PES UNIVERSITY

PES University, Bengaluru

(Established under Karnataka Act No. 16 of 2013)

UE18CS302

OCTOBER 2020: IN SEMESTER ASSESSMENT
B. Tech. (SEMESTER TEST – 1)
UE18CS302 - Operating System

Time: 2 Hrs	Answer All Questions	Max Marks: 60

1.	a)	Clearly explain different states of the process drawing state diagram	4
	b)	Precisely explain fork(), exec(), and wait() system calls including parameters and return value	3
	c)	Precisely and clearly explain Primary benefits of Multiprocessor Based Systems	3

2. a) Suppose that the following processes arrive for execution at the times indicated. Each process will run for the amount of time listed as Burst Time. In answering the questions, use non-preemptive scheduling, and base all decisions on the information you have at the time the decision must be made. **5 (1+2+2)**

Process	Arrival Time	Burst Time
P1	0.0	8
P2	0.4	4
P3	1.0	1

1. What is the average turnaround time for these processes with the First Come First Serve (FCFS) scheduling algorithm?
2. What is the average turnaround time for these processes with the Shortest Job First (SJF) scheduling algorithm?
3. The SJF algorithm is supposed to improve performance, but notice that we chose to run process P1 at time 0 because we did not know that two shorter processes would arrive soon. Compute what the average turnaround time will be if the CPU is left idle for the first 1 unit and then SJF scheduling is used. Remember that processes P1 and P2 are waiting during this idle time, so their waiting time may increase. This algorithm could be known as ***future-knowledge scheduling.***

b) The following processes are being scheduled using a pre-emptive, round-robin scheduling algorithm. Each process is assigned a numerical priority, with a higher number indicating a higher relative priority. In addition to the processes listed below, the system also has an idle task (which consumes no CPU resources and is identified as P_{idle}). This task has priority 0 and is scheduled whenever the system has no other available processes to run. The length of a time quantum is 10 units. If a process is pre-empted by a higher-priority process, the pre-empted process is placed at the end of the queue **5(2+2+1)**

Thread	Priority	Burst	Arrival
P_1	40	20	0
P_2	30	25	25
P_3	30	25	30
P_4	35	15	60
P_5	5	10	100
P_6	10	10	105

1. What is the turnaround time for each thread?
2. What is the waiting time for each thread?
3. What is the CPU utilization rate?

3.	a)	Precisely and clearly explain four conditions to occur simultaneously for deadlock	4
	b)	Precisely and clearly explain primary benefits of multithreading an applications	3
	c)	Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free.	3
4.	a)	Give the correct and concise structure of reader and writer processes using semaphores for the ***first reader writer problem*** where no reader be kept waiting unless a writer has already obtained permission to use the shared object. Obviously, readers can access the shared object simultaneously.	5 (3+2)
	b)	Give a clear, correct and complete algorithm for deadlock detection among n processes and m resources type with multiple instances and mention the complexity of the algorithm.	5 (4+1)
5.	a)	Clearly Explain all the Steps to Service a Page Fault in a demand paging based system	4
	b)	Clearly differentiate between internal fragmentation and external fragmentation with example	3
	c)	Concisely describe and differentiate between Frame Allocation and Page replacement	3
6	a)	Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order), 1. How would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order) 2. Which algorithm makes the most efficient use of memory?	5 (4+1)
	b)	Consider the segment table as follows : Segment Base Length 0 219 600 1 2300 14 2 90 100 3 1327 580 4 1352 96 What are the Physical addresses for the following logical address? Seg# Offset 0 430 1 10 2 500 3 400 4 112	5 (1*5)