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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SUPPLEMENTARY SEMESTER EXAMINATIONS – JULY/AUGUST 2018

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.
- For the problematic questions, assume the missing data.

UNIT- I

1. a) Illustrate concurrency problems in multi-threaded technique with a program. CO1 (06)

   b) Describe limited direct execution protocol with time-line for restricted operations. CO1 (06)

   c) Consider the following set of processes with arrival time and burst time CO1 (08)

Process	Arrival-Time	Burst-Time (ms)
P1	0	7
P2	1	5
P3	2	10
P4	2	3

Draw the Gantt chart and find the average waiting time and turnaround time by using the following scheduling algorithms.
i) FCFS algorithm ii) Round Robin algorithm (time slice 2ms)

2. a) List out and explain the services of an operating system that it provides to the user and the system. CO1 (06)

   b) Consider the following set of processes arrived at the same time, with different burst time ; CO1 (08)

PROCESS	BURST TIME
P1	21
P2	3
P3	6
P4	2

Draw the Gantt chart and find the average waiting time and turnaround time by using the following
i) SJF
ii) Short test time to completion first (STCF)

   c) Explain process state transition diagram. Trace process state for both CPU and I/O bound processes. CO1 (06)

UNIT- II

3. a) Describe the issues associated with MLFQ and also provide the solutions for the same. CO2 (08)

   b) Justify how proper scheduling of processes makes the better use of resources with an example. CO2 (06)

c) Given, an address space of 64-bit and page size 4KB. Assume 4 bytes per page table entry (PTE). CO3 (06)
Compute the following:
i) How many numbers of bits are needed for Virtual Address?
ii) How many bits are needed for VPN?
iii) How many entries are there in page table?
iv) What is the size of page table?

4. a) Describe various Linux multiprocessor schedulers. CO2 (06)
b) Illustrate with an example cache affinity mechanism in single queue multiprocessor scheduling. CO2 (06)
c) Write the Multi-level Page Table Control Flow algorithm. CO3 (08)

UNIT- III

5. a) Describe replacement policy used in implementing TLB to access memory. CO3 (06)
b) Consider the following page reference string: CO3 (06)
0 1 3 6 2 4 5 2 5 0 3 1 2 5 4 1 0
How many page faults would occur for the following page replacement algorithms assuming 3 frames?
i) LRU replacement ii) FIFO replacement iii) Optimal replacement
c) Write page fault control flow algorithm (hardware). CO3 (08)

6. a) With an example show that sharing of segmentation improves the performance. CO3 (06)
b) With a code snippet explain how operating system maps logical segment address to a physical address. CO3 (06)
c) i) Consider a movie player application that supports functions like play movie, skip forward x frames and skip backward x frames. Suggest a memory management policy that will be best suited for this application. CO3 (08)
ii)For a single-level page table system, with the page table stored in memory. If the hit ratio to a TLB is 80%, and it takes 15 nanoseconds to search the TLB, and 150 nanoseconds to access the main memory, then what is the effective memory access time in nanoseconds?

UNIT- IV

7. a) With an example show that using flag to signal between two threads instead of a condition variable and lock is not a good idea. CO4 (06)
b) Consider the following snapshot of a system, with total resources of R1(8), R2(6) , R3(12) and R4(14). CO4 (08)

Processes	Allocation				Max				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P1	2	0	1	1	3	2	1	4	2	3	2	3
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.
c) With a data structure and necessary routines describe the concept of thread creation. CO4 (06)

8.	a)	State reader-writer locks problem of synchronization and suggest suitable solution for the same.	CO4	(04)
	b)	With a code snippet describe semaphore as a condition variable.	CO4	(08)
	c)	Discuss the necessary conditions for the occurrence of deadlock with an example.	CO4	(08)

UNIT- V

9.	a)	Suppose that a disk drive has 200 cylinders, numbered from 0 to 199, the drive is currently serving at 84. The queue of pending request in FIFO order is: 67, 18, 87, 82, 142, 177, 72, 54. Starting from current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests using following algorithms? i) SPTF ii) SCAN (Assume head is moving towards right).	CO5	(06)
	b)	Describe reading a file from the disk with suitable example and a time-line.	CO5	(08)
	c)	Explain directory organization with a suitable example.	CO5	(06)
10.	a)	Explain the following terms with suitable examples: i) Rotational Delay ii) Seek Time iii) Track Skew iv) Track Buffer.	CO5	(06)
	b)	Describe the various crash scenarios in case of write operation to a disk.	CO5	(08)
	c)	Illustrate cylinder group associated with the fast file systems with suitable diagrams.	CO5	(06)

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