QUESTION 1

Question 1: Contiguous memory allocation.

Part A: Consider a user process executing in a single-core CPU computer system that uses an execution-time address-binding scheme, where the base register holds 200080 and the limit register is 130400. Determine the range of legal addresses that the process may access by answering the following questions:

i. Specify the smallest and the largest legal physical memory addresses.

Smallest Legal Address	200080
Largest Legal Address	330479

i. Indicate if each of the following logical addresses is legal or not. Then translate it into its corresponding physical address (if applicable).

Logical address	Legal/Illegal	Physical address
30060	Legal	230140
131400	Illegal	NA

Note: Use the word "Legal" OR "Illegal" with the same letter case. If the logical address is Illegal then use "NA" as an answer in the physical address blank. Please provide only the final number for the physical address without including any details

QUESTION 2

Question 1: Contiguous memory allocation.

Part B: Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order).

i. How would the first-fit, best-fit, and worst-fit algorithms place five processes of size P1(115 KB), P2(755 KB), P3(358 KB), P4(200 KB), and P5(275 KB) (in order) in this fixed size-partition scheme? Indicate the size of the internal fragmentation in each hole (If applicable). *Note: Assume the search always start at the beginning of the memory list.*

First Fit:

Hole	Process	Internal Fragmentation Size
Hole1 (300 KB)	P1	185
Hole2 (600 KB)	P3	242
Hole3 (350 KB)	P4	150
Hole4 (200 KB)	NA	NA
Hole5 (750 KB)	P5	475
Hole6 (125 KB)	NA	NA

Note: Use in the column *Process* either ("P1", "P2","P3","P4","P5", OR "NA" if the hole is not occupied) with the same letter case. For the column *internal fragmentation* provide only the final number without including any details OR unit. If the blank is not occupied by any process then use "NA" as an answer in the blank for BOTH columns.

QUESTION 3

Question 1: Contiguous memory allocation.

Part B: Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order).

i. How would the first-fit, best-fit, and worst-fit algorithms place five processes of size P1(115 KB), P2(755 KB), P3(358 KB), P4(200 KB), and P5(275 KB) (in order) in this fixed size-partition scheme? Indicate the size of the internal fragmentation in each hole (If applicable). *Note: Assume the search always start at the beginning of the memory list.*

Best Fit:

Hole	Process	Internal Fragmentation Size
Hole1 (300 KB)	P5	25
Hole2 (600 KB)	P3	242
Hole3 (350 KB)	NA	NA
Hole4 (200 KB)	P4	0
Hole5 (750 KB)	NA	NA
Hole6 (125 KB)	P1	10

Note: Use in the column *Process* either ("P1", "P2","P3","P4","P5", OR "NA" if the hole is not occupied) with the same letter case. For the column *internal fragmentation* provide only the final number without including any details OR unit. If the blank is not occupied by any process then use "NA" as an answer in the blank for BOTH columns.

QUESTION 4

Question 1: Contiguous memory allocation.

Part B: Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order).

i. How would the first-fit, best-fit, and worst-fit algorithms place five processes of size P1(115 KB), P2(755 KB), P3(358 KB), P4(200 KB), and P5(275 KB) (in order) in this fixed size-partition scheme? Indicate the size of the internal fragmentation in each hole (If applicable). *Note: Assume the search always start at the beginning of the memory list.*

Worst Fit:

Hole	Process	Internal Fragmentation Size
Hole1 (300 KB)	P5	25
Hole2 (600 KB)	P3	242
Hole3 (350 KB)	P4	150
Hole4 (200 KB)	NA	NA
Hole5 (750 KB)	P1	635
Hole6 (125 KB)	NA	NA

Note: Use in the column *Process* either ("P1", "P2","P3","P4","P5", OR "NA" if the hole is not occupied) with the same letter case. For the column *internal fragmentation* provide only the final number without including any details OR unit. If the blank is not occupied by any process then use "NA" as an answer in the blank for BOTH columns.

QUESTION 5

Question 1: Contiguous memory allocation.

Part B: Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order).

i. Indicate which—if any—requests cannot be satisfied by any of the three policies (process rejected).

- ○ a. P1
- ◉ b. P2
- ○ c. P3
- ○ d. P4
- ○ e. P5
- ○ f. All requests are satisfied

QUESTION 6

Question 2: Paging.

Part A: Consider a logical address space of 4 pages mapped onto a physical memory of 16 frames. Given that the frame size is 2048 bytes, answer the following questions:

a) How many bits are required for the page number? 2

b) How many bits are required for the offset? 11

c) What is the size of the logical address space? 8192

d) How many bits are required for the logical address? 13

e) What is the size of the physical address space? 32768

NOTE: Provide only the final number (as a whole number) and without including any details OR unit.

QUESTION 7

Question 2: Paging.

Part B: Consider a process of size 22860 bytes mapped onto a physical memory of 23 frames with a 1024 bytes frame size. What is the amount of internal fragmentation for this process (in bytes)?

NOTE: Provide only the final number (as a whole number) and without including any details OR unit.

692

QUESTION 8

Question 2: Paging.

Part C: Consider the page table below, where numbers are in decimal and everything is numbered starting from zero, all addresses are memory byte addresses, and the page size is 1024 bytes.

Page Number	Frame Number
0	5
1	11
2	4
3	20
4	8

What would each of the following virtual addresses correspond to? You are required to specify the page number, offset, and then translate each logical address into its corresponding physical address.

Logical Address	Page Number	Offset	Physical Address
2066	2	18	4114
4100	4	4	8196

)TE: Provide only the final number (as a whole number) and without including any details OR unit.

QUESTION 9

Question 3: Swapping.

Consider a computer system performing a standard swapping of two same-sized processes using a disk as a backing store. If a user process has a size of 260 MB and the backing store has a transfer rate of 20 MB/sec, how long does the total swapping take?

NOTE: Provide only the final number and without including any details OR unit.

26