PES UNIVERSITY

PES University, Bengaluru

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UE19CS254

March 2021: IN SEMESTER ASSESSMENT B Tech IV SEMESTER

TEST – 1

UE19CS254: Operating Systems

Time: 2Hr | Answer All Questions | Max Marks: 60

1.	a)	What is peer to peer computing? Name the applications of the peer-to-peer computing environment.	2
	b)	What are the services provided by the operating systems ?	3
	c)	Consider the set of 5 processes whose arrival time and burst time are given below-	5

Process ID	Arrival time	Burst Time(ms)
P1	4	6
P2	2	4
P3	0	2
P4	3	3
P5	1	4

i. Calculate the waiting time and average waiting for round Robin Scheduling algorithm (given time quantum= 3)
ii. What will be the number of context switches for process P5? (Exclude the context switches at the start of the process and at termination)
iii. Does an increase in time quantum decrease the number of context switches?
iv. List the processes in the ready queue after 11ms.

2.	a)	What are the possible conditions for the process to move from running state to ready state? A diagram depicting the same is required.	4
	b)	Why short-term scheduler executes at a higher frequency than long-term scheduler?	2
	c)	An operating system uses Shortest Remaining Time First (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes:	4 (2+1+1)

Process	Execution time	Arrival time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

i. What is the average waiting time for these processes?
ii. Does this scheduling policy suitable for time-shared operating systems?
iii. if no, name the scheduling policy suitable for time-sharing operating systems?

3.	a)	Why is it that threads are faster to create than processes? What are the benefits of threads?	4
	b)	Write Peterson's solution to the critical section problem.	4
	c)	List two programming examples of multithreading giving improved performance over a single-threaded solution.	2
4	a)	Does the following code satisfy the requirements for solution to critical section problem?	4

```
while(true) {
    while(lock!=0);
```

lock=1;
Critical section
lock=0;
Remainder section }

If not, suggest the solution to critical section problem.

b) What is the significance of wait-for graph and resource allocation graph? Give an example for each. 4

c) A counting semaphore S is initialized to 20. Then, 10 P operations and 6 V operations are performed on S. What is the final value of S? 2

5 a) Consider a program of size 26 bytes and a page size of 4 bytes. The physical address consists of 200 frames. The user program consists of 26 instructions a, b, c, . . . z. Assume the size of each instruction to be 1byte. Given a page table entry as shown below 5

Page number	Frame number
0	7
1	26
2	52
3	20
4	55
5	6

Page table

i. What will be the number of pages for a given process?
ii. Find the physical addresses for the instructions a, e , i, o, u?
iii. Calculate the fragmentation if exists?
iv. Reference to which instruction causes page fault?

b) How the processes are protected from each other during their execution? 3

c) Consider the following segment table: 2

Segment #	Base address	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?
a. 0,430 b. 1,10 c. 2,500 d. 3,400

6 a) Consider the reference stream 1,4,3,4,2,1,5,6,2,1,2,3,7,6 for a particular process execution. How many page faults occur while using LRU page replacement algorithms with 4 frames? 5

I. Calculate the number of page faults
II. What are the data structures used to implement this algorithm?
III. Does it suffer from Belady's anomaly?

b) What is the significance of valid-invalid bits of page table in paging and in demand paging? 2

c) What is thrashing? What are the methods to prevent thrashing? 3