

Roll Number:

Thapar University Patiala
Computer Science & Engineering Department

B.E 2nd Yr. 1st Semester CSE
EST, 9th December 2011

UCS303: Operating System
Maximum Marks: 40

Time: 3 hrs

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Note: All Questions are Compulsory.

Attempt ALL the questions in a SEQUENTIAL ORDER.

Evaluated Answers sheets can be seen on **19th December 2011** at 11:00 am (Room no. D-115)

SECTION (A)

- Q.1 Write the full form of KLT & ULT. (1)
- Q.2 Consider a computer system with a 32-bit logical address and 4-KB page size. The system supports up to 512 MB of physical memory. How many entries are there in each of the following? (1,1)
- (a) A conventional single level page table (b) An Inverted page table
- Q.3 For the below mentioned resource usage and availability matrix for processes: P₁, P₂, P₃, P₄. Draw Resource Allocation Graph. (2)

Process	Current Allocation			Outstanding Requests			Resources Available		
	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃
P ₁	2	0	0	1	1	0	0	0	0
P ₂	3	1	0	0	0	0			
P ₃	1	3	0	0	0	1			
P ₄	0	1	1	0	1	0			

- Q.4 Suppose that a disk drive has cylinders numbered 0 to 180. The drive is currently serving a request at cylinder 60, and the previous request was at cylinder 55. The queue of pending requests, in FIFO order is: 87, 170, 40, 150, 36, 72, 66, 15. (2,1)

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests using C-SCAN and FCFS disk scheduling algorithm. (Diagram Rquired)

- Q.5 For a particular program the Reference String is as given: 0,9,0,1,8,1,8,7,8,7,1,2,8,2,7,8,2,3,8,3 (3)
How many page faults will occur if the program has three page frames available to it and uses the following algorithms: (Assume page table initially empty)

(a) FIFO replacement. (b) LRU replacement (c) Optimal replacement

- Q.6 Assuming a 1 KB page size, what are the page numbers and offsets for the following address references (provided as decimal numbers): (Take 1st page as page no. 0) (3)

(a) 1415 (b) 19366 (c) 30000 (d) 256 (e) 1025 (f) 778

- Q.7 Consider a system with the following current resource-allocation state: (1,1,1,2)
There are five processes: P₀, P₁, P₂, P₃, P₄ and three resource types: A, B and C. For each process, the current allocation and the maximum required allocation are given by the Allocation and MAX matrices. The current available resources are given by the Available vector.

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P ₀	1	1	2	4	3	3	2	1	0
P ₁	2	1	2	3	2	2			
P ₂	4	0	1	9	0	2			
P ₃	0	2	0	7	5	3			
P ₄	1	1	2	11	2	3			

P.T.O.

- i. Determine the total amount of resources of each type.
- ii. What is the Need matrix?
- iii. Determine if this state is “safe” using the “safety algorithm”.
- iv. Starting with the allocation resource state given above, suppose the current request for each process is given by the request matrix below. Furthermore assume that these requests are granted.

Request Matrix:

	A	B	C
P ₀	3	3	1
P ₁	1	1	0
P ₂	6	0	1
P ₃	7	2	3
P ₄	0	1	1

Will the system be in deadlocked state? Determine this using the *Deadlock Detection Algorithm*.

SECTION (B)

- Q.8 (a). Categorize the files into various groups on the basis of extension: (2)
 .c, .bat, .txt, .rtf, .dll, .java, .sh, .doc, .lib
- (b). List the system calls present in Windows & Unix Operating System for Process control & File manipulation. (2)
- (c). What is the difference between Time Sharing & Real Time systems? (2)
- Q.9 (a). Explain the main advantages of the microkernel approach to system design (2)
- (b). What is the purpose of system program? (2)
- (c). Explain with diagram Multi step processing of a user program. (2)
- Q.10 (a). Explain with example the Shortest Remaining Time First CPU scheduling algorithm. (3)
- (b). List the various File allocation methods. (3)
- (c). What is the purpose of paging the page table? Explain inverted page table with diagram. (3)