointer is a pointer that doesn't have a datatype attached to it. It may store any form of address.

Example:

void \*ptr;

char \*str;

p=str; // no error

str=p; // error because of type mismatch

We can assign any type of pointer to a void pointer, but we can't do the opposite unless we typecast it as void.

str=(char\*) ptr;

### 42. How do you allocate and deallocate memory in C++?

In C++, the new operator is used to allocate memory, whereas the deletes operator is used to deallocate memory.

Example:

int value=new int; //allocates memory for storing 1 integer

delete value; // deallocates memory taken by value

int \*arr=new int[10]; //allocates memory for storing 10 int

delete []arr; // deallocates memory occupied by arr

### 43. What is a virtual destructor?

In C++, a virtual destructor is used in the base class to allow the derived class object to be destroyed as well. The tilde operator and the virtual keyword are used before the constructor to declare a virtual destructor.

### 44. What should be the output of the below code?

#include <iostream>

using namespace std;

int main()

{

int a=5;

int b=6;

int c;

c=(a>b) ? a : b;

cout<<c;

return 0;

}

Output: 6

Explanation:  Ternary operator is used, and the value of a is less than b which violates the condition that is why 6 is the answer

### 45. Define the Local and Global scope of a variable.

Global variables are useful for data that are relatively constant or that must be accessed by multiple functions in the script, such as a session id. A local variable, on the other hand, has a limited scope: it only exists within the block in which it was defined. The variable is destroyed and its values are lost once that block ends.

### 46. Example program for Overloading Using Different Types of Parameter.

// Program to compute absolute value

// Works for both int and float

#include <iostream>

using namespace std;

// function with float type parameter

float absolute(float var){

if (var < 0.0)

var = -var;

return var;

}

// function with int type parameter

int absolute(int var) {

if (var < 0)

var = -var;

return var;

}

int main() {

// call function with int type parameter

cout << "Absolute value of -5 = " << absolute(-5) << endl;

// call function with float type parameter

cout << "Absolute value of 5.5 = " << absolute(5.5f) << endl;

return 0;

}

Output:

Absolute value of -5 = 5

Absolute value of 5.5 = 5.5

### 47. Can we call a virtual function from a constructor?

We can use a constructor to call a virtual function. However, in this scenario, the behavior differs slightly. The virtual call is resolved at runtime when a virtual function is invoked. The current class's member function is always invoked. That is, the constructor does not support virtual machines.

Example:

class base{

private:

int value;

public:

base(int x){

value=x;

}

virtual void fun(){

}

}

class derived{

private:

int a;

public:

derived(int x, int y):base(x){

base \*b;

b=this;

b->fun(); //calls derived::fun()

}

void fun(){

cout<<”fun inside derived class”<<endl;

}

}

### 48. Explain what is upcasting in C++?

Upcasting is the process of transforming a derived-class pointer or reference to a base class. To look at it another way, one can consider a derived type as though it were its

**JAVA question**

1. What is the difference between JDK, JRE, and JVM?

JVM

JVM is an acronym for Java Virtual Machine; it is an abstract machine which provides the runtime environment in which Java bytecode can be executed. It is a specification which specifies the working of Java Virtual Machine. Its implementation has been provided by Oracle and other companies. Its implementation is known as JRE.

JVMs are available for many hardware and software platforms (so JVM is platform dependent). It is a runtime instance which is created when we run the Java class. There are three notions of the JVM: specification, implementation, and instance.

JRE

JRE stands for Java Runtime Environment. It is the implementation of JVM. The Java Runtime Environment is a set of software tools which are used for developing Java applications. It is used to provide the runtime environment. It is the implementation of JVM. It physically exists. It contains a set of libraries + other files that JVM uses at runtime.

JDK

JDK is an acronym for Java Development Kit. It is a software development environment which is used to develop Java applications and applets. It physically exists. It contains JRE + development tools. JDK is an implementation of any one of the below given Java Platforms released by Oracle Corporation:

* Standard Edition Java Platform
* Enterprise Edition Java Platform
* Micro Edition Java Platform

2) How many types of memory areas are allocated by JVM?

