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Q1. → Computer language are set of instructions that programmers use to communicate with computer. They are used to create software application, websites, and other digital products.

Computer language can be classified in 3 generations.

1) First-generation language (machine language).

It is lowest level of computer language.

They consist of binary code, which is series

of 0's and 1's, that represent instruction that

computer must execute. Machine language is very

difficult to read and write, so it is rarely

used by programmers today.

2) Second-generation language (assembly language)

It is more human-readable than machine language.

They use mnemonic code to represent instruction

that computer must execute. Assembly language is

still used by some programmers today, but it is

mainly used for low-level programming tasks,

such as writing device driver and operating

system.

3) Third-generation language (high-level language).

It is most widely used type of computer language

today. They are much easier to read and write

than assembly language, and they allow programmer

to express complex idea in concise way. Some popular high-level language include Python, Java, C++, etc

Q2 → life cycle of program from source code to executable.

→ Step 1: Editor

A programmer edit ~~and~~ program with editor and gives source code.

→ Step 2: Preprocessor

During preprocessing, these <sup>header</sup> files are attached with source code resulting in preprocessed source code.

→ Step 3: Compiler

Compiler translate the preprocessed source code into assembly level code (symbolic language). if there is no syntax error.

→ Step 4: Assembler

Assembler takes assembly level language from compiler and generates the object code. this code is quite similar to machine code.

→ Step 5: linker

It takes the object code and link it with other library files, these library files are not part of our code, but it helps to execute total program.

→ Step 6: loader

Executable code stored in hard disk. In order to execute object code, it has to be loaded into main memory. loader loads executable object code - into main memory from hard disk.

## Step 7: CPU

After all phase execution phase comes. In this CPU execute program one instruction at time and output of code is printed on monitor screen.

Q3 → 2 utility software are:-

### 1) Antivirus Software:-

It is designed to protect computer from malicious software, such as virus, malware, etc. It works by scanning computer for known threats and remove them. Some also include real-time protection and firewall protection.

### 2) Disk management tool:-

It is used to manage disk drive and partitions. These tool can be used to create, delete, format and resize partitions. Disk management tools can also be used to defragment disk, which can improve performance of computer.

### \* Advantage of Utility Software:-

- It helps to improve performance of computer by removing junk files, defragmenting disk, and optimizing system settings.
- It helps in increasing security by protecting it from malicious software and unauthorized access.
- ~~It~~ It help to enhance convenience of help using computer by providing feature such as file compression, backup & recovery, etc.



Q4 → Kernel - mode device drivers runs kernel mode which is most privileged mode of operation on computer. This means that kernel - mode driver ~~are~~ typically used for devices that have direct access to all hardware resources on computer. It is typically used for devices that require high performance and low latency.

User - mode device driver runs user mode, which is less privileged mode of operation on computer. This means user mode driver don't have direct access to hardware resources. Instead, they communicate with operating system kernel through special interface. It is used for device requires low performance and high latency.

Kernel - mode device driver	User - mode device driver
<p><u>Advantage</u></p> <ul style="list-style-type: none"> <li>→ direct access to hardware</li> <li>→ can perform complex task</li> <li>→ high performance, low latency</li> </ul>	<p><u>Advantage</u></p> <ul style="list-style-type: none"> <li>→ less complex to develop and maintain</li> <li>→ less vulnerable to security attacks</li> </ul>
<p><u>Disadvantages</u></p> <ul style="list-style-type: none"> <li>→ more complex to develop and maintain</li> <li>→ more vulnerable to security attack</li> </ul>	<p><u>Disadvantages</u></p> <ul style="list-style-type: none"> <li>→ low performance, high latency</li> <li>→ limited access to hardware</li> <li>→ can't perform complex task</li> </ul>
<p><u>Examples</u></p> <p>Network card, disk drives, graphic card, USB controller</p>	<p><u>Examples</u></p> <p>Printer, Scanner, Webcam, Bluetooth devices.</p>