Total number of printed pages – 7   __B. Tech__

Sixth / Eighth Semester Examination – 2008

OPERATING SYSTEM

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory
and any **five** from the rest.
The figures in the right-hand margin
indicate marks.*

1. Answer the following questions :   2 ×10

    (a) What are the differences between binary
         and general semaphores ?

    (b) What are the essential goals of disk
         scheduling ?

    (c) What is the difference between deadlock
         prevention and deadlock avoidance ?

    (d) When do page fault occurs ?

    (e) What are the advantages of storage inter-
         leaving ?

    (f) What is purpose of short-term-scheduler
         and long-term-scheduler ?

    (g) Can a resource allocation graph have
         cycles without a deadlock existing ? If so,
         state why and draw a sample graph ; if no,
         state why not ?

    (h) What is the difference between trap and
         interrupt ?

    (i) Define the difference between preemptive
         and non-preemptive scheduling.

    (j) What are the basic functions of an operat-
         ing system ?

2. (a) What do you mean be process in a
         computer system ? What are the different
         process states ? Explain the process life
         cycle in operating system.   5

(b) When do page fault occurs ? Describe the actions taken by the operating system, when a page fault occurs. 5

3. (a) What resources are used when a thread is created ? What two advantages do threads have over multiple processes ? What major disadvantage do they have ? 5

(b) Why paging is used ? Which is the best page replacement algorithm and Why ? How much time is spent usually in each phases and why ? 5

4. (a) Explain the structure of a Process control Block. Explain how the process is created when program is in execution ? 5

(b) Define deadlock. State four conditions of deadlock and explain how each condition can be satisfied ? 5

5. (a) When a resource is returned by a process calling a monitor, the monitor gives priority to an end waiting process over a new requesting process ? Why ? 5

(b) What do you mean by inter-processor communication mechanism associated with an Operating system? Discuss the mechanism associated with fifo ( ) ? 5

6. (a) In a test of a new operating system, the ready queue scheduler uses FCFS. For a particular test, beginning at time zero, the evolution of the ready queue is as follows :

Process	Arrival time	Next CPU Burst time
P0	0	7
P1	0	8
P2	1	4
P3	4	6

It may be assumed that P0 and P1 arrive just fractionally before time zero, but P0 arrives before P1. All times in the above

table: arrival time and burst time, are in milliseconds. The next scheduling decision is made at time zero. What is the average wait time ? 5

(b) Give an example of a simple resource deadlock involving three processes and three resources. Draw the appropriate resource allocation graph. 5

7. (a) Consider the following reference string. Calculate the page fault rates for the FIFO and LRU algorithms. Assume that the memory size is 4 frames. 5

1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2

(b) Why SSTF scheduling tends to fervor middle cylinders over the innermost and outermost cylinder ? 5

8. (a) Suppose three concurrent processes, P1, P2, and P3, executing in a machine with a single processor.

P1 contains an instruction S1;

P2 contains an instruction S2;

P3 contains an instruction S3;

The three processes use a *busy waiting* semaphore *synch* and wait()/signal() code to ensure that both S2 and S3 execute before S1. *Hence answer the followings :*
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(i) Which process or processes require that *signal (sync)* be inserted appropriately ?

(ii) If *synch* can be initially set to any integer value, positive, negative or zero, what value must *synch* be initialized to ?

(iii) Write out the semaphore code that must be placed near S1 in P1 to ensure that both S2 and S3 execute before S1. Include "S1;" in your answer.

(b) Explain the difference between internal fragmentation and external fragmentation.

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