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Fifth Semester B.E. Degree Examination, December 2012
Operating Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions atleast TWO questions from each part.

PART – A

- 1 a. Define an operating system. Discuss its role with respect to user and system viewpoints. (06 Marks)
- b. Briefly explain the clustered systems and real time systems. (04 Marks)
- c. Define a virtual machine. With a neat sketch, explain the working of a virtual machine. What are the benefits of virtual machine? (10 Marks)
- 2 a. What is a process? With a state diagram, explain states of a process. Also write the structure of process control block. (08 Marks)
- b. Discuss the three common ways of establishing relationship between user and kernel threads. (06 Marks)
- c. For the following set of processes, find the average waiting time and average turn around time along with Gantt chart illustrations for
 - i) Shortest remaining time first
 - ii) Preemptive priority scheduling algorithms (06 Marks)

Process	Burst time	Arrival time	Priority
P ₁	6	2.0	5
P ₂	4	0.0	4
P ₃	7	1.6	3
P ₄	2	1.0	1
P ₅	1	0.4	2

- 3 a. Define mutual exclusion and critical section. Write the software solution for 2 – process synchronization. (07 Marks)
- b. What is semaphore? Explain how it can be used to solve the producer – consumer problem. (07 Marks)
- c. Explain the solution to dining philosopher problem using monitors. (06 Marks)
- 4 a. Define the necessary and sufficient conditions for deadlock to occur. (04 Marks)
- b. Consider the following snapshot of a system:

Process	Allocated resources			Maximum requirements			Total resources		
	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃
P ₁	2	2	3	3	6	8	7	7	10
P ₂	2	0	3	4	3	3			
P ₃	1	2	4	3	4	4			

- i) What is the content of need matrix?
- ii) Is the system in a safe state?
- iii) If the following requests are made, can they be satisfied /granted immediately in the current state : P₁ requests for (1, 1, 0)
 P₃ requests for (0, 1, 0) resources additionally. (10 Marks)
- c. Given three processes A, B and C, 3 resources X, Y and Z and the following events :
 - i) A requests X
 - ii) A requests Y
 - iii) B requests Y
 - iv) B requests Z
 - v) C requests Z
 - vi) C requests X
 - vii) C requests Y.

Assume the requested resource is always allocated to requesting process if it is available. Draw the resource allocation graph (RAG) for the sequence (2, 6, 3, 5, 1, 4 and 7). Also mention if deadlock occurs. If so, how do you recover from the deadlock? (06 Marks)

PART – B

- 5 a. Explain with illustrations, the internal and external fragmentation problem encountered in contiguous memory allocation. (06 Marks)
- b. Explain the concept of forward – mapped page table. (06 Marks)
- c. Consider the following sequence of memory references from a 460 word program.
10, 11, 104, 170, 73, 309, 185, 245, 246, 434, 458, 364
- i) Show the reference string assuming page size of 100 words
- ii) Find page fault rate for the above reference string assuming 200 words of primary memory available and FIFO and LRU replacement algorithms. (08 Marks)
- 6 a. Describe the different access methods on files. (09 Marks)
- b. Explain the concept of file mounting. (05 Marks)
- c. With neat sketch, explain the linked file allocation and indexed file allocation methods. (06 Marks)
- 7 a. A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at 143 and previously serviced a request at 125. The queue of pending requests in FIFO order is : 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130
starting from current head position, what is total distance traveled(in cylinders) by disk arm to satisfy the requests using FCFS, SSTF, SCAN and look algorithms. (10 Marks)
- b. Explain the access matrix model of implementing protection in operating system. (10 Marks)
- 8 a. Explain the different system components of LINUX operating system. (10 Marks)
- b. Discuss the interprocess communication facility in LINUX operating system. (10 Marks)

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