JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- OCTOBER 2018

B.Tech 5th Semester

Dr. P. K. Gupta

COURSE CODE: 10B11CI511 MAX. MARKS: 25

COURSE NAME: OPERATING SYSTEMS

COURSE CREDITS: 04 MAX. TIME: 1Hr 30 Min

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

SECTION – A [5 x 1 = 5 marks]

Q1.

a) What is convoy effect?

b) How Spinlock is obtained?

c) If the P() and V() semaphore operations are not executed atomically, then can mutual exclusion be violated? Why or why not??

d) What is the optimistic assumption made in the deadlock-detection algorithm? How could this assumption be violated?

e) Assume there are three resources R_1, R_2, and R_3 that are each assigned unique integer values 35, 20, and 25, respectively. Find out the resource ordering which prevents a circular wait?

SECTION –B [4 x 2 = 8 marks]

Q2.

a) Consider a System which has CPU bound process which requires Burst time of 65 time units. Multilevel feedback queue scheduling is used. The time quantum is 2 units and it will be incremented by 5 units in each level. How many times the process will be interrupted and in which queue, the process will complete the execution? Explain.

b) Differentiate between **Test_and_Set** & **xchg** operations with their syntax.

c) A system is having 3 processes each require 2 units of resources 'R'. Find the minimum number of units of 'R' such that no deadlock will occur in the system and processes complete their execution successfully?

d) How does the **signal()** operation associated with monitors differ from the corresponding operation defined for semaphores. Explain your answer.

SECTION – C [4 x 3 = 12 marks]

Q3.

a) Consider a process with burst time (t_i) values of: t1 = 14, t2 = 23, t3 = 15, t4 = 19, t5 = 24, t6 = 36. Assume that τ_1 = t1. For **alpha = 0.5,** what is the value of τ_7?

b) Fix the following program code such that all concurrent calls to the function Synchro() by multiple threads, are effectively serialized.

```
void Synchro(void) {
struct lock mutex;
acquire(&mutex);
// access a global variable
release(&mutex);
}
```

c) We are given 10 cooperating processes {P1, P2, .. P10}. Each process from P1 to P9 execute Code 1 whereas process p10 execute code 2.

```
repeat                      repeat
P(mutex)                    V(mutex)
//Critical section          //Critical section
V(mutex)                    V(mutex)
forever                     forever
```

What is the maximum number of processes that can reside inside the critical section at any point of time? Explain your answer with reason.

d) Consider the following resource allocation problem in a system with 3-resources (R1-R3), and 4-processes (P1-P4). R1 has 9 instances, R2 has 8 instances, and R3 has 2 instances. The table indicates the currently allocated resources and in parenthesis the maximum possible demand.

	R1	R2	R3
P1	0 (3)	0 (0)	2 (2)
P2	2 (3)	0 (0)	0 (0)
P3	4 (9)	0 (0)	0 (1)
P4	0 (0)	1 (8)	0 (0)

Answer the following:

- Is the system is in Safe state? If yes, then find the safe sequence. **[3 marks]**
- Is additional request of [2,0,0] from P3, can be granted? **[1 marks]**