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FOR A & F SECTIONS ONLY

PES University, Bengaluru

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UE15CS302

END SEMESTER ASSESSMENT (ESA)
B.TECH. 5th SEMESTER CSE DECEMBER 2017
UE15CS302 - INTRODUCTION TO OPERATING SYSTEMS

Time: 180 minutes | Answer All Questions | Max Marks: 100

1.	a)	Which of the following instructions should be privileged in a typical Operating system environment ? i. Timer Initialization. ii. Reading the clock value. iii. Freeing memory. iv. Issuance of trap instruction. v. Turn off interrupts. vi.Updating device-status table vii. Switching from user to kernel mode. viii. Access to I/O device.	4
	b)	Why is an Operating System software usually loaded from hard disk than from a ROM chip?	4
	c)	The time taken to switch between user and kernel modes of execution be t1 while the time taken to switch between two processes be t2. Which of the following is TRUE and WHY? i. t1 > t2 ii. t1 = t2 iii. t1 < t2 iv. nothing can be said about the relation between t1 and t2.	2+2
	d)	i. List and explain advantages and disadvantages of the layered approach in design of a typical operating system. ii. Which Scheduler work while moving a process from Running state to Wait State ? iii. Why is the state transition of Ready Suspended state to Blocked Suspended state not possible?	4+2+2
2.	a)	Which of the following statements you think are TRUE or otherwise and why? i. A thread can acquire more than one lock ii. A mutex can be locked more than once iii. Binary semaphore and mutex are same iv. A thread must block always when resource is not available v. A non-recursive mutex can be locked more than once	2*5=10
	b)	Consider three processes, all arriving at time zero, with total execution time(includes I/O) of 120, 220 and 330 units, respectively. Each process spends the first 50% of execution time doing I/O, the next 20% of time doing computation, and the last left over %time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remain idle? Indicate your appropriate intermediate calculations, justifying your answer.	10
3.	a)	A system has n resources R0,...,Rn-1,and k processes P0,....Pk-1.The implementation of the resource request logic of each process Pi is as follows:	2+3

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		if (i % 2 == 0) {
		if (i < n) request Ri
		if (i+2 < n) request Ri+2
		}
		else {
		if (i < n) request Rn-i
		if (i+2 < n) request Rn-i-2
		}
		for what Value of n and k deadlock is possible ? Justify your answer.	

	b)	Consider the following snapshot of a system: Allocation / Max / Available A B C D / A B C D / A B C D P0 1 1 1 0 / 3 3 1 7 / 0 1 1 0 P1 1 1 0 0 / 2 2 2 2 P2 0 0 0 1 / 1 1 1 1 P3 1 0 0 1 / 3 2 3 2 P4 0 1 1 0 / 2 1 3 1 i. What is the content of the matrix Need and Rmax? ii. Write the corresponding resource allocation graph by inferring the above snapshot	2+3
	c)	Consider a paging system with the page table stored in memory. i. If a memory reference takes 300 nanoseconds How long does a paged memory reference take? ii. If we add associative registers, and 50% of all page-table references are found in the associative registers, what is the effective memory reference time? (Assume that finding a page-table entry in the associative registers takes zero time, if the entry is there.)	2+3
	d)	Discuss situations under which the least frequently used page-replacement algorithm generates fewer page faults than the least recently used page replacement algorithm. Also discuss under what circumstance does the opposite holds.	5
4.	a)	Explain the following disc scheduling algorithms with a relevant example i. Shortest Seek Time First (SSTF) ii. C-SCAN	5+5
	b)	What are the advantages and disadvantages of a system providing mandatory locks instead of providing advisory locks whose usage is left to the users' discretion?	5
	c)	List and explain several pieces of information that is usually associated with an open file.	5
5.	a)	In what situations would using memory as a RAM disk be more useful than using it as a disk cache?	4
	b)	Why are disks prefered as secondary storage for maintaining file system?	5
	c)	Write short notes on the following i. Input / Output port registers ii. Directory Implementation using Linear List iii. Indexed Allocation	4+4+3