

Sem V / I.T. / C.B.G.S / O.S. / May 2017 / 17-05-17

## Operating Systems

Q.P. Code : 594200

( 3 Hours )

[Total Marks : 80



- N.B.: (1) Question No. 1 is compulsory.  
(2) Solve any three questions out of remaining five.  
(3) Figures to right indicate full marks.  
(4) Assume suitable data where necessary.

1. (a) Describe the file systems of Windows. [5]  
(b) Write the deadlock detection algorithm [5]  
(c) What are the differences between user level-threads and kernel-level threads? Under what circumstances one better than the other? [5]  
(d) Describe how does critical section avoid race condition? What are the properties which data item should possess to implement critical section? [5]
2. (a) A page size of 4096 bytes and following page table [10]

Page No	In/out	Frame
0	out	333
1	in	300
2	in	1000
3	out	100
4	out	500
5	in	120
6	out	412
7	in	740

Which of the following virtual addresses would generate a page fault? For those that do not generate page fault, to what physical address would they translate?

- i) 21610 ii) 35410 iii) 27012 iv) 10234

- (b) What is semaphore? Explain the counting semaphore with the help of example. [10]
3. (a) Consider a system running 10 I/O bound tasks and one CPU bound task. Assume that I/O bound task issues an I/O operation once for every millisecond of CPU computing and that each I/O operation takes 10 milliseconds to complete. Also assume that the context switching overhead is 0.1 millisecond and that all processes are long running tasks. What is the CPU utilization for a round robin scheduler when : [10]  
i) The time quantum is 1 millisecond ii) The time quantum is 10 milliseconds
- (b) Show that Peterson's algorithm satisfies the requirements of a mechanism to control access to a critical section [10]

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- 4 (a) Consider the following snapshot of the process to be executed. Draw the Gantt chart [10] and determine the average waiting time and average turnaround time for FCFS, SJF(pre-emptive), SJF(nonpreemptive ) and round robin (quantum=2) scheduling algorithm.

Process	Arrival Time	Burst Time
P1	0	7
P2	1	4
P3	3	3
P4	5	1
P5	7	5

- (b) What is a kernel? Describe briefly the approaches of designing kernel [10]

- 5 (a) On a simple paging system with  $2^{24}$  bytes of physical memory, 256 pages of logical address space, and a page size of  $2^{10}$  bytes. [10]
- How many bytes are in page frame?
  - How many bits in the physical address specify the page frame?
  - How many entries in the page table?
  - How many bits are in the logical address?

- (b) What criteria should be adopted for choosing type of file organization? Describe the implementation of file allocation techniques? [10]

- 6 (a) Consider the following snapshot of the system:- [10]

Process	Allocation			Max.			Available		
	A	B	C	A	B	C	A	B	C
P0	1	1	2	4	3	3	2	1	0
P1	2	1	2	3	2	2			
P2	0	2	0	4	4	2			
P3	0	6	3	2	6	3			
P4	1	1	2	2	2	3			

Answer the following questions using Banker's algorithm?

- Determine the total amount of resource of each type.
- What is the content of need matrix?
- Determine if the system is in safe state using safety algorithm.
- If a request from process p1 arrives for (1,1,0) can the request be granted immediately.

- (b) Explain the Android operating system. [10]