

Final Assessment Test (FAT) – May 2022

Programme	B.Tech	Semester	Winter Semester 2021-22
Course Title	OPERATING SYSTEMS	Course Code	CSE2005
Faculty Name	Prof. Bhanu Chander Balusa	Slot	B2+TB2
		Class Nbr	CH2021225000774
Time	3 Hours	Max. Marks	100

Part A (10 X 10 Marks)
Answer All questions

- i) Identify the type of kernel which facilitates dynamically loadable module that can be added to a running system without rebooting the system or rebuilding the kernel. (2 Marks) [10]
 ii) Compare and contrast the above mentioned kernel over micro kernel. (8 Marks)
- Redesign the readers-writers problem such that, a reader should start its read after two writers have completed their writing. The third writer has to wait until 5 readers have completed their reading. Use appropriate variables and write the pseudo-code for the above scenario using semaphores. [10]
- Create two threads thread1 and thread2 and call functions fun1 and fun2 respectively. Initialize the value of 'a' and return it to thread1 object and initialize the value of 'b' and return it to thread2 object. Add the values of 'a' and 'b' and print the same in the main function. Write a 'C' code to implement the same. [10]
Note: a and b values should be initialized in main function and send them as arguments through threads to the respective functions.
- Assume that 6 students S1, S2, ..., S6 are willing to practise basketball and the target is to place a shoot. Every student enters the stadium on their own time and they take an amount of time to place a shoot. Let us consider that the Students S1, S2, ..., S6 arrives the stadium at 01:00 Hrs, 01:30 Hrs, 02:00 Hrs, 02:30 Hrs, 03:00 Hrs and 03:30 Hrs respectively and takes 3mins, 43mins, 73mins, 63mins, 13mins and 25mins to place a shoot. With respect to the student's arrival time, allow the students based on the following constraints and identify the time at which they have completed their practice and the time they have taken to wait for their turn to play. [10]
 - The students S1, S2 and S3 are allowed to play based on the longest time taken to place a shoot first. Even if the students S2/S3 arrived, takes more time compared with the student S1, do not allow the student S2/S3 to take over the student S1. [3 Marks]
 - After S1, S2 and S3 has completed, the students S4, S5 and S6 are allowed to play for 2ms for each of their turns. They alternately play till they complete their shooting. [4 marks]
 - Draw a Gantt chart to depict the sequence in which every student has played their game with the average time taken by all the students and average waiting time of all the students till they complete their turns. [3 Marks]
- Illustrate hypervisor with container virtualization in detail with the neat sketch. [10]

6. Assume that there exists 24 numbers of blocks available in the back store each of size 256 bytes. [10]
The list of files, the starting block from where it has to be allocated, with its size details are as follows:

File Name	Start	Size in bytes
A	3	999
B	8	456
C	12	1212
D	20	112
E	22	320

- Allocate the files into the blocks specified using contiguous file allocation strategy. [2 Marks]
 - For the linked allocation of files into the blocks, each block will take 15 bytes to store the pointer information and the remaining 241 bytes can be allocated with the file contents. Allocate the files into the blocks specified using linked file allocation strategy. [2 Marks]
 - Draw the File Allocation Table for the sub division no. ii. [2 Marks]
 - Allocate the files into the blocks using indexed file allocation strategy by considering the index block as 18 [2 Marks]
 - Identify the files which cannot be allocated into the blocks, if any. [2 Marks]
7. The disk has 100 cylinders and the read/write head is pointing at cylinder 22. There are a sequence of I/O request for accessing the cylinder numbers are 43, 23, 15, 46, 64, 88, 4, 10, and 92. Calculate the total head movement using the following disk scheduling algorithms. **Note:** Initially head is moving towards the end of the disk drive [10]
- LOOK [5 Marks]
 - SCAN [5 Marks]
8. Consider 22 pages with the following reference string order 11, 13, 2, 13, 11, 15, 17, 3, 5, 3, 16, 1, 3, 8, 19, 13, 7, 2, 1, 12, 22, 14. Initially there exist 3 free frames. Apply appropriate algorithms for the following for inserting/replacing the reference string pages into the frames. [10]
- Find the number of Page Faults with LRU page replacement algorithm. [4 Marks]
 - Find the number of Page Faults with Optimal page replacement algorithm. [4 Marks]
 - Identify the algorithm which gives the minimum number of page faults and justify the same. [2 Marks]
9. Consider a main memory in the system with 8 partitions, where 4 partitions are already loaded with user processes and remaining four partitions are free. The memory map of the system is given below: [10]

500 MB	750 MB	1000 MB	1500 MB	2000 MB	2500 MB	3000 MB	3500 MB
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The processes with different sizes have to be loaded into the main memory are given as (in order): 1550MB, 600MB, 200MB, and 2750MB. Implement the partition allocation strategies **First Fit**, **Best Fit** and **Worst Fit** for the given input and determine which strategy can optimally satisfy this requirement. Justify your answer with a proper explanation.

Note: the free partitions are 750MB, 1500MB, 2500MB and 3500MB

10. A system has 4 processes and 4 allocatable resource. The current allocation and maximum needs are as follows: [10]

Maximum Matrix

Process Name	A	B	C	D
P1	2	1	3	2
P2	3	2	1	1
P3	1	1	1	2
P4	4	3	2	1

Allocation Matrix:

Process Name	A	B	C	D
P1	1	0	0	1
P2	2	1	1	0
P3	0	1	0	1
P4	1	0	1	0

- i. Find the safe sequence for available resource $A = 10$, resource $B = 8$ resource $C = 6$, and resource $D = 4$. [6 Marks]
- ii. For the above safe sequence, if a process P2 requests 2, 3, 3, 1 as additional instance of A, B, C, D. Will the request be granted immediately? Explain it with a proper solution. [4 Marks]

