FIT2100
Semester 2 2017
Sample Exam Questions
Part B

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Contents

1 Impportant Disclaimer: Preparing for Your Exam

It is advisable to complete your required preparation(s) as quickly as possible and be prepared at least 1 week before your exam.

The Sample Exam Questions ARE NOT designed to provide you with all exam coverage for the final exam assessment of your current skill levels, but to orient you to the style of questions used in the actual final exam assessment.

DO NOT treat the sample questions as the ONLY scope for your practice exam, or as the actual exam. The final questions can be vary considerably in their content, coverage and the level of difficulty.

2 Part I: Review Questions

Question 1

Describe the two general roles of an operating system, and elaborate why these roles are important.

Question 2

Describe the *three-state process model*, describe what transitions are valid between the three states, and describe an event that might cause such a transition.

Question 3

What is a *process*? What are the attributes of a process?

Question 4

What is the function of the *ready queue*?

Question 5

What is the relationship (or differences) between threads and processes?

Question 6

Name the advantages and disadvantages of *user-level* and *kernel-level* threads.

Question 7

Describe the *process control block* and the details of information it maintains?

Question 8

Describe the sequence of steps that occur when a timer interrupt occurs that eventually results in a *context switch* to another application.

Question 9

What is a *race condition*? Give an example.

Question 10

What is a *critical region*? How do they relate to controlling access to shared resources?

Question 11

What are the three requirements of any solution to the critical sections problem? Why are the requirements needed?

Question 12

What is the *producer consumer problem*? Give an example of its occurrence in operating systems.

Question 13

What is *deadlock*? What is *starvation*? How do they differ from each other?

Question 14

What are the four conditions required for deadlock to occur?

Question 15

Describe general strategies for dealing with deadlocks.

Question 16

For single unit resources, we can model resource allocation and requests as a *directed graph* connecting processes and resources. Given such a graph, what is involved in deadlock detection?

Question 17

Assuming the operating system detects the system is deadlocked, what can the operating system do to recover from deadlock?

Question 18

What must the *banker's algorithm* know a priori in order to prevent deadlock?

Question 19

Describe the general strategy behind *deadlock prevention*, and give an example of a practical deadlock prevention method.

Question 20

Explain *short term* and *medium term* scheduling policy.

Question 21

What are four general characteristics of processor scheduling policies?

Question 22

Define *turnaround time* and *normalized turnaround time*. Why are these useful for measuring the performance of a scheduling algorithm?

Question 23

List and describe the four memory allocation algorithms. Which two of the four are more commonly used in practice?

Question 24

Describe the difference between *external* and *internal* fragmentation. Indicate which of the two are most likely to be an issue on: (a) a simple memory management machine using static partitioning; and (b) a similar machine using dynamic partitioning.

Question 25

What is *thrashing*? How might it be detected? How might one recover from it once detected?

Question 26

Enumerate some pros and cons for increasing the page size.

Question 27

Describe two virtual memory *page fetch* policies. Which is less common in practice? Why?

Question 28

What is the maximum file size supported by a file system with 16 direct blocks, single, double, and triple indirection? The block size is 512 bytes. Disk block numbers can be stored in 4 bytes.

Question 29

What are *temporal* locality and *spatial* locality?

Question 30

Explain the following basic algorithms that are used for the selection of a page as replacement algorithms: clock policy, first-in-first-out (FIFO), least recently used (LRU), and optimal policy?

3 Part II: Problem-Solving Questions

3.1 Task 1

Consider the following table, which shows when each of the processes arrives to the system and the CPU time (in seconds) required for its execution. Assume that no I/O operations are involved in these processes.

Process	Arrival Time	Service Time
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

Draw a chart (or sequence) of process execution under the following process scheduling:

(a) First-Come-First-Served (FCFS) or First-In-First-Out (FIFO)

(b) Round Robin with the CPU time slice quantum of 1 second

(c) Shortest Process Next (SPN)

(d) Shortest Remaining Time (SRT)

(e) Highest Response Ratio Next (HRRN)

(f) Feedback Scheduling

3.2 Task 2

Is the following system of 4 processes with 2 resources deadlocked?

Process	R1	R2
P1	1	3
P2	4	1
P3	1	2
P4	2	0

Table 1: Current allocation matrix

Process	R1	R2
P1	1	2
P2	4	3
P3	1	7
P4	5	1

Table 2: Current request matrix

R1	R2
1	4

Table 3: Availablility vector

(a) If the availability vector is as below (Table 4), is the system above still in deadlock?

R1	R2
2	3

Table 4: Availablility vector

(b) Is the system deadlocked if the availability is as below (Table 5)?

R1	R2
2	4

Table 5: Availablility vector

3.3 Task 3

Consider the following snapshot of a system:

R1	R2	R3	R4
3	4	5	5

Table 6: Available resources

Process	R1	R2	R3	R4
P1	1	1	2	2
P2	1	0	0	0
P3	0	0	1	2

Table 7: Current allocation matrix

Process	R1	R2	R3	R4
P1	2	4	5	2
P2	1	1	3	5
P3	1	0	2	2

Table 8: Maximum request matrix

(a) Prove that the system is in a *safe state* by showing a sequence of process completion even when all the processes eventually request for their maximum requirements.

(b) If a request from process `P2` arrives for `(0, 1, 0, 0)`, can the request be granted immediately? Justify your answer.