H Roll No. .....

TBC-204/TBI-204

B. C. A./B. SC. (IT)

(SECOND SEMESTER)

END SEMESTER

EXAMINATION, June, 2023

OPERATING SYSTEMS

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Explain and design the layered diagram of operating system. Differentiate between multitasking and multiprogramming

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operating system. Also explain their advantages and disadvantages with proper example. (CO1)

(b) Explain the following in brief : (CO1)

(i) Multiuser and single user operating system

(ii) System calls

(iii) Real time operating system

(iv) Multitasking operating system

(v) Multiprocessing operating system

(c) What is a thread ? How are threads different from processes ? Also explain multiprocessing scheduling. (CO1)

2. (a) Differentiate between long-term, short-term, medium-term scheduler. Also explain process control block with proper diagram. (CO2)

(b) Five batch jobs, where processes arrive at a computer center at essentially the arrival time 0, 1, 2, 3, 4. They have an estimate running time of 5, 9, 7, 2, 4, respectively. For each of the following scheduling

algorithms. Draw the Gantt chart, determine the turnaround time for each process and the average turnaround time and average waiting time for all jobs :

(CO2)

(i) Round robin with a time quantum of 1 unit.

(ii) Preemptive SJF

(c)

Process	Arrival time	Execution time	Priority number
P1	0	3	3
P2	2	7	4
P3	3	5	1
P4	5	9	2

Draw the Gantt chart for the execution of the processes, showing their start time and end time, using priority-number non-pre-emptive based scheduling. Calculate turnaround time, normalized turnaround time, waiting time for each process and average turnaround time, average

normalized turn around time and average waiting time for the system. (CO2)

3. (a) What do you understand by deadlock ? Explain the deadlock prevention method of deadlock handling with suitable example. (CO3)

(b) What is a critical section problem? Explain two process solution approaches to critical section implementation. (CO3)

(c) Consider a system with the following information. Determine whether the system is in safe state or not. If it is in safe state, what is the safe sequence ? (CO3)

Total Resource R1 = 15, R2 = 8, R3 = 8

Process	Max			Allocation		
	R1	R2	R3	R1	R2	R3
P1	5	6	3	2	1	0
P2	8	5	6	3	2	3
P3	4	9	2	3	0	3
P4	7	4	3	3	2	0
P5	4	3	3	1	0	1

(a) Calculate the number of page faults for the following reference string using FIFO algorithm with frame size as 3 : (CO4)

5 0 2 1 0 3 0 2 4 3 0 3 2 1 3 0 1 5

(b) What do you understand by Memory ? Explain contiguous memory allocation and their types with example. A program's logical memory has been divided into 7 pages, and these pages are given frame numbers 4, 10, 3, 7, 6, 8 and 2. Show the logical memory mapping to the physical memory. (CO4)

(c) Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB. These partitions need to be allocated to four processes of sizes 357 KB, 210 KB, 468 KB and 491 KB in that order. After performing First Fit Algorithm, Best Fit Algorithm and Worst Fit Algorithm. What would be the external fragmentation in the main memory ? (CO4)

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5. (a) Discuss the history of Linux operating system. Explain the changing file/directory permission modes in Linux operating system. (CO5)

   (b) Write a shell script to concatenate two strings in VI Editor. Also explain how permissions are granted under LINUX. (CO5)

   (c) What do you mean by file handling in Linux operating system? List and explain various file handling commands. (CO5)