CSE202   Enrol. No. A2305220448

[ET]

END SEMESTER EXAMINATION : APRIL-MAY 2022

OPERATING SYSTEM

Time : 3 Hrs.   Maximum Marks : 60

Note: *Attempt questions from all sections as directed.*

Use of scientific Calculator is allowed

SECTION – A   (24 Marks)

Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

1. Describe the difference between symmetric and asymmetric multiprocessing. What are the three advantages and one disadvantages of multiprocessor systems?

2. "Priority inversion is a condition that occurs in real time systems where a low priority process is starved because higher priority processes have gained hold of the CPU" – Comment on this statement.

3. When multiple interrupts from different devices appear at about the same time, a priority scheme could be used to determine the order in which the interrupts

P.T.O.

(921)

would be serviced. Discuss what issues need to be considered in assigning priorities to different interrupts.

4. In a multiprogramming and time-sharing environment, several users share the system simultaneously. The situation can result in various security problems.

   (i) What are two such problems?

   (ii) Can we ensure the same degree of security in a time-shared machine as in a dedicated machine? Explain your answer.

5. Define authentication? Why simple password protection is the most common authentication scheme in use today? Discuss the weakness inherent in the password protection scheme.

SECTION – B   (20 Marks)
Attempt any **two** *questions out of* **three**.
Each question carries **10** *marks*.

6. (a) Explain race condition and show how a critical section avoids this condition. List down the properties which a data items should possess to implement a critical section? Describe ta solution to the Dinning philosopher problem so that no races arise.   (5)

(b) Let a disk drive has 5000 cylinders from 0 to 4999. Currently drive is at 143rd cylinder, and the previous request was at cylinder 125. Queue of pending request in FIFO order I 86, 1470, 913, 1774, 948, 1509, 1022, 130. What is the total distance the disk arm moves to satisfy all the pending requests for LOOK disk scheduling algorithms from current position?   (5)

7.   Consider a file system where a file can be deleted and its disk space reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided?

8.   Consider the following reference string : 1,2,3,4,2, 1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults would occur for the following replacement algorithms assuming three frames? Remember that frame is initially empty.

   (i) FIFO replacement

   (ii) LRU replacement

   (iii) MFU replacement

   (iv) Optimal replacement

SECTION – C   (16 Marks)

(Compulsory)

9. (a) Consider the following snapshot of a system. P0, P1, P2, P3, P4 are the processes and A, B, C, D are the resource types.

Process	Max Matrix ABCD	Allocation Matrix ABCD	Available Matrix ABCD
P0	6 0 1 2	4 0 0 1	3 2 1 1
P1	1 7 5 0	1 1 0 0	
P2	2 3 5 6	1 2 5 4	
P3	1 6 5 3	0 6 3 3	
P4	1 6 5 6	0 2 1 2	

Using Banker's algorithm, answer the following questions :

How many resources of type A, B, C and D are there?

What are the contents of the need matrix?

Is the system is in a safe state? Why?

If a request from P4 arrives for additional resources of (1, 2, 0, 0) can the Banker's algorithm grant the request immediately? Show the new system state and other criteria.   (8)

(b) Compare the main memory organization schemes of contiguous-memory allocation, pure segmentation, and pure paging with respect to the following issues :

    (i) External Fragmentation

    (ii) Internal Fragmentation   (8)