

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- October 2017

B.Tech/ 5<sup>th</sup> Semester

COURSE CODE: 10B11CI511

MAX. MARKS: 25

COURSE NAME: OPERATING SYSTEM

COURSE CREDITS: 03

MAX. TIME: 1 Hr 30 Min

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

1. What is the meaning of the term busy waiting? What other kinds of waiting are there in an operating system? Can busy waiting be avoided altogether? Explain your answer. [3 Marks]
2. Compare the circular-wait scheme with the deadlock-avoidance schemes (like the banker's algorithm) with respect to the following issues: [3 Marks]
  - a. Runtime overheads
  - b. System throughput
3. Explain why interrupts are not appropriate for implementing synchronization primitives in multiprocessor systems. [3 Marks]
4. Consider the deadlock situation that could occur in the dining-philosophers problem when the philosophers obtain the chopsticks one at a time. Discuss how the four necessary conditions for deadlock indeed hold in this setting. Discuss how deadlocks could be avoided by eliminating any one of the four conditions. [3 Marks]
5. Show how to implement the wait() and signal() semaphore operations in multiprocessor environments using the TestAndSet() instruction. The solution should exhibit minimal busy waiting. [4 Marks]
6. Assume that a system has multiple processing cores. For each of the following scenarios, describe which is a better locking mechanism-a spinlock or mutex lock where waiting processes sleep while waiting for the lock to become available:
  - (a) The lock is to be held for a short duration
  - (b) The lock is to be held for a long duration
  - (c) A thread may be put to sleep while holding the lock. [4 Marks]

7. Consider the following snapshot of a system:

Processes	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	2	0	0	1	4	2	1	2	3	3	2	1
P1	3	1	2	1	5	2	5	2				
P2	2	1	0	3	2	3	1	6				
P3	1	3	1	2	1	4	2	4				
P4	1	4	3	2	3	6	6	5				

Answer the following question using the banker's algorithm;

a. Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

b. If a request from process P1 arrives for (1,1,1,0) can the request be granted immediately ?

(c) If a request from process P4 arrives for (0,0,2,0) can the request be granted immediately ?

[5 Marks]

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