VIT
Vellore Institute of Technology

Final Assessment Test – July 2023

Course: **BITE303L - Operating Systems**

Class NBR(s): **0115 / 0119 / 0121 / 0136 / 0535** Slot: **D1+TD1**

Time: **Three Hours** Max. Marks: **100**

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Classify the various types of System calls based on its usage in operation of the system and list the functions of each system call.

2. Compare and Contrast the various pros and cons of two types of Inter Process Communications-Shared Memory and Message Passing with its merits and demerits.

3. What do you meant by Safe and Unsafe state? The following table shows a system at time slot T_0.

	MAX		Allocation	
	R1	R2	R1	R2
A	2	5	1	1
B	1	4	0	3
C	5	3	2	3
D	6	2	2	1

The current available resource are R1 of 3 and R2 of 2.

i) Check whether the system is safe or not using Bankers algorithm. If safe, find out the safe sequence. **[4]**

ii) If Process A requests for (1, 3) can it be granted? **[3]**

iii) If Process C requests for (3, 0) can it be granted? **[3]**

4. Consider the following set of processes, with the length of the CPU burst given in milliseconds.

Process	Execution Time	Arrival Time	Priority
P1	11	0	2
P2	3	0	1
P3	9	5	5
P4	4	2	4
P5	9	1	3

The processes are assumed to have arrived in the order P1, P2, P5, P4 and P3.

i) Draw Gantt charts that illustrate the execution of the process using the following scheduling algorithms FCFS, SRTF, Pre-emptive Priority (larger priority implies highest priority) and RR (Quantum=3). [4]

ii) Calculate the turnaround time and waiting time of each process for the above algorithms. [4]

iii) Which scheduling algorithm results in minimal average waiting time? [1]

iv) Which scheduling algorithm results in minimal average turnaround time? [1]

5. a) Prove that Critical Section requirements are satisfied using Mutex Lock's Solution for process synchronization. [5]

b) What is Semaphore? Mention its types and also explain how it is used for achieving Mutual Exclusion? [5]

6. a) Consider the following segment table: [4]

Segment	Base	Length
0	219	60
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

i) 0,30

ii) 2,500

iii) 4,112

iv) 3,400

b) What do you meant by thrashing? Mention its effect in the system. Illustrate the techniques which avoid thrashing in a system. [6]

7. A processor references five pages A, B, C, D and E in the following order.

A, B, C, D, A, E, B, C, E, D

Assume that the replacement algorithm is LRU, Optimal and FIFO.

Find the number of page transfers during the sequence of reference starting with empty main memory with 3 and 4 free frames.

Find which algorithm results in minimum number of page fault.

8. Suppose that a disk has 50 cylinders named 0 to 49.

The R/W head is currently serving at Cylinder 15 and the previous request was at 18.

The queue of pending requests are in order

4, 40, 11, 35, 7, 14

Starting from the current head position. What is the total distance travelled (in cylinders) by the disk arm to satisfy the requests using algorithms:

i) FCFS

ii) SSTF

iii) SCAN

iv) C-SCAN

v) LOOK

Illustrate with figure for each case.

9. a) Consider the disk where blocks 2, 4, 5, 8, 9, 15, 16, 18 and 21 are free and the rest of the block are allocated. **[4]**

The total number of blocks is 25.

Represent the free space list as a bit vector.

b) Elaborate with advantages and disadvantages of any two disk allocation methods with a neat sketch. **[6]**

10. a) With an example show how files and directories are protected in Linux and specify what command is used to change the modes of a file. **[4]**

b) Summarize the different Directory Structures with a neat diagram. **[6]**

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