COMP30023 — Computer Systems

Question Bank

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Q1. Five processes arrive at the same time with the following burst times and priorities:

Process	Burst Time (ms)	Priority (5 = highest)
P_1	8	3
P_2	4	5
P_3	9	1
P_4	5	2
P_5	2	4

Calculate the average turnaround time under the following scheduling algorithms:

(a) First-Come, First-Served (FCFS)

(b) Shortest Job First (SJF)

(c) Round Robin (RR) with a time quantum of 4 ms

(d) Priority Scheduling (higher number = higher priority)

Q2. A system has 16-bit logical addresses and uses a page size of 256 bytes.

(a) How many bits are used for the page number and how many for the offset?

(b) How many entries are in the page table?

(c) If the physical address space is 4 KB, how many bits are required for the physical address?

Q3. You are given the following list of memory hole sizes in sequential order (in MB):

[10, 4, 20, 18, 7, 9, 12, 15]

You also have a set of memory allocation requests (in MB):

[12, 10, 9]

Using each of the following memory allocation strategies, determine which hole each request will be allocated to (if possible), and update the hole sizes accordingly after each allocation:

(a) First Fit

(b) Best Fit

(c) Worst Fit

Q4. Calculate the size (in bytes) of a page table for a system with:

- Virtual address space: 1 GB
- Page size: 4 KB
- Page table entry size: 4 bytes

Q5. You are given the following data about a virtual memory system:

- The Translation Lookaside Buffer (TLB) can hold 2048 entries and can be accessed in 1 clock cycle (1 nsec).
- A page table entry (PTE) can be found in 100 clock cycles or 100 nsec.
- The average page replacement time is 10 milliseconds.

If page references are handled by the TLB 98% of the time, and only 0.01% lead to a page fault, what is the effective address-translation time?

Q6. A virtual memory system has a logical address space of 64 pages, each 2 KB in size, and 32 physical frames.

(a) How many bits are needed for the logical address?

(b) How many bits are needed for the physical address?