1.

Memory management is intended to satisfy the following requirements:

Relocation: Ensuring processes can be moved in memory to maximize efficiency.

Protection: Isolating processes from each other to prevent interference or corruption.

Sharing: Allowing multiple processes to access shared resources without conflicts.

Logical Organization: Managing programs and data in a logical and modular way.

Physical Organization: Optimizing memory use across the hierarchy of storage devices.

2.

Efficient Utilization of Memory: Unequal-size partitions allow processes of varying sizes to fit better, reducing internal fragmentation.

Support for Large Processes: Larger partitions accommodate bigger processes that would not fit in equal-size partitions.

Flexibility: Provides a range of partition sizes, offering better matching for diverse process memory requirements.

3.

Page: A fixed-size block of a process's logical memory (virtual address space).

Frame: A fixed-size block of physical memory (RAM).

Pages are mapped to frames in a one-to-one correspondence during execution, enabling processes to run efficiently in a virtual memory environment.

4.

Memory Size: 2242^{24}224 bytes.

Partition Size: 2162^{16}216 bytes.

Number of Partitions: 224/216=28=2562^{24} / 2^{16} = 2^{8} = 256224/216=28=256 partitions.

Bits Required for the Pointer: log⁡2(256)=8\log_2(256) = 8log2 (256)=8 bits.

5.

A. If the block is of size 4, what is the binary address of its buddy?

Block Size: 22=42^2 = 422=4 bytes.

Buddy Address Rule: Flip the last log⁡2(4)=2\log_2(4) = 2log2 (4)=2 bits of the address.

Address: 01101111000001101111000011011110000.

Flip the last 2 bits: 01101111001101101111001101101111 0011.

Buddy Address: 01101111001101101111001101101111 0011.

B. If the block is of size 16, what is the binary address of its buddy?

Block Size: 24=162^4 = 1624=16 bytes.

Buddy Address Rule: Flip the last log⁡2(16)=4\log_2(16) = 4log2 (16)=4 bits of the address.

Address: 01101111000001101111000011011110000.

Flip the last 4 bits: 01101111100001101111100011011111000.

Buddy Address: 01101111100001101111100011011111000.