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Thapar Institute of Engineering and Technology (TIET), Patiala
Department of Computer Science & Engineering (CSED)
AUXILIARY EXAMINATION

B.Tech Auxiliary Examination (2022-23)	**Course Code**: UCS303 **Course Name**: Operating System
Feb 23, 2023	Saturday, 05:30PAM-08:30 PM
Time: 3Hrs, Max. Marks: 100	**Name of Faculty**: Dr. Shashank Sheshar Singh

Note: All questions are compulsory. All parts of a question should be attempted in one place. Assume missing data, if any suitably.

Q. 1

a) Discuss the difference between Multiprogramming, Multi-tasking, and Multiprocessing operating systems with examples. **[5]**

b) Draw a labelled diagram for Process Execution Life Cycle.

c) Consider the following distribution of resources, maximum need, and availability to the process for applying Banker algorithm to identify the state of process execution. If the state is Safe, find out at least one Safe sequence? **[5]** **[10]**

Process Ids	**Maximum Need**			**Allocated**			**Available**		
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
P0	6	5	4	0	3	4	4	3	1
P1	3	4	2	2	1	2			
P2	1	0	4	0	0	2			
P3	3	2	5	1	2	1			

Q. 2

a) Consider two concurrent process P and Q executing the below respective codes. What should be the semaphore (binary) operations (such as (P(S), V(S), P(T), V(T))) on w, x, y, z? And what the initial value of binary semaphore 'S' and 'T' in order to get the output 00110011001100…..? **[5]**

Process 'P' Code	**Process 'Q' Code**

While(TRUE)
{
w: -----
print('0');
print('0'):
x: -----
}
	While(TRUE)
	{
	y: -----
	print('1');
	print('1'):
	z: -----
	}

b) The following six processes are being scheduled by different scheduling algorithms. Find the average waiting time of process using First Come First Serve (FCFS), Shortest Job First (SJF), and Shortest Remaining Time First (SRTF, Preemptive) Scheduling Algorithms. **[15]**

Process Id	**Arrival Time**	**Burst Time**
P1	0	7
P2	1	5
P3	2	3
P4	3	1
P5	4	2
P6	5	1

Q. 3 **a)** Draw the labelled diagram of Paging for allocating non-contiguous memory to a process. **[5]**

b) Explain the Fork() system call and its return values in child process creation with an example. **[5]**

c) What is deadlock? Explain the four characteristic of deadlock. **[10]**

Q. 4 Consider a disk storage system with 200 cylinders numbered as 0,1,….,199. Cylinder number 0 starts from center and move in an incremental fashion towards circumference. The disk requests with following cylinder are received by the disk controller: **[20]**

98, 183, 37, 122, 14, 124, 65, 67

Compute the Total Head Movements, when following algorithms have been deployed. Currently head is positioned at cylinder 53. Initial direction of movement is towards higher cylinder for C-LOOK and C-SCAN. Show suitable diagrams and intermediate computational steps for each case.

i. FCFS
ii. SSTF
iii. C-LOOK
iv. C-SCAN

Q. 5 **a)** Consider three concurrent processes P1, P2 and P3 as shown below, which access a shared variable B that has been initialized to 100. The process are executed on a uniprocessor system running a time-shared operating system. If the minimum and maximum possible values of B after the three processes have completed execution are X and Y respectively, calculate the value of X and Y? **[5]**

P1	P2	P3
…. …. B=B+20 …. ….	…. …. B=B-50 …. ….	…. …. B=B+10 …. ….

b) Discuss the difference between Fixed Partitioning and Variable Partitioning Scheme with examples for contiguous memory allocation. **[5]**

c) Consider a system with 4 frames allocated to a process in the main memory. The process having the page references 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1 to compute its execution. With the help of suitable diagram (showing step by step exaction) compute the page faults that will occur using First in First out (FIFO) and Most Recently Used (MRU). **[10]**

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