





5 Consider the following page reference string 6,2,3,4,2,1,5,6,2,1,2,3,7,6,3,4,1,2,7,6 Find out the number of page faults if there are 4-page frames, using the following page replacement algorithm i) LRU ii) FIFO iii) Optimal.

10 CO4 L3

FIFO FIRST IN FIRST OUT																					
PAGE DEMAND		6	2	3	4	2	1	5	6	2	1	2	3	7	6	3	4	1	2	7	6
f1		6	6	6	6	6	1	1	1	1	1	1	1	3	3	3	3	3	3	2	2
f2			2	2	2	2	2	5	5	5	5	5	3	7	7	7	7	7	7	7	6
f3				3	3	3	3	3	6	6	6	6	6	6	6	6	4	4	4	4	4
f4					4	4	4	4	4	2	2	2	2	2	2	2	2	1	1	1	1
		fault	fault	fault	fault	hit	fault	fault	fault	fault	hit	hit	fault	fault	hit	hit	fault	fault	fault	hit	fault
REFERENCE STRING		20																			
PAGE FAULTS		14																			
PAGE HITS																					
OPTIMAL PAGE REPLACEMENT																					
REFERENCE STRING		6	2	3	4	2	1	5	6	2	1	2	3	7	6	3	4	1	2	7	6
f1		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
f2			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
f3				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
f4					4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		fault	fault	fault	fault	hit	fault	fault	hit	hit	hit	hit	hit	hit	hit	hit	hit	hit	hit	hit	hit
PAGE FAULT		10																			
PAGE HIT		10																			
LRU LEAST RECENTLY USED																					
REFERENCE STRING		6	2	3	4	2	1	5	6	2	1	2	3	7	6	3	4	1	2	7	6
f1		6	6	6	6	6	1	1	1	1	1	1	1	1	6	6	6	6	6	2	2
f2			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	4
f3				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	7
f4					4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	1
		fault	fault	fault	fault	hit	fault	fault	fault	hit	hit	hit	hit	hit	hit	hit	hit	hit	hit	hit	hit
PAGE FAULT		15																			
PAGE HIT		5																			

6 Distinguish between the following:  
 i. Internal fragmentation and external fragmentation.  
 ii. Paging and segmentation.

10 CO3 L2

	INTERNAL FRAGMENTATION	EXTERNAL FRAGMENTATION
<b>Definition</b>	The difference between memory allocated and required space or memory.	The unused spaces formed between non-contiguous memory fragments are too small to serve a new process.
<b>Sized memory</b>	fixed-sized memory blocks.	variable-sized memory blocks.
<b>Happens</b>	When the method or process is larger than the memory.	When the method or process is removed.
<b>Solution of external fragmentation</b>	Best-fit block.	Compaction, paging and segmentation.

<b>Basis</b>	<b>Paging</b>	<b>Segmentation</b>
Division of program	The program is divided into fixed-size pages in paging.	Program is divided into the variable-size partition in segmentation.
Speed	Paging is faster than segmentation.	Segmentation is slower than paging.
Fragmentation	Internal fragmentation.	External fragmentation.
Protection	Very difficult to apply for protection in paging.	Easier to apply protection in segmentation.
Handling of data structure	Difficult to handle the data structure.	Segmentation efficiently handles the data structure.
Visibility to the user	It is not visible to the user.	It is visible to the user.
Accountability	The operating system is accountable for paging.	Compiler is accountable here.
Determining the size	Hardware determines the page size.	The user determines the section size.
Storing the type of data	Page table stores page data.	Section table stores section data.
Sharing	Difficult to share the procedures between processes.	Easier to share the procedures between processes.

Faculty Signature

CCI Signature

HOD Signature