7.1 MEMORY MANAGEMENT REQUIREMENTS

1- because in multiprogramming systems, the available memory is shared among a number of processes. It is not possible for the programmer to know in advance which portions of memory will be free. When a process is swapped out, it will be limiting to specify that when it is swapped back in, it must be placed in the same memory region as it was before.

2-

- Logical address: are the addresses used by system software to address memory locations.
- Relative address: is an address in memory location that is generated by specifying an offset or distance from a known location in memory like the base of the program.
- Physical address: is the actual address of data in main memory.

7.2 MEMORY PARTITIONING

3-

- Internal fragmentation: occurs when the size of the page of a process is smaller than the frame size. It is a common problem in paging techniques. In other words, it is a wastage of memory within an allocated block of memory.
- External fragmentation: it is a situation in which there are a lot of small holes in memory which causes inefficient utilization of memory. In other words, it is a wastage of memory that occurs between blocks of allocated memory.

4- #partitions = (2^24) / (2^16) = 2^8 partitions

#bits = log2(2^8) = 8 bits

5-

- Pros:
  - It is faster than first-fit and next-fit since it only needs to find the largest available block of memory and doesn't need to search for the best block that fits.
- Cons:
  - It causes external fragmentation.

- It leads to an inefficient utilization of memory since it leaves many small holes in memory that can't fit in any process.

