SPRING SEMESTER EXAMINATION-2020(online)

4th Semester B. Tech, ~~2nd Semester B. Tech &2nd Semester M. Tech~~

SCHOOL OF COMPUTER ENGINEERING

~~DEPARTMENT ELECTIVE / OPEN ELECTIVE~~

OPERATING SYSTEM

CS 2002

Time: 2 Hours Full Marks: 50

(SECTION-A:1 Hour, SECTION-B:1 Hour)

Question paper consists of two sections-A, B.
Section A is compulsory.
Attempt any TWO questions from Sections B.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words

SECTION-A (Time: 1 Hour **)**

			MARK
1.	(a)	Justify whether "Creation of multiple threads is preferred over multiple processes or not".	[2.5]
	(b)	Consider process arrival as given below where n = right most significant digit of your Roll No.(ex:- for Roll No. 180854, n=**4**):	[10]

Process	CPU Burst Time(ms)	Arrival Time
A	4	0
B	3	6
C	6	n

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			D	1+(n%9)	3
			E	1	4
		Calculate the following for *round robin* (time quantum = 2 ms) CPU scheduling algorithm: i. Average waiting time ii. Turnaround time for each process iii. Order of completion iv. Minimum time quantum so that *round robin* will act as *first come first serve* scheduling.		
2.	(a)	Write down WAIT( ) and SIGNAL( ) operations on counting semaphore.		[2.5]
	(b)	Assume a set *X of n* processes, where $n < 20$ with process IDs [0, *n*-1]. A function *void Barrier(int pid)* is defined over the set *X* such that if anyone process P_0 in *X* with a process ID pid_0 calls *Barrier(int* pid_0*)*, it is blocked until all processes in *X* have called *Barrier( )* with their process IDs. Write the pseudo-code for the *Barrier( )* function using only semaphores. List the semaphores that you have used with their initial values without concerning who creates and initializes. Show the code for *Barrier( )* that uses the semaphores declared by making WAIT( ) and SIGNAL( ) calls on them.		[10]

SECTION-B(Time:1 Hour)

3.	(a)	In a system n processes, P_1, ... , P_n share m resources of same type, R. Each resource can be acquired and released one at a time. If the maximum requirement of resources for each process P_i is r_i, where $r_i > 0$, then find the sufficient condition in extreme situation to ensure deadlock does not occur in the system.	[4.5]
	(b)	An operating system uses the Banker's algorithm for deadlock avoidance when managing the allocation of three resource types R_0, R_1, and R_2 to three processes P_0, P_1, and P_2. The snapshot of current system state is shown in the following table. The Allocation matrix shows the number of resources of each type already allocated to each process and the Max matrix shows the maximum number of resources of each type required by each process during its execution.	[8]

Process	Max				Allocation		
	R_0	R_1	R_2		R_0	R_1	R_2
P_0	7	3	3		1	0	1
P_1	5	2	1		2	2	1
P_2	6	3	3		2	1	1

There are 3 instances of resource type R_0, 2 instances of resource type R_1 and 2 instances of resource type R_3

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		still available in the system. Check the system is currently in a safe state. Find out which process will complete its execution at end? Consider the following independent requests for additional resources in the current state: **REQ1:** P0 requests 2 instances of resource type R3 only. **REQ2:** P1 requests 1 instances of resource type R0 only. Explain, which of the above request can be permitted?	
4.	(a)	How can not a process be allowed to access the memory locations that it does not have its own?	[4.5]
	(b)	Compare the address translation mechanism of paging and segmentation for convection of logical addresses to physical addresses. Consider a system with 32 bits logical address and 4KB of the page size. The system has also 512MB of physical memory. Find the following: i. Number of entries in a single-level page table ii. Size of the single-level page table iii. Maximum size of the program for two level paging?	[8]
5	(a)	A manufacturer wishes to design a hard disk with a capacity of M GB. If the technology used to manufacture the disks allows 1024-byte sectors, 2048 sectors/track, and 4096 tracks/platter, how many platters are required? (Assume M=10*(1+(right most digit of your Roll No % 9)); Ex:- for Roll No. 183452; M=10*(1+(2 % 9)) i. e 30)	[4.5]
	(b)	Explain the purpose and importance of system calls related to device management. Discuss the structure of directory and its implementation in detail	[8]
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(Subhasis Dash)
Name of the **Moderator/Course Coordinator**

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