Many types:

1. Class(Method) Area: Class Area stores per-class structures such as the runtime constant pool, field, method data, and the code for methods.
2. Heap: It is the runtime data area in which the memory is allocated to the objects
3. Stack: Java Stack stores frames. It holds local variables and partial results, and plays a part in method invocation and return. Each thread has a private JVM stack, created at the same time as the thread. A new frame is created each time a method is invoked. A frame is destroyed when its method invocation completes.
4. Program Counter Register: PC (program counter) register contains the address of the Java virtual machine instruction currently being executed.
5. Native Method Stack: It contains all the native methods used in the application.

3) What is JIT compiler?

Just-In-Time(JIT) compiler: It is used to improve the performance. JIT compiles parts of the bytecode that have similar functionality at the same time, and hence reduces the amount of time needed for compilation. Here the term “compiler” refers to a translator from the instruction set of a Java virtual machine (JVM) to the instruction set of a specific CPU.

4) What is the platform?

A platform is the hardware or software environment in which a piece of software is executed. There are two types of platforms, software-based and hardware-based. Java provides the software-based platform.

5) What are the main differences between the Java platform and other platforms?

There are the following differences between the Java platform and other platforms.

* Java is the software-based platform whereas other platforms may be the hardware platforms or software-based platforms.
* Java is executed on the top of other hardware platforms whereas other platforms can only have the hardware components.

6) What gives Java its 'write once and run anywhere' nature?

The bytecode. Java compiler converts the Java programs into the class file (Byte Code) which is the intermediate language between source code and machine code. This bytecode is not platform specific and can be executed on any computer.

7) What is classloader?

Classloader is a subsystem of JVM which is used to load class files. Whenever we run the java program, it is loaded first by the classloader. There are three built-in classloaders in Java.

1. Bootstrap ClassLoader: This is the first classloader which is the superclass of Extension classloader. It loads the rt.jar file which contains all class files of Java Standard Edition like java.lang package classes, java.net package classes, java.util package classes, java.io package classes, java.sql package classes, etc.
2. Extension ClassLoader: This is the child classloader of Bootstrap and parent classloader of System classloader. It loads the jar files located inside $JAVA\_HOME/jre/lib/ext directory.
3. System/Application ClassLoader: This is the child classloader of Extension classloader. It loads the class files from the classpath. By default, the classpath is set to the current directory. You can change the classpath using "-cp" or "-classpath" switch. It is also known as Application classloader.

8) Is Empty .java file name a valid source file name?

Yes, Java allows to save our java file by .java only, we need to compile it by javac .java and run by java classname Let's take a simple example:

1. //save by .java only
2. class A{
3. public static void main(String args[]){
4. System.out.println("Hello java");
5. }
6. }
7. //compile by javac .java
8. //run by     java A

compile it by javac .java

run it by java A

9) Is delete, next, main, exit or null keyword in java?

No.

10) If I don't provide any arguments on the command line, then what will the value stored in the String array passed into the main() method, empty or NULL?

It is empty, but not null.

11) What if I write static public void instead of public static void?

The program compiles and runs correctly because the order of specifiers doesn't matter in Java.

12) What is the default value of the local variables?

The local variables are not initialized to any default value, neither primitives nor object references.

13) What are the various access specifiers in Java?

In Java, access specifiers are the keywords which are used to define the access scope of the method, class, or a variable. In Java, there are four access specifiers given below.

* Public The classes, methods, or variables which are defined as public, can be accessed by any class or method.
* Protected Protected can be accessed by the class of the same package, or by the sub-class of this class, or within the same class.
* Default Default are accessible within the package only. By default, all the classes, methods, and variables are of default scope.
* Private The private class, methods, or variables defined as private can be accessed within the class only.

14) What is the purpose of static methods and variables?

The methods or variables defined as static are shared among all the objects of the class. The static is the part of the class and not of the object. The static variables are stored in the class area, and we do not need to create the object to access such variables. Therefore, static is used in the case, where we need to define variables or methods which are common to all the objects of the class.

