Memory Management Numerical Exercise Sheet

1. A virtual memory system has an address space of 16K words, a memory space of 6K words, and page and block sizes of 2K words The following page reference changes occur during given time interval.

   2 4 0 1 2 6 1 4 0 1 0 2 3 5 7

   Determine the three pages that are resident in main memory after each page reference change if the replacement algorithm used is **(a) FIFO; (b) LRU. (c) Optimal**

2. Given five memory partitions of 500 KB, 350 KB, 250 KB, 420 KB, and 450 KB (in order), how would the, best fit and worst-fit algorithms place processes of 325 KB, 150 KB, 400 KB, and 375 KB (in order)?
3. In a paged-segmented system, a virtual address consists of 32 bits of which 10 bits are displacement, 14 bits segment number.

   Calculate the following:

   a. Page size
   b. Max segment size
   c. Max number of Pages
   d. Max number of segments
4. The Logical memory and physical memory is 32k and 512 words respectively. If Page size is of 64 words, formulate logical and physical memory space. How many pages logical and physical memory can accommodate? Write number of entries in the page table also
5.

Consider the following segment table:

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

a. 0,430
b. 1,10
c. 2,500
d. 3,400
e. 4,112

6. A Computer provides each process with 65536 bytes of address space divided into pages of 4096 bytes. A particular program has instruction of 32768 bytes , a data size of 16386 bytes and a stack size of 15870 bytes. Will this program fit in the address space? If the page size were 512 bytes , would it fit? Remember that a page may not contain part of two different segments.

7. The logical address space in a computer system consists of 128 segments each segment can have up to 32 pages of 4K words In each. Physical memory consists of 4K block of 4K words in each. Formulate the logical and physical address formats.
8. Suppose the order of request is- (82,170,43,140,24,16,190) in request (0-199) And current position of Read/Write head is: 50 and last request serve was 30. Find the Head movement for FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK.
9. Work Queue: 23, 89, 132, 42, 187 and there are 200 cylinders numbered from 0 – 199. The disk head stars at number 100. Find Head movement for FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK when head is moving towards end.
10. Consider a physical memory of 64 MB and 32 bits of virtual memory address space. If the page size is 4KB, find the size of memory page table.
11. Consider a paging hardware with a TLB. Assume that the entire page table and all the pages are in the physical memory. It takes 10 milliseconds to search the TLB and 80 milliseconds to access the physical memory. If the TLB hit ratio is 0.6, the effective memory access time (in milliseconds) is____.
12. Consider a reference string that shows how the CPU demands the pages.

    Reference String: 0,1, 2, 3, 0, 1, 4, 0, 1, 2, 3, 4.

    When the number of Frames is: 3 and 4. Find the Page Fault and Page Fault Ratio for FIFO Page Replacement Algorithm. Also validate Is Belady's Anomaly exist or not?