

(Please write your Exam Roll No.)

Exam Roll No.

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH.] NOVEMBER-DECEMBER-2019

Paper Code: IT-317

Subject: Operating System

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.No1 which is compulsory.

- Q1 Answer the following questions (Any five):- (5x5=25)
- How PCB (Process Control Block) helps in process management? Explain the structure of PCB.
 - What are the three requirements of any solution to the critical sections problem? Why these requirements are needed?
 - Consider a logical address space of 64 pages with 1024 words per page, mapped onto a physical memory of 32 frames.
 - How many bits are required in the logical address?
 - How many bits are required in the physical address?
 - Explain why SSTF scheduling tends to favor middle cylinders over the innermost and outermost cylinders.
 - Explain the principle of locality. How locality is exploited using cache memory?
 - Explain Banker's algorithm. How it helps in deadlock avoidance?
- Q2 (a) Explain the concept of thread. Compare user level threads and kernel level threads. (6.5)
- (b) Consider the following set of process, with the length of the CPU-burst time given in milliseconds:- (3+3)

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The process are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0. Draw Gantt chart illustrating the execution of these processing using.

- A non-preemptive priority (a smaller priority number implies a higher priority)
 - Round Robin (Quantum=1) scheduling.
- Q3 (a) With regard to process synchronization, describe what is meant by race conditions? (6.5)
- (b) Consider the following snapshot of a system. (3+3)

	Allocation				Request				Available			
	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄
P ₁	0	0	1	2	0	0	1	2	1	5	2	0
P ₂	1	0	0	0	1	7	5	0				
P ₃	1	0	5	4	2	3	5	6				
P ₄	0	3	3	2	0	6	5	2				
P ₅	0	6	1	4	0	6	5	6				

- What is the content of 'need' matrix?
- Is the system in a safe state?

- Q4 (a) A Process references following pages in the following order. (6.5)
5,6,7,8,5,6,6,9,9,5,6,7,8,9,7,5,8,6
Use LRU page replacement algorithms to find out the number of page faults for the above reference string using 4 page size.
- (b) Consider a paging system where the page table is stored in memory. (3+3)
- If a memory reference takes 200 nanoseconds. How long does a paged memory reference take?
 - If we add TLBs, and 75% of all page-table references are found in the TLBs. What is the effective memory reference time? (Assume that finding the page-table entry in the TLBs takes zero time, if the entry is there).
- Q5 (a) Describe segmentation-based virtual memory. You should consider the components of a memory address, the segment table and its contents, and how the final physical address is formed in your answer. (6.5)
- (b) Describe the difference between external and internal fragmentation. Indicate which of the two are most likely to be issues on:- (3+3)
- a simple memory management machine using base limit registers and static partitioning.
 - a similar machine using dynamic partitioning.
- Q6 (a) The requested tracks in the order received are (3+3)
57,60,41,20,92,162,152,40,186.
Starting track is 120. Perform the computation for the following disk scheduling algorithm:
- SSTF
 - C-SCAN
- (b) The Linux Ext2fs use the idea of block groups. Describe what this idea is and what improvements block groups have over the simple file system layout. (6.5)
- Q7 (a) What is the cause behind thrashing? How does the system detect thrashing? Once it detects thrashing. What can the system do to eliminate this problem? (6.5)
- (b) Consider the following set of processes, with the length of the CPU burst and arrival time given in milliseconds (6)
- | Process | Burst Time | Arrival Time |
|---------|------------|--------------|
| P1 | 8 | 0 |
| P2 | 4 | 0.4 |
| P3 | 1 | 1 |
- Draw Gantt charts for SJF and compute waiting time of each process?
- Q8 (a) Show that, if wait and signal operations of semaphore are not executed atomically, then mutual exclusion may be violated. (6.5)
- (b) What advantage is there in having different time-quantum sizes on different levels of a multilevel queuing system? (6)
