

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), Nov.-Dec. 2016

B. Tech in Computer Science Engineering, Semester V

Roll No.....

CSE501: OPERATING SYSTEMS

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
 2. Assume suitable data wherever required and mention it clearly.
 3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
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Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

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- i. Which directory implementation is used in most Operating system ?
 - a. Single level directory structure
 - b. Two level directory structure
 - c. Three directory structure
 - d. Acyclic directory structure
- ii. Round Robin algorithm is essentially the preemptive version of ?
 - a. FIFO
 - b. Shortest job Frist
 - c. Shortest Remaining
 - d. Longest time first
- iii. A Page Fault Occurs ?
 - a. when the page is not in the memory
 - b. when the page is in the memory
 - c. when the process enter the blocked state
 - d. when the process is in the ready state
- iv. Spatial locality refers to the problem that once a location is referenced?
 - a. It will not be referenced again ;
 - b. It will be referenced again ;
 - c. A nearby location will be referenced soon;
 - d. None of Above
- v. Overlays is ?
 - a. A part of operating system
 - b. A specific memory location
 - c. A single contiguous memory that was used in the olden day for running
 - d. large problem by swapping
 - e. Overloading the system with many user files

- vi. What is a shell ?
 - a. it is a hardware component
 - b. it is a command interpreter
 - c. it is a part in complier
 - d. it is a tool in CPU scheduling
 - vii. Which is not the state of the process ?
 - a. Blocked
 - b. Running
 - c. Ready
 - d. Privileged
 - viii. Virtual Memory is ?
 - a. An extremely large main memory
 - b. An extremely large secondary memory
 - c. An illusion of extremely large main memory
 - d. A type of memory used in super computer
 - ix. In the blocked state ?
 - a. the processes waiting for I/O are found
 - b. the process which is running is found
 - c. the process waiting for the processor are found
 - d. none of the above
 - x. Concurrent processes are process that?
 - a. Do not overlap in time
 - b. overlap in time
 - c. Are executed by processor at the same time
 - d. None of Above
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- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- a. What is busy waiting?
 - b. Differentiate between multi-tasking and multi-processing systems.
 - c. Explain the role of DMA.
 - d. What is degree of multiprogramming?
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- Q.3A Explain time slicing. How its duration affects the overall working of the system. 05
- Q.3B Define the concept of 'Process'. List the possible contents of PCB. Draw simple process State -Transition diagram and explain various process states through which a process may move during its lifetime. 05
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- Q.4A What is the role of pipe (|) in Linux. Explain giving atleast 3 examples. 05
- Q.4B Why size of Page is in powers of 2? Explain giving an example. 05
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- Q.5A What is meant when saying that a scheduling algorithm could result in starvation? Clearly mark the algorithms listed below that could result in starvation. (Explain Why) You can assume that each process will use the CPU 05

for a finite burst before performing I/O.

- i. First-come, First-Served
- ii. Round Robin
- iii. Shortest Job First
- iv. Priority based

Q.5B Time Quantum for Round Robin algorithm should be neither too large nor too small. Comment on the statement. 05

Q.6A There are two basic performance considerations for virtual memory systems: efficient use of memory, and efficient per-memory accesses (i.e. fewer delays on the CPU). For each of the following design points, explain how the range of possible choices affects these two performance criteria. Present points for and against a given choice. 05

- Small vs. large page size.
- Choice of page replacement algorithm

Q.6B Explain the scheme Segmentation with Paging with a neat diagram. 05

OR

Q.6B Two processes, A and B, have the following sequential execution patterns: 05

A: [cpu 4 ms; I/O 2 ms; cpu 4 ms; I/O 2 ms; cpu 4 ms]

B: [cpu 1 ms; I/O 2 ms; cpu 1 ms; I/O 2 ms; cpu 1 ms]

I/O operations for the two processes do not interfere with each other and are blocking.

- (i) If the processes are run consecutively one after another, what is the elapsed time for all to complete?
- (ii) Sketch the execution pattern under non-preemptive scheduling and determine the total elapsed time for completion. You may assume that processes are scheduled in the order in which they become ready to run and that in the event of a tie A has priority over B. You may further assume that the scheduler and context switches take negligible time.
- (iii) Repeat (ii) but for a preemptive scheduler that operates on a time slice of 2 ms, that is, no process can run for more than 2 ms at a time (unless no other process is runnable).
- (iv) Is there any evidence from your results for (ii) and (c)(iii) of a significant advantage for either scheduling method?

Q.7A What is Role of Translation Lookaside buffer? Explain with diagram TLB hit and TLB miss clearly indicating steps before TLB reference and Post TLB reference starting from page request to page load in memory. 05

Q.7B What are monitors? Write a solution to Producer Consumer Problem using monitors.

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OR

Q.7B You have to solve a variation of the readers-writers problem, in which multiple writers can write at the same time. Specifically, there are readers and writers. Multiple reads at the same time are allowed. Multiple writes at the same time are allowed. A read and a write at the same time is not allowed. Provide a solution using semaphores with the properties: no busy waiting & starvation-free

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Q.8A Describe briefly different policies of Disk Scheduling. Consider following sequence of disk track requests: 25, 124, 132, 115, 94, 140, 100, 10, 64, and 120. Assume that the disk head is initially positioned over track 100. Calculate average seek length and show the movement of disk head graphically for each of the scheduling policies.

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Q.9A What is Page Fault ? What are the reasons for Page Fault in System? Consider following reference string with 4 page frames in a system.
0,2,1,6,4,0,1,0,3,1,2,1

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Calculate page faults in FIFO, Optimal, LRU and MFU Page Replacement Algorithms. Mention Full forms of each of algorithms listed.

Q.9B Compare and contrast the following:

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- Page and Segment
- User level threads and Kernel level threads.

OR

Q.9B Considering a system with five processes P0 through P4 and three resources types A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t0 following snapshot of the system has been taken:

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

- What will be the content of the Need matrix?
- Is the system in safe state? If Yes, then what is the safe sequence?
- What will happen if process P1 requests one additional instance of resource type A and two instances of resource type C?