6-

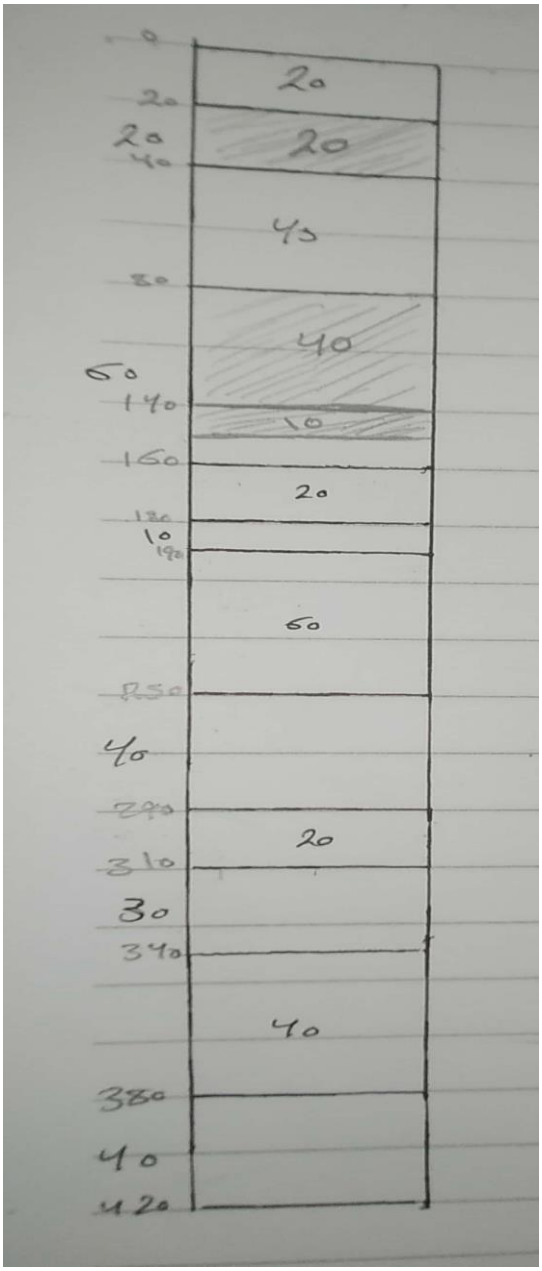


Figure a

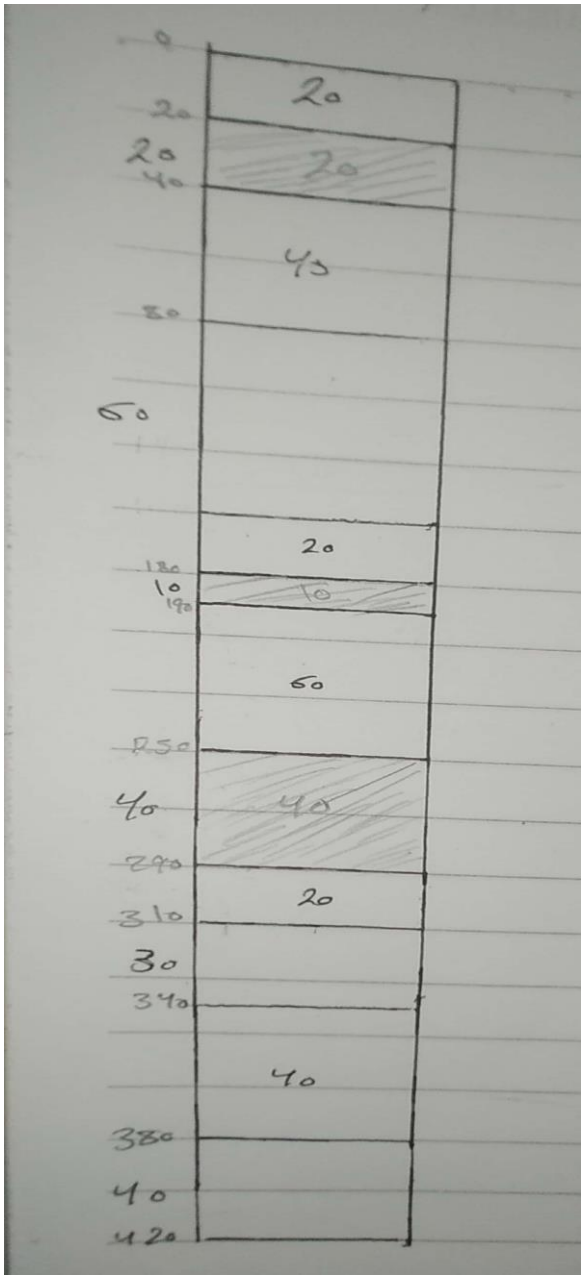


Figure b

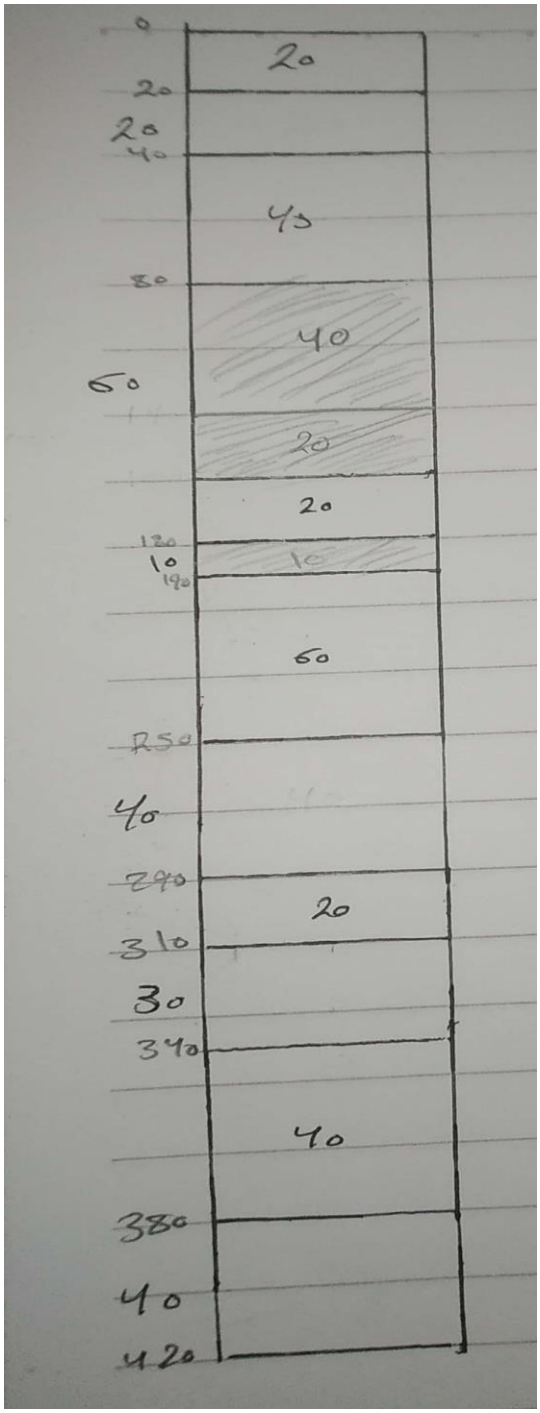


Figure c

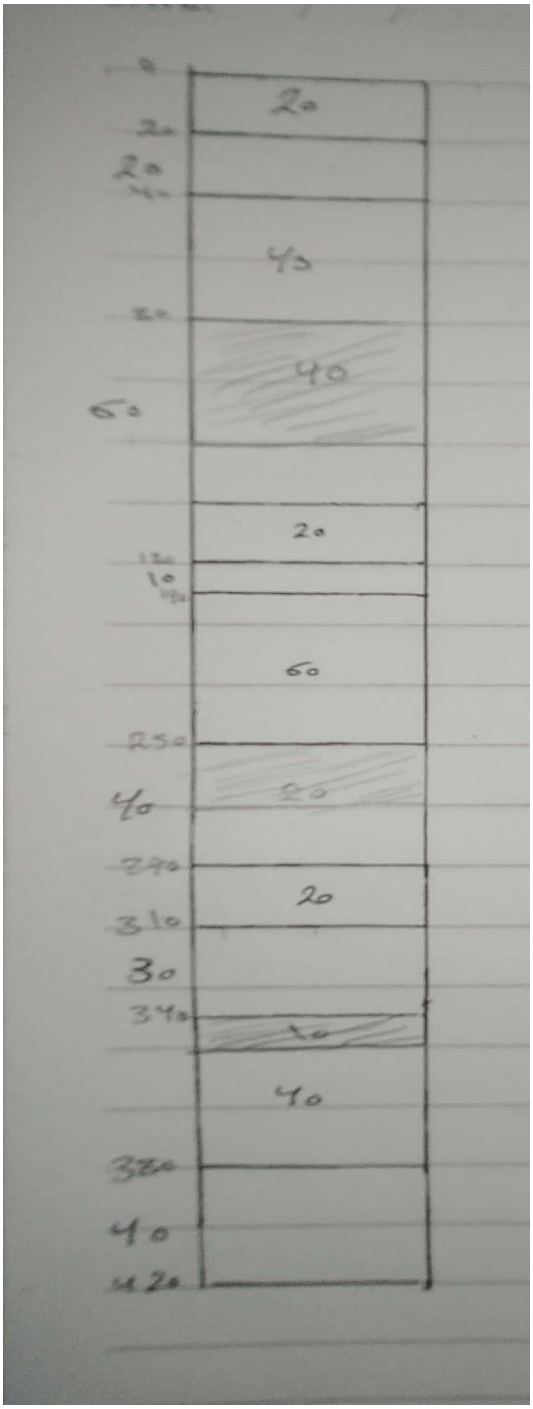


Figure d

9-

- a) 011011110001
- b) 011011110100

7.3 PAGING

10-

- a) we need 16 bits to address a specific page plus 10 bits to address a byte within that page. Hence, logical address should be 16 bits.
- b) size of the frame = size of the page = 2^10 bytes
- c) #frames = (2^32)/(2^10) = 2^22 frames. 22 bits should be used to specify a frame
- d) 2^16 entries

