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B. Tech
BCSE 3305

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 ?

P.T.O.

- (d) When do page fault occurs ?
- (e) What are the advantages of storage interleaving ?
- (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 operating 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

(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 favor 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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