COMSATS UNIVERSITY ISLAMABAD
DEPARTMENT OF COMPUTER SCIENCE
Terminal Examination
FALL 2021

Class: -	BSCS/BSSE-4	**Subject:** -	Operating Systems (CSC322)
Marks: -	50	**Time:** -	3 Hours
Dated: -	------------------------------		

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================ **Question No.1**   (Marks 10) ================ **(CLO 2)**

Part 1:- Write major problem/ disadvantage associated with following scheduling algorithms **(3)**

FCFS,   SJF and Priority Scheduling

Part 2:- Suppose multilevel feedback queue scheduling is implemented in an OS. There are three types of processes in the system: System (Sys.), Background (BG) and Foreground (FG). System processes are kept in ready queue Q1, Foreground processes are kept in ready queue Q2 while Background processes are kept in ready queue Q3. FCFS scheduling is used to schedule system processes, RR (with q=5) scheduling is used for Foreground processes while SJF (Preemptive) scheduling is used for scheduling background processes. For first 40 ms processes are executed from Q1, for next 30 ms processes are executed from Q2 and then for next 20 ms processes from Q3 are executed. The same pattern repeats if there are pending processes. If any of the queues gets empty then execution from next queue is started. Considering this scheduling algorithm, show the execution of processes given in the table using the Gantt chart. **(7)**

Process	Process Type	Arrival Time	Burst Time (ms)
P1	Sys.	2	25
P2	Sys.	0	30
P3	Sys.	1	20
P4	FG	10	22
P5	FG	20	20
P6	FG	55	25
P7	BG	60	10
P8	BG	60	25
P9	BG	60	12
P10	BG	60	10

================ **Question No.2**   (Marks 15) ================ **(CLO 3)**

Part 1:- Differentiate Avoidance, Prevention and Deadlock Detection. How the Hold and Wait condition can be prevented **(5)**
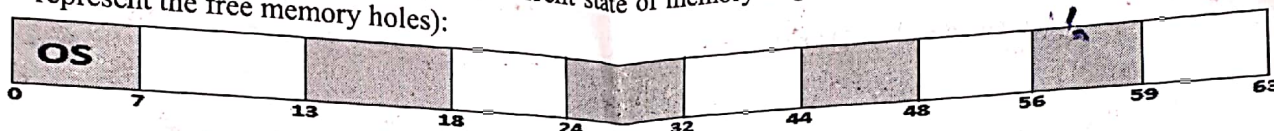
Part 2:- Consider the following system state.

Process	Request				Allocation				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	2	0	0	1	0	0	1	1	2	1	0	0
P2	1	0	1	0	2	0	0	1				
P3	2	1	0	0	0	1	2	0				
P4	3	3	3	3	1	0	1	0				

I.   How many instances each of the resource type (A, B, C, D) are installed in the system **(1)**
II.   Use Deadlock Detection algorithm to decide whether the system is in deadlock or not **(5)**
III. If the system is in deadlock then suggest any solution to recover from it **(1)**

Part 3:- Differentiate binary and counting semaphore? Which one works like mutex locks? Can we use binary semaphore as resource counter? **(3)**

===== **Question No.3** **(Marks 15)** ===== **(CLO 4)**

Part 1:- Assume that a system uses segmentation memory allocation scheme. The total physical memory consists of 64 Bytes (addressed from 0 to 63). The current state of memory is given in the following image (white boxes represent the free memory holes):

Assume that a process consists of three segments: S1: (A, B, C, D, E, F, G); S2 (I, J, K, L) and S3 (L, M, N, O) (Each character requires one byte to be stored in the memory)

I.   If memory is allocated to the process using the best fit algorithm then write the segment table   **(2 Marks)**
II.   Write the logical address of characters: **G, K, M (2 Marks)**
III. Convert the logical addresses of characters **G, K, M** to physical addresses **(2 Marks)**
IV.   Write the sizes of free-memory holes after the allocation of memory to the process **(1 Mark)**

Part 2:- During the execution of a process various pages are referenced in the given sequence:
    1, 3, 0, 3, 5, 2, 4, 5, 6, 5, 7, 2, 6, 3, 5, 0, 1, 2, 3, 5, 1
Compute the number of page faults in following policies, when the frame quota is 4:
    a. LRU Page-replacement (4 Marks)
    b. Second Chance Page-replacement Algorithm (4 Marks)

===== **Question No.4**   **(Marks 5)** ===== **(CLO 5)**

Part 1:- Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 2150, and the previous request was at cylinder 1,805. The queue of pending requests, in FIFO order, is:
    956\
        2069, 1212, 2296, 2800, 544, 1618, 356 1,523, 4,965, 3681
Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms? **(5)**
    a. FCFS
    b. SSTF

===== **Question No.5**   **(Marks 5)** ===== **(CLO 6)**

Part 1:- What is access control and intrusion detection? What are different techniques to implement access control and intrusion detection? **(5)**

The End