For example, In the class simulating the collection of the students in a college, the name of the college is the common attribute to all the students. Therefore, the college name will be defined as static.

15) What are the advantages of Packages in Java?

There are various advantages of defining packages in Java.

* Packages avoid the name clashes.
* The Package provides easier access control.
* We can also have the hidden classes that are not visible outside and used by the package.
* It is easier to locate the related classes.

16) What is the output of the following Java program?

1. class Test
2. {
3. public static void main (String args[])
4. {
5. System.out.println(10 + 20 + "hello");
6. System.out.println("hello" + 10 + 20);
7. }
8. }

The output of the above code will be

30hello

hello1020

Explanation

In the first case, 10 and 20 are treated as numbers and added to be 30. Now, their sum 30 is treated as the string and concatenated with the string hello. Therefore, the output will be 30hello.

In the second case, the string Javatpoint is concatenated with 10 to be the string hello10 which will then be concatenated with 20 to be hello1020.

17) What is the difference between an object-oriented programming language and object-based programming language?

There are the following basic differences between the object-oriented language and object-based language.

* Object-oriented languages follow all the concepts of OOPs whereas, the object-based language doesn't follow all the concepts of OOPs like inheritance and polymorphism.
* Object-oriented languages do not have the inbuilt objects whereas Object-based languages have the inbuilt objects, for example, JavaScript has window object.
* Examples of object-oriented programming are Java, C#, Smalltalk, etc. whereas the examples of object-based languages are JavaScript, VBScript, etc.

18) What will be the initial value of an object reference which is defined as an instance variable?

All object references are initialized to null in Java.

19) How many types of constructors are used in Java?

Based on the parameters passed in the constructors, there are two types of constructors in Java.

* Default Constructor: default constructor is the one which does not accept any value. The default constructor is mainly used to initialize the instance variable with the default values. It can also be used for performing some useful task on object creation. A default constructor is invoked implicitly by the compiler if there is no constructor defined in the class.
* Parameterized Constructor: The parameterized constructor is the one which can initialize the instance variables with the given values. In other words, we can say that the constructors which can accept the arguments are called parameterized constructors.

20) What is the purpose of a default constructor?

The purpose of the default constructor is to assign the default value to the objects. The java compiler creates a default constructor implicitly if there is no constructor in the class.

1. class Student3{
2. int id;
3. String name;
5. void display(){System.out.println(id+" "+name);}
7. public static void main(String args[]){
8. Student3 s1=new Student3();
9. Student3 s2=new Student3();
10. s1.display();
11. s2.display();
12. }
13. }

[Test it Now](https://www.javatpoint.com/opr/test.jsp?filename=Student3" \t "_blank)

Output:

0 null

0 null

Explanation: In the above class, you are not creating any constructor, so compiler provides you a default constructor. Here 0 and null values are provided by default constructor.

  
21) Does constructor return any value?

Ans: yes, The constructor implicitly returns the current instance of the class (You can't use an explicit return type with the constructor).

22) Is constructor inherited?

No, The constructor is not inherited.

22) Can you make a constructor final?

No, the constructor can't be final.

23) Can we overload the constructors?

Yes, the constructors can be overloaded by changing the number of arguments accepted by the constructor or by changing the data type of the parameters. Consider the following example.

1. class Test
2. {
3. int i;
4. public Test(int k)
5. {
6. i=k;
7. }
8. public Test(int k, int m)
9. {
10. System.out.println("Hi I am assigning the value max(k, m) to i");
11. if(k>m)
12. {
13. i=k;
14. }
15. else
16. {
17. i=m;
18. }
19. }
20. }
21. public class Main
22. {
23. public static void main (String args[])
24. {
25. Test test1 = new Test(10);
26. Test test2 = new Test(12, 15);
27. System.out.println(test1.i);
28. System.out.println(test2.i);
29. }
30. }

In the above program, The constructor Test is overloaded with another constructor. In the first call to the constructor, The constructor with one argument is called, and i will be initialized with the value 10. However, In the second call to the constructor, The constructor with the 2 arguments is called, and i will be initialized with the value 15.

