(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)**

(a) How PCB (Process Control Block) helps in process management? Explain the structure of PCB.

(b) What are the three requirements of any solution to the critical sections problem? Why these requirements are needed?

(c) Consider a logical address space of 64 pages with 1024 words per page, mapped onto a physical memory of 32 frames.

(i) How many bits are required in the logical address?

(ii) How many bits are required in the physical address?

(d) Explain why SSTF scheduling tends to favor middle cylinders over the innermost and outermost cylinders.

(e) Explain the principle of locality. How locality is exploited using cache memory?

(f) 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.

(i) A non-preemptime priority (a smaller priority number implies a higher priority)

(ii) 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				

(i) What is the content of 'need' matrix?

(ii) 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)**

i. If a memory reference takes 200 nanoseconds. How long does a paged memory reference take?

ii. 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)**

i. a simple memory management machine using base limit registers and static partitioning.

ii. 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:
(i) SSTF
(ii) 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)**

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