Q.1] write short note on Java Developers kit

→ i] The Java Development kit (JDK) is a Software development kit used for Java Programming.

ii] It includes tools. exectable and bihaviar required for Java applications developers

iii] JDK Comprises The Java Runtime Environment (JRE) exetical libries and development tools like Compilers and debuggers.

iv] Developers are JDK to create, compile and run Java application

v] It plays a aracial role in building robust and platform - independent software making it a fundamental component for Java developers.

vi] JDK Contains:

- Java Runtime Environment (JRE)
- An Interpreter Holder (Java)
- A compiler Javac()
- An architecture (Jar) and many more.

vii] you can use the JDK compiler to convert your Java text file into an executable Program.

Q.2] List and explain the scilent features o Java.

→ The primary objective of Java Progra language creation was to made it portable simple and secure programmin language. the features of Java are also known as Java buzzwords.

A list of the most important features of the Java language

1] Simple :- Java is a very easy to learn & its syntax is simple,

2] Object oriented :- Java is an object-orien Programming language Everything in Ja is an object

3] Portable :- Java is Portable because it facilities you to ~~ea~~ carry the Java byte code to any Platform it Go dosn' require implementation.

4] secured :- Java is best known for its security with Java We can develop free systems.

5] High Performance :- Java is faster then other Traditional interpreted Programmin languages because Java byte code is "close" to native code.

Q3] List and explain the components of Java virtual machine?

→ The Java virtual machine (JVM) is a components of the Runtime function ment (or JRE) are playes a centrau role in executing Java bytecode Here are the main components of the Java virtual machine

① Class header: Responsible for loading classes needed by the Java Program during runtime. It takes the compiled Java classes and makes there available for the JVM

② Bytecode verifiers: Ensure that the bytecode generates by the Java compiler address to Java for language & specifications and does not vilate security constrict It help prevent certain security

③ Interpreter: interpreter the bytecode line by line and executes it while this time approach is straigh forward it can be efficient compared other executions methods

④ Just-in-time (JIT) compiler converts the bytecode into native machine code just before execution this can significantly improve performance on native machine

Q.4] write in details about different types of operation in Java category wise quoting functionality approache and return type, given an example statemank for each:

→ certainly In Java operation can be categorized based on their functionay Here are same common type.

- Arithmetic operations:-
- functionality :- Perform basic Arithmetic opon
- operations:- numeric values.
- Return type :- Same as the operands

Example:

```
int result = 10+5; //Addition
```

- Relational operator:-
- functionality :- compare value and return a booln result.
- Operations :- Any primitive data type
- Return type :- boolean
- Logical operator.

functionality :- Perform logical operations an boolean values.

- operator :- boolean value
- Return value :- boolean
- Assignment operator:-
- functionality :- Assign value are variable
- operator :- = variable & values
- Return type :- same as the assign value.

Q.5] what are the primitive data type in Java? briefly explain their size range and other details:

→

		size	range
1]	byte	8 bit	128 to 127
2]	short	16 bit	32768 to 37,767
3]	int	32 bit	2731 to 2731-1
4]	long	64 bit	2^63 to 2^63-1
5]	float	32 bit	single-precision floating point
6]	double	64 bit	double-precision floating point
7]	char	16-bit	onicode charac

Q.6] Explain above memory management in Java with reference to stack and heap?

→ In Java memory, management in values The allocation and dellication of memory for objects during Program execution the memory is divided into two main area the stack & heap.

i] Stack :- The Stack is used for storing local Variables & managing

invocations.

- Size & Allocations:- memory allocation is automatic and follows a last in first out (LIFO) structure. Each Thread has its own stack and the size is usually smaller compared to heap.

- Data types :- Store primitive data type and reference objects
- Lifetime :- short-lived memory is automatically reclaimed when are method execution completes.

ii) Heap :- Purpose :- the heap is used for dynamically memory allocation primarily for objects and arrays.
- Size and Allocations :- memory allocations is managed by the Java virtual machine (JVM). the heap in size can be adjusted using JVM parameter

Q.7] Explain the terms : narrowing widening

→ In Java narrowing and widening refer to type conversion between different data types specifically concerning numeric type

i] widening :- widening also known as implicit conversion, occurs when a value of smaller data type is automatically converted to larger data type.

ii] Automatic :- It happens automatically as there generally no loss of precision because the largest type can represent the entire range of the source type.

iii] Narrowing (Explicit conversion) :- Narrowing or explicit conversion occurs when a vale of a larger data type is explicity converted and smaller data type

iv] manual casting :- It requires manual intervention through casting and there might be loss of precisions If the might be loss of precisions .

Q8] Write in detail about static keyword?

→ In Java the static keyword is used to declare members that belong to the class rather than instance of the class. It can be applied to variables methods nested classes, and blocks. Here are detailed explanation to how the static keyword used in variable ~~to~~ contexts:

1] static variables:- variables declared with the static keyword are known as static variable or class variable
- Scope variables :- They are shared by all instance of the class and belong to class rather than individual object.
- Access :- Acessed using the class rather than an instance.

2] Static method:-
- methods declared with the static keywords static method.
- class used the class name rather than an instance. they cannot access non-static members directly.

Q.9] write a short note on access specifier in Java?

→ Access specifier in Java determine the act visibility and accessibility of classes, methods and variables in program. there are four access specifier In Java.

1] Java Public :-
Description :- The most permissive access level public members are accessible from any other class.
Example :-
```
Public class Example{
  Public int Public variable;
  Public void Public method(){
  }
}
```

2] protected :-
Description :- Accessible within the same package and subclass even if they in different package.
Example :-
```
class Example{
Protected int Protected variables
Protected void Protected method,
    // code here.
  }
}
```