24) What do you understand by copy constructor in Java?

There is no copy constructor in java. However, we can copy the values from one object to another like copy constructor in C++.

There are many ways to copy the values of one object into another in java. They are:

* By constructor
* By assigning the values of one object into another
* By clone() method of Object class

In this example, we are going to copy the values of one object into another using java constructor.

1. //Java program to initialize the values from one object to another
2. class Student6{
3. int id;
4. String name;
5. //constructor to initialize integer and string
6. Student6(int i,String n){
7. id = i;
8. name = n;
9. }
10. //constructor to initialize another object
11. Student6(Student6 s){
12. id = s.id;
13. name =s.name;
14. }
15. void display(){System.out.println(id+" "+name);}
17. public static void main(String args[]){
18. Student6 s1 = new Student6(111,"Karan");
19. Student6 s2 = new Student6(s1);
20. s1.display();
21. s2.display();
22. }
23. }

Output:

111 Karan

111 Karan

25) What are the differences between the constructors and methods?

There are many differences between constructors and methods. They are given below.

|  |  |
| --- | --- |
| Java Constructor | Java Method |
| A constructor is used to initialize the state of an object. | A method is used to expose the behavior of an object. |
| A constructor must not have a return type. | A method must have a return type. |
| The constructor is invoked implicitly. | The method is invoked explicitly. |
| The Java compiler provides a default constructor if you don't have any constructor in a class. | The method is not provided by the compiler in any case. |
| The constructor name must be same as the class name. | The method name may or may not be same as class name. |

26) What is the output of the following Java program?

1. public class Test
2. {
3. Test(int a, int b)
4. {
5. System.out.println("a = "+a+" b = "+b);
6. }
7. Test(int a, float b)
8. {
9. System.out.println("a = "+a+" b = "+b);
10. }
11. public static void main (String args[])
12. {
13. byte a = 10;
14. byte b = 15;
15. Test test = new Test(a,b);
16. }
17. }

The output of the following program is:

a = 10 b = 15

Here, the data type of the variables a and b, i.e., byte gets promoted to int, and the first parameterized constructor with the two integer parameters is called.

27) What is the output of the following Java program?

1. class Test
2. {
3. int i;
4. }
5. public class Main
6. {
7. public static void main (String args[])
8. {
9. Test test = new Test();
10. System.out.println(test.i);
11. }
12. }

The output of the program is 0 because the variable i is initialized to 0 internally. As we know that a default constructor is invoked implicitly if there is no constructor in the class, the variable i is initialized to 0 since there is no constructor in the class.

28) What is the output of the following Java program?

1. class Test
2. {
3. int test\_a, test\_b;
4. Test(int a, int b)
5. {
6. test\_a = a;
7. test\_b = b;
8. }
9. public static void main (String args[])
10. {
11. Test test = new Test();
12. System.out.println(test.test\_a+" "+test.test\_b);
13. }
14. }

There is a compiler error in the program because there is a call to the default constructor in the main method which is not present in the class. However, there is only one parameterized constructor in the class Test. Therefore, no default constructor is invoked by the constructor implicitly.

29) What is the static variable?

The static variable is used to refer to the common property of all objects (that is not unique for each object), e.g., The company name of employees, college name of students, etc. Static variable gets memory only once in the class area at the time of class loading. Using a static variable makes your program more memory efficient (it saves memory). Static variable belongs to the class rather than the object.

1. //Program of static variable
3. class Student8{
4. int rollno;
5. String name;
6. static String college ="ITS";
8. Student8(int r,String n){
9. rollno = r;
10. name = n;
11. }
12. void display (){System.out.println(rollno+" "+name+" "+college);}
14. public static void main(String args[]){
15. Student8 s1 = new Student8(111,"Karan");
16. Student8 s2 = new Student8(222,"Aryan");
18. s1.display();
19. s2.display();
20. }
21. }

Output:111 Karan ITS

222 Aryan ITS

  
30) What is the static method?

* A static method belongs to the class rather than the object.
* There is no need to create the object to call the static methods.
* A static method can access and change the value of the static variable.