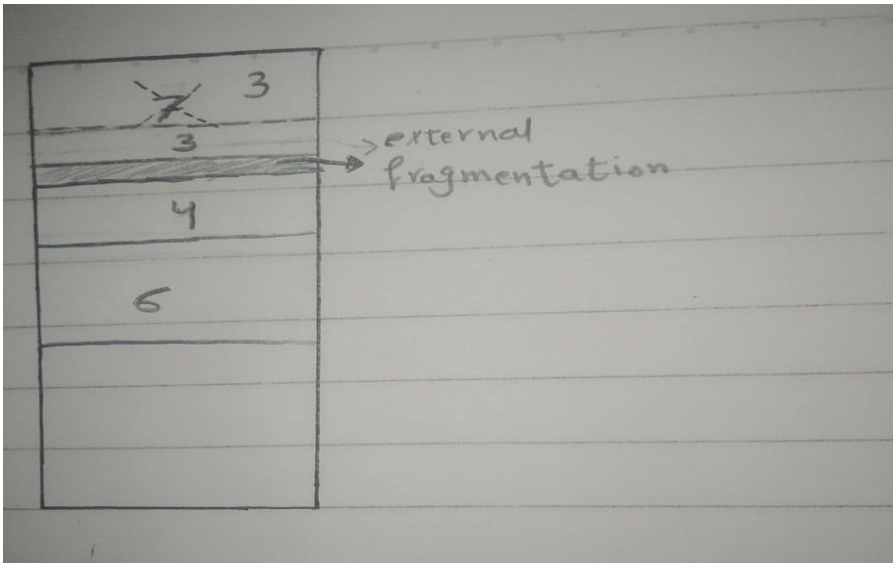
11-

- p = a / z
- w = a % z

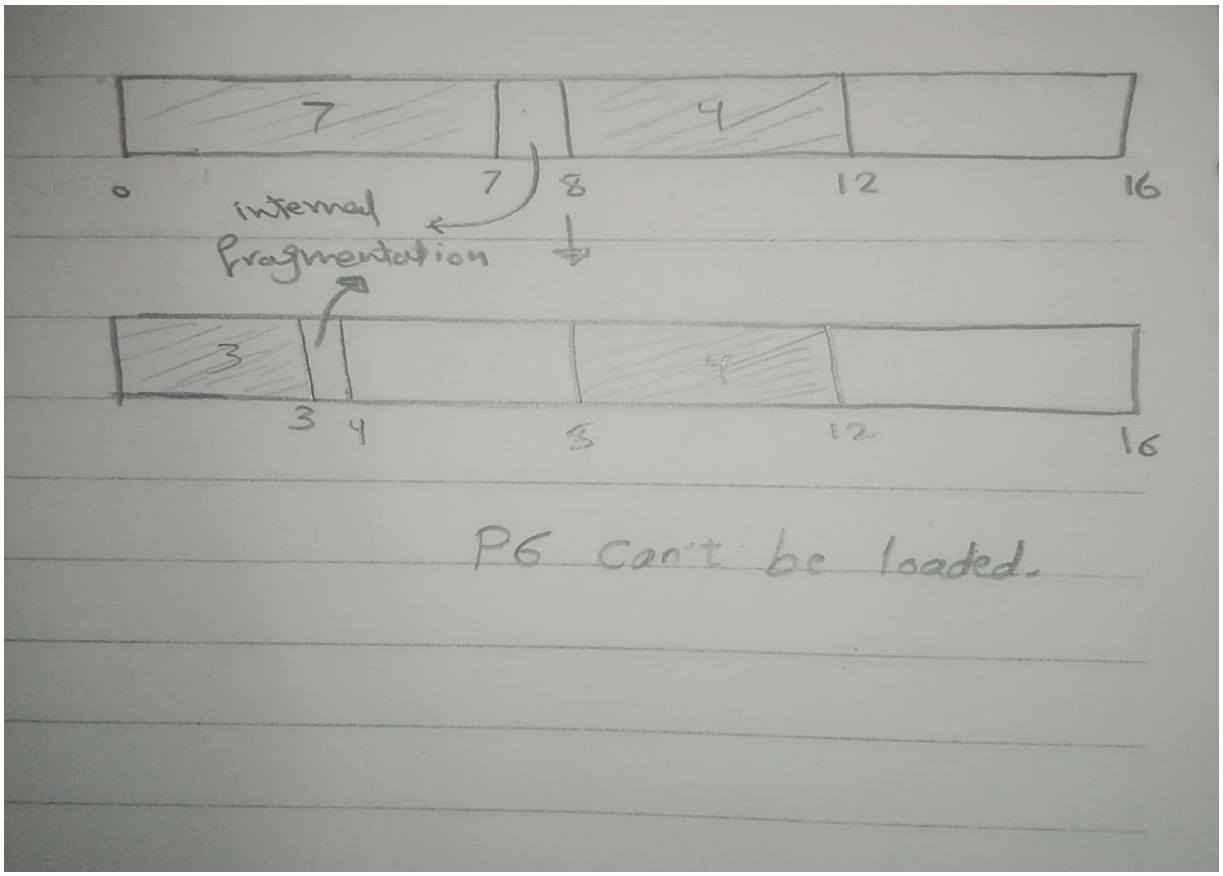
12-

- a) 660 + 198 = 858
- b) 222 + 156 = 378
- c) segment fault
