

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), Nov.-Dec. 2015

B. Tech in Computer Science Engineering, Semester V

Roll No.....

CSE501: OPERATING SYSTEM

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.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The main function of the command interpreter is a) to get and execute the next user-specified command b) to provide the interface between the API and application program c) to handle the files in operating system d) none of the mentioned	
ii.	The number of processes completed per unit time is known as _____. a) Output ; b) Throughput; c) Efficiency; d) Capacity	
iii.	Which one of the following is the address generated by CPU? a) physical address; b) absolute address; c) logical address; d) none of the mentioned	
iv.	Program always deals with a) logical address; b) absolute address; c) physical address; d) relative address	
v.	Which of the following condition is required for deadlock to be possible? a) mutual exclusion b) a process may hold allocated resources while awaiting assignment of other resources c) no resource can be forcibly removed from a process holding it d) all of the mentioned	
vi	The processes that are residing in main memory and are ready and waiting to execute are kept on a list called a) job queue; b) ready queue; c) execution queue; d) process queue	
vii	The time required to create a new thread in an existing process is a) greater than the time required to create a new process c) less than the time required to create a new process c) equal to the time required to create a new process	

	d) none of the mentioned	
viii	Which one of the following is not a valid state of a thread? a) running; b) parsing; c) ready; d) blocked	
ix	Because of virtual memory, the memory can be shared among a) processes; b) threads; c) instructions; d) none of the mentioned	
x	Which term means to access some data and instructions repeatedly? a) spatial locality; b) temporal locality; c) reference locality; d) access locality	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
a.	What is the difference between preemptive and non-preemptive scheduling?	
b.	Which one requires specific hardware support and what is that hardware support?	
c.	Compare Rotational latency vs. Seek time.	
d.	List the four conditions necessary for deadlock.	

Q.3A	Consider the free memory layout shown below (the blocks are ordered from top to bottom). To the right, draw to the what the free memory layouts would be after satisfying requests for (in order) memory blocks of size 75K, 410K, 281K, and 295K. Draw one memory layout for the best-fit algorithm, and one for first-fit.	05
	500K 300K 200K 300K	
Q.3B	Explain the Usage of Process Control Block. What are the major components of PCB?	05

Q.4A	Discuss various types of schedulers.	05
Q.4B	Distinguish between deadlock and live lock giving an example.	05
Q.5A	Distinguish between Internal Fragmentation and Internal Fragmentation.	05
Q.5B	Why size of Page is in powers of 2? Explain giving an example.	05
Q.6A	What are bad sectors? How they are handled by Operating System?	05
Q.6B	Explain various levels of RAID.	05

OR

Q.6B 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 following properties:

1. no busy waiting.
2. starvation-free

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.

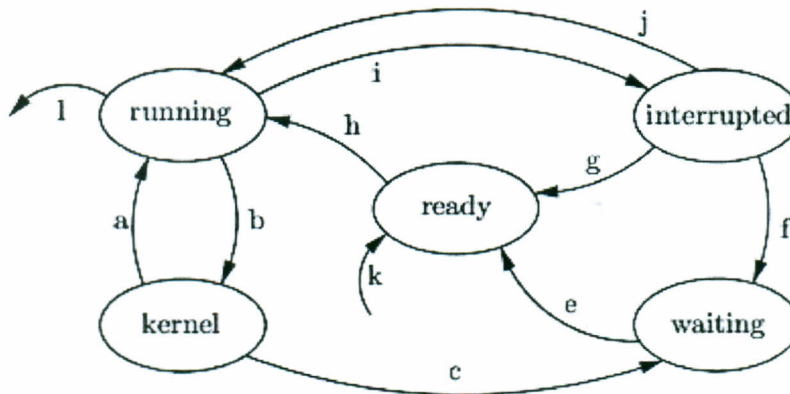
Q.7B Explain External and Internal Fragmentation problem in Memory Management with diagram.

OR

Q.7B 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.

- Single-level page table vs. multi-level page table.
- Small vs. large page size.

Q.8A The diagram below is a simplified state transition diagram for a process in a generic operating system.



For each of the following, describe the transitions taken by the process and say whether or not it is necessary for the process scheduler to run:

- (i) A running process is interrupted by a timer. The timer interrupt service routine determines that the time slice given to the process has not yet expired.
- (ii) As in (i) but the time slice given to the process has expired.
- (iii) A running process makes a system call which can be serviced immediately by the kernel.

(iv) A running process makes a system call which requires an I/O operation to be initiated.

(v) Label j.

Q.9A Say we have the process arrival time chart given below.

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Process	Arrival time	Burst Time
p_1	0	16
p_2	0	10
p_3	6	4
p_4	7	6
p_5	8	10

Draw a Gantt chart to illustrate how these processes would be scheduled using Round Robin (RR) and First-come First-Served (FCS) scheduling, and calculate the waiting time for each process. If when choosing a process to schedule next you could legally choose any of a number of processes, choose the one with the lowest-numbered name; i.e., choose p_i over p_j if $i < j$. Do not include context-switching time in your chart. Assume that the quantum is set to 5 time units.

Q.9B Suppose we have a virtual address space consisting of 5 pages, numbered 1 to 5, and physical memory to hold 4 frames. For FIFO and LRU, assuming no pages are in memory at the start, indicate which pages are in memory in the indicated frames following each reference in the sequence, using the given page replacement algorithm. If a fault occurs, put a check the "fault?" box. If an algorithm needs to evict a frame, but could choose equally from among multiple frames (i.e., there is a tie according to the algorithm), choose the frame for the page that was brought in to memory least recently.

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Page References are : 2 1 3 4 1 2 5 1 2 3 4 5

OR

Q.9B Suppose that a disk drive has 10,000 cylinders, numbered 0 to 9999. The driver is currently serving a request at cylinder 1400. The queue of pending requests is, in the order received: 100, 1200, 900, 8000, 8100, 100, 8200, 1000, 4200 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for the following scheduling algorithms. (For the algorithms in which the head is in constant motion, head moving is initially moving upwards.) Calculate head movements for FCFS, SSTF algorithm.

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