CS51/CS1551

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RAMAIAH
Institute of Technology

(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
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SEMESTER END EXAMINATIONS – JANUARY 2019

Course & Branch	**:**	**B.E : Computer Science and Engineering**	**Semester**	**:**	**V**
Subject	**:**	**Operating Systems**	**Max. Marks**	**:**	**100**
Subject Code	**:**	**CS51/CS1551**	**Duration**	**:**	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1.	a)	Describe the operation of process API, used to create a process in operating system. List the data structures of process.	CO1	(08)
	b)	Illustrate with examples the following CPU scheduling algorithms: i) FCFS ii) STFC.	CO1	(06)
	c)	Compute the response time and turnaround time when running three jobs of length 200 with the SJF and FIFO schedulers.	CO2	(06)
2.	a)	Describe the various states of process using process state diagram.	CO1	(08)
	b)	Give the definition of the following scheduling criteria's: i) Turnaround time ii) Response time iii) Throughput.	CO1	(06)
	c)	Compute the response time and turnaround time when running three jobsof length 200 with the FIFO and RR schedulers (time quantum =50).	CO2	(06)

UNIT– II

3.	a)	With a code snippet, explain translation of virtual address to physical address using paging technique.	CO2	(08)
	b)	With an example, discuss cache coherence problems in multiple CPU environments and provide the solutions for the same.	CO2	(06)
	c)	Describe with example Hybrid approach of reducing the size of page table.	CO2	(06)

4.	a)	Give the equivalent assembly code for the following code and demonstrate with a neat diagram, "the total no of memory accesses required to fetch the array elements when paging technique is used". Consider Virtual address space of size 64KB and page size is of 1KB, page table address=2048.(Assume the relevant data).
		int array[2000];
		for(i=0;i<1000<i++)
		array[i]=0;
			CO2	(08)

	b)	Identify the issues in Multi level feedback queue scheduling and provide the solution for the same.	CO2	(06)
	c)	With a neat diagram, show how multilevel paging technique is implemented to reduce the memory overhead of page tables.	CO2	(06)

UNIT- III

5.	a)	With an algorithm explain TLB Control Flow to access memory.	CO3	(08)
	b)	Differentiate between fixed-size and variable-size techniques of partitioning the memory.	CO3	(06)
	c)	With a code snippet explain briefly how system handles page-fault using hardware technique.	CO3	(06)

6. a) Consider the following page reference string: CO3 (08)
7,0,1, 2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1
How many page faults would occur for the following page replacement algorithms assuming 3 frames?
i) LRU replacement ii) FIFO replacement iii) Optimal replacement

b) Discuss the issues and solutions related to the context switching, in implementing Translation Look Aside Buffer (TLB). CO3 (06)

c) Differentiate between fine-grained and coarse-grained segmentation techniques. CO3 (06)

UNIT- IV

7. a) Consider the following snapshot of a system, with total resources of R1(10), R2(14) R3(12) and R4(14) CO4 (10)

Processes	Allocation				Max Request			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	2	0	1	1	3	2	1	4
P2	0	1	2	1	0	2	5	2
P3	4	0	0	3	5	1	0	5
P4	0	2	1	0	1	5	3	0
P5	1	0	3	0	3	0	3	3

Using the Banker's algorithm answer the following.
i) Calculate the need matrix
ii) Determine whether system is in deadlock state or not.

b) Explain the interaction among the threads in accessing the shared data. CO4 (10)

8. a) With necessary routines, explain how kernel provides mutual exclusion to critical section problems using locks. CO4 (06)

b) Identify the uses of semaphore in providing synchronization among the multiple processes. CO4 (06)

c) Discuss the different techniques used by an operating system to recover from the deadlock. CO4 (08)

UNIT- V

9. a) Discuss how OS handles updates to a disk in the case of a system crashes. CO5 (07)

b) Discuss how caching technique can improve the performance of reading and writing operations on a file. CO5 (07)

c) i) What is the average time to read 8 KB of data in 16 consecutive sectors in the same cylinder? CO5 (06)
ii) Consider a disk with 1000MB/second then how long does it take to transfer a 512KB block in milliseconds? (With dimensional analysis.)

10. a) Explain how Fast File System performs calculations in order to spread large files across the groups with necessary graph. CO5 (06)

b) Discuss different crash scenarios that may occur on the disk after a single write succeeds. CO5 (06)

c) Suppose that a disk drive has 5000 cylinders numbered from 0-4999. The drive is currently serving a request at cylinder 90 and the previous request was at cylinder 125, the following is the queue of pending requests in FIFO order, CO5 (08)
86,1470,913,1774,948, 1509.1022,1750,130
Starting from the current head position, what is the total distance that the disk arm moves to satisfy the pending requests for each of the following disk-scheduling algorithms?
i) Shortest Seek Time First ii) C-SCAN.

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