31) What are the restrictions that are applied to the Java static methods?

Two main restrictions are applied to the static methods.

* The static method can not use non-static data member or call the non-static method directly.
* this and super cannot be used in static context as they are non-static.

32) Why is the main method static?

Because the object is not required to call the static method. If we make the main method non-static, JVM will have to create its object first and then call main() method which will lead to the extra memory allocation.[More Details.](https://www.javatpoint.com/static-keyword-in-java)

33) Can we override the static methods?

No, we can't override static methods.

34) What is the static block?

Static block is used to initialize the static data member. It is executed before the main method, at the time of classloading.

1. class A2{
2. static{System.out.println("static block is invoked");}
3. public static void main(String args[]){
4. System.out.println("Hello main");
5. }
6. }

Output: static block is invoked

Hello main

35) Can we execute a program without main() method?

Ans) No, It was possible before JDK 1.7 using the static block. Since JDK 1.7, it is not possible.

36) What if the static modifier is removed from the signature of the main method?

Program compiles. However, at runtime, It throws an error "NoSuchMethodError."

37) What is the difference between static (class) method and instance method?

|  |  |
| --- | --- |
| static or class method | instance method |
| 1)A method that is declared as static is known as the static method. | A method that is not declared as static is known as the instance method. |
| 2)We don't need to create the objects to call the static methods. | The object is required to call the instance methods. |
| 3)Non-static (instance) members cannot be accessed in the static context (static method, static block, and static nested class) directly. | Static and non-static variables both can be accessed in instance methods. |
| 4)For example: public static int cube(int n){ return n\*n\*n;} | For example: public void msg(){...}. |

38) Can we make constructors static?

As we know that the static context (method, block, or variable) belongs to the class, not the object. Since Constructors are invoked only when the object is created, there is no sense to make the constructors static. However, if you try to do so, the compiler will show the compiler error.

39) Can we make the abstract methods static in Java?

In Java, if we make the abstract methods static, It will become the part of the class, and we can directly call it which is unnecessary. Calling an undefined method is completely useless therefore it is not allowed.

40) Can we declare the static variables and methods in an abstract class?

Yes, we can declare static variables and methods in an abstract method. As we know that there is no requirement to make the object to access the static context, therefore, we can access the static context declared inside the abstract class by using the name of the abstract class. Consider the following example.

1. abstract class Test
2. {
3. static int i = 102;
4. static void TestMethod()
5. {
6. System.out.println("hi !! I am good !!");
7. }
8. }
9. public class TestClass extends Test
10. {
11. public static void main (String args[])
12. {
13. Test.TestMethod();
14. System.out.println("i = "+Test.i);
15. }
16. }

Output

hi !! I am good !!

i = 102

41) What is this keyword in java?

The this keyword is a reference variable that refers to the current object. There are the various uses of this keyword in Java. It can be used to refer to current class properties such as instance methods, variable, constructors, etc. It can also be passed as an argument into the methods or constructors. It can also be returned from the method as the current class instance.

  
42) What are the main uses of this keyword?

There are the following uses of this keyword.

* this can be used to refer to the current class instance variable.
* this can be used to invoke current class method (implicitly)
* this() can be used to invoke the current class constructor.
* this can be passed as an argument in the method call.
* this can be passed as an argument in the constructor call.
* this can be used to return the current class instance from the method.

43) Can we assign the reference to this variable?

No, this cannot be assigned to any value because it always points to the current class object and this is the final reference in Java. However, if we try to do so, the compiler error will be shown. Consider the following example.

1. public class Test
2. {
3. public Test()
4. {
5. this = null;
6. System.out.println("Test class constructor called");
7. }
8. public static void main (String args[])
9. {
10. Test t = new Test();
11. }
12. }

Output

Test.java:5: error: cannot assign a value to final variable this

this = null;

^

1 error

44) Can this keyword be used to refer static members?

Yes, It is possible to use this keyword to refer static members because this is just a reference variable which refers to the current class object. However, as we know that, it is unnecessary to access static variables through objects, therefore, it is not the best practice to use this to refer static members. Consider the following example.

1. public class Test
2. {
3. static int i = 10;
4. public Test ()
5. {
6. System.out.println(this.i);
7. }
8. public static void main (String args[])
9. {
10. Test t = new Test();
11. }
12. }

Output

10

45) How can constructor chaining be done using this keyword?

Constructor chaining enables us to call one constructor from another constructor of the class with respect to the current class object. We can use this keyword to perform constructor chaining within the same class. Consider the following example which illustrates how can we use this keyword to achieve constructor chaining.

1. public class Employee
2. {
3. int id,age;
4. String name, address;
5. public Employee (int age)
6. {
7. this.age = age;
8. }
9. public Employee(int id, int age)
10. {
11. this(age);
12. this.id = id;
13. }
14. public Employee(int id, int age, String name, String address)
15. {
16. this(id, age);
17. this.name = name;
18. this.address = address;
19. }
20. public static void main (String args[])
21. {
22. Employee emp = new Employee(105, 22, "Vikas", "Delhi");
23. System.out.println("ID: "+emp.id+" Name:"+emp.name+" age:"+emp.age+" address: "+emp.address);
24. }
26. }

Output

ID: 105 Name:Vikas age:22 address: Delhi

### Which class is the superclass for all the classes?

The object class is the superclass of all other classes in Java.

### 46) Why is multiple inheritance not supported in java?

To reduce the complexity and simplify the language, multiple inheritance is not supported in java. Consider a scenario where A, B, and C are three classes. The C class inherits A and B classes. If A and B classes have the same method and you call it from child class object, there will be ambiguity to call the method of A or B class.

Since the compile-time errors are better than runtime errors, Java renders compile-time error if you inherit 2 classes. So whether you have the same method or different, there will be a compile time error.

### 47) What is aggregation?

Aggregation can be defined as the relationship between two classes where the aggregate class contains a reference to the class it owns. Aggregation is best described as a has-a relationship. For example, The aggregate class Employee having various fields such as age, name, and salary also contains an object of Address class having various fields such as Address-Line 1, City, State, and pin-code. In other words, we can say that Employee (class) has an object of Address class. Consider the following example.

### 48) What is composition?

Holding the reference of a class within some other class is known as composition. When an object contains the other object, if the contained object cannot exist without the existence of container object, then it is called composition. In other words, we can say that composition is the particular case of aggregation which represents a stronger relationship between two objects. Example: A class contains students. A student cannot exist without a class. There exists composition between class and students.

### 49) What is the difference between aggregation and composition?

Aggregation represents the weak relationship whereas composition represents the strong relationship. For example, the bike has an indicator (aggregation), but the bike has an engine (composition).

### 50) Why does Java not support pointers?

The pointer is a variable that refers to the memory address. They are not used in Java because they are unsafe(unsecured) and complex to understand.

### 51) What is super in java?

The super keyword in Java is a reference variable that is used to refer to the immediate parent class object. Whenever you create the instance of the subclass, an instance of the parent class is created implicitly which is referred by super reference variable. The super() is called in the class constructor implicitly by the compiler if there is no super or this.

### 52) What are the main uses of the super keyword?

There are the following uses of super keyword.

* super can be used to refer to the immediate parent class instance variable.
* super can be used to invoke the immediate parent class method.
* super() can be used to invoke immediate parent class constructor.

### 53) What are the differences between this and super keyword?

There are the following differences between this and super keyword.

* The super keyword always points to the parent class contexts whereas this keyword always points to the current class context.
* The super keyword is primarily used for initializing the base class variables within the derived class constructor whereas this keyword primarily used to differentiate between local and instance variables when passed in the class constructor.
* The super and this must be the first statement inside constructor otherwise the compiler will throw an error.

### 54) Can you use this() and super() both in a constructor?

No, because this() and super() must be the first statement in the class constructor.

### 55) Can we overload the methods by making them static?

No, We cannot overload the methods by just applying the static keyword to them(number of parameters and types are the same).

### 56) Can we overload the main() method?

Yes, we can have any number of main methods in a Java program by using method overloading.