Operating Systems

Final-Term Theory Exam, S22
BSCS
Time Allowed: 150 minutes

Instructions

- Attempt all questions.
- Understanding the problem is part of the problem.
- There is no mistake in the question paper. If you find any, make a sensible assumption and solve the paper.
- Scientific calculator is allowed.
- Do NOT write any thing other than your name and registration number on question paper.

Question#1 (10 points)

For a given reference string, find the number of page faults using the Least Frequently Used page replacement policy. Also, consider the page frame size to be three.

7 0 2 4 3 1 4 7 2 0 4 3 0 3 2 7

Question#2 (10 points)

Riders come to a bus stop and wait for a bus. Write synchronization code for them that enforces the following constraints.

- When the bus arrives, all the waiting riders invoke boardBus (), but anyone who arrives while the bus is boarding must wait for the next bus.
- The capacity of the bus is 50 people; if there are more than 50 people waiting, some will have to wait for the next bus.
- When all the waiting riders have boarded, the bus can invoke depart (). If the bus arrives when there are no riders, it should depart immediately.

Question#3 (7+3 points)

1. A 32-bit program can have maximum of 32K pages on a machine having 33-bit usable physical address bus. Calculate the following with correct units.
    a) Size of p field
    b) Size of d field
    c) Size of f field
    d) Page Size
    e) Size of logical address

f) Number of frames
g) RAM size

2. Calculate the effective access time if the TLB is missed 40% of the time on a system with RAM with an access time of 80 millisecond.

Question#4 (3+3+4 points)

Answer the following questions precisely. Your answer to each question must not exceed 4 lines.

1. Write down any three benefits of using kernel level threads over user level threads.
2. What is an atomic operation? How does it provide a solution to the critical section problem?
3. What are the conditions that hold for a deadlock to occur?

Question#5 (5x2 points)

Write 'Yes" or "No" against each characteristic of the respective memory mapping technique. This question has to be done on answer booklet. Negative marking applies to this question.

S.No.	Characteristics	Paging	Segmentation
1	Internal Fragmentation		
2	External Fragmentation		
3	Table store in TLB		
4	Non-Contiguous memory allocation		
5	Support of Virtual Memory		

Best of Luck