CSE231 Operating System, Quiz 03 Monsoon 2023
Time allocated: 4pm – 4:20pm

Name	
Roll Number	

Instructions:

- This **is a closed book and closed notes quiz. Please be aware of strict plagiarism policy.**
- For questions requiring justification, please be as concise as possible. 2-3 sentences would be the ideal size of a justification. No extra pages will be provided.

Question 1: Memory allocations can be of _____ types. Local variable allocations on process stack is an example of _____ size and _____ allocation, and is carried out by _____**(2 mark)**.

Three, static, dynamic, compiler. [0.5 x 4 marks]

Question 2: Imagine that the OS returns free memory in multiples of page size (4KB) for each and every call to "malloc". Answer the followings: a) how many bytes of memory would be lost in fragmentation for the following series of mallocs in an application (**exact** answer needed and **justify**), b) name this type of fragmentation, and c) assuming the pointers are of char type, how many page faults are there if the program has statements A[512]='c', A[1023]='s', B[0]='a', C[0]='d', C[4607]='k' (**justify**). **[3 marks]**.

A=malloc(1024), B=malloc(3072), C=malloc(5120), D=malloc(2048)

Answer:

(a) **A = 4096-1024=3072, B = 4096-3072=1024, C=8192-5120=3072, D=4096-2048=2048. [0.5 marks]**
Total = 9216 bytes [0.5 marks]
(b) Internal fragmentation [1 marks]
(c) A=1, B=1, C=2. Total = 4 page faults [1 marks]

Question 3: How many segment registers are there in x86? Name any three of them (full name) **[2 marks]**.
Answer:

Total 6 segment registers [+0.5 marks]. See the names in slides [0.5 x 3 marks]

Question 4: Name (full name) any two x86 MMU registers that are used to hold the base addresses for the tables used in address translations (except the ones from Question 3 above) **[1 marks]**
Answer:

Global Descriptor Table Register [+0.5 marks]
Page Table Base Register [+0.5 marks]

Question 5: How many bits are required for storing page number and memory offset in a 8-bit address with the page size of 8 bytes? (**justify**) **[2 marks]**
Answer:

Total number of pages = 2^8 / 2^3 = 2^5 [1 marks]
Bits required to identify 2^5 pages = 5. [0.5 marks]
Bits required to store offset = 3. [0.5 marks]