BTS–VI(R/S)–06–23–1819 Reg. No. | | | | | | | | |

C

B.Tech. Degree VI Regular/Supplementary Examination June 2023

CS 19-202-0605 OPERATING SYSTEM

(2019 Scheme)

Time: 3 Hours Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

CO1: Familiarize with the basic concepts of operating systems.
CO2: Implement various process scheduling algorithms.
CO3: Design programs to avoid the synchronization problems.
CO4: Gain knowledge about memory management and virtual memory concepts.
CO5: Analyze various security and protection mechanisms in file system implementation.
CO6: Illustrate the problems related with deadlocks and deadlock handling.
CO7: Compare different types of operating systems.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create

PO – Programme Outcome

PART A

(Answer *ALL* questions)

$(8 \times 3 = 24)$

		Question	Marks	BL	CO	PO
I.	(a)	What is meant by guaranteed scheduling? Explain in brief.	3	L1	2	1,2
	(b)	Define Operating System. Explain briefly about the services provided by Operating System.	3	L1	1	1,2
	(c)	A system supports 64 pages and size of page=512Byte.Physical memory consists of 32 page frames. Calculate the number of bits required in physical and logical address space.	3	L2	4	1,2
	(d)	Explain the structure of a page table.	3	L1	4	1,2
	(e)	Write short notes on clocks and terminals.	3	L1	5	1,2
	(f)	Differentiate between security and protection mechanisms.	3	L2	5	1,2
	(g)	What is meant by deadlock? List out the necessary conditions for a deadlock to occur.	3	L1	6	1,2
	(h)	Discuss in brief on the methods for handling deadlocks.	3	L1	6	1,2

PART B

$(4 \times 12 = 48)$

II. Consider the scenario given below: 12 L3 2 1,2

PROCESS	ARRIVAL TIME	BURST TIME
P1	0	7
P2	2	4
P3	4	1
P4	5	5

For each of the following scheduling algorithms, draw the Gantt chart, determine the average turnaround time