- d) 996 + 444 = 1440
- e) 660 + 222 = 882

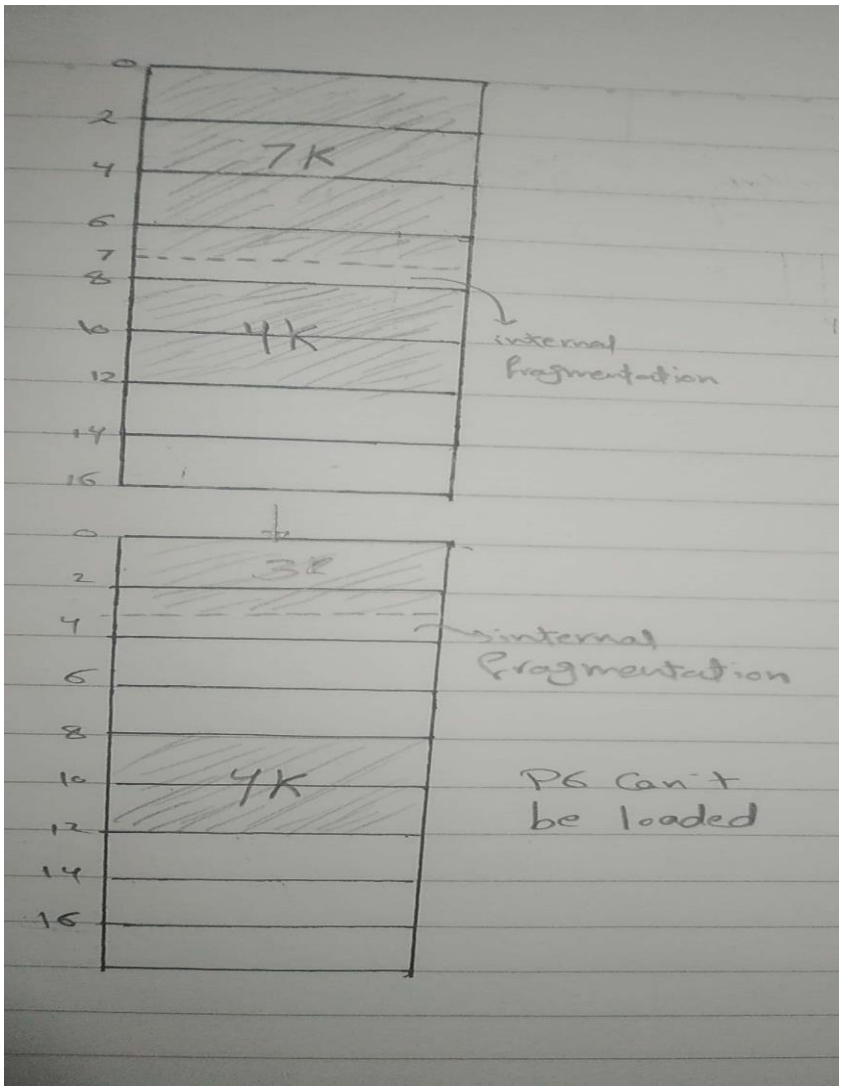
General questions



First fit and best fit



Buddy system



Simple paging