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Section : BSCS 5

Question : 1

In modern computer systems, memory is often managed in a non-contiguous way. This allows programs to use memory more efficiently and improves overall system performance.

Techniques Used:

Paging:

Memory is divided into fixed-size blocks called *pages*.

Each page can be loaded into any free frame in the physical memory.

Eliminates the need for large contiguous memory blocks.

Segmentation:

Divides memory based on logical sections like code, data, and stack.

Each segment is variable in size and can be stored in different memory locations.

Virtual Memory:

Uses part of the hard drive (disk) as an extension of RAM.

Combines paging (and sometimes segmentation) to handle large programs.

Question : 2

In modern systems, especially 64-bit operating systems, the following page sizes are commonly used:

- 4 KB (Kilobytes) – Standard page size.
- 2 MB (Megabytes) – Large page.
- 1 GB (Gigabyte) – Huge page, used for specific high-memory-demand applications.
- These page sizes are supported by hardware features like Intel and AMD's large page support.

Question : 3

Feature	Small Page Size (e.g., 4 KB)	Large Page Size (e.g., 2 MB or 1 GB)
Advantages	- Less memory wastage (better for small processes) - Better sharing and protection	- Fewer page table entries - Improved performance for large memory use
Disadvantages	- Wasted memory (internal fragmentation) - More page table entries needed - Increased overhead for large programs	- Less flexible for small applications

Question : 4

Small Page Sizes:

Used when memory needs to be used efficiently in small pieces.

Examples:

Multitasking environments (many small programs)

Web browsers

Office applications

Operating system processes **Large**

Page Sizes:

Used when applications need to access large amounts of memory quickly and efficiently.

Examples:

Games

Video editing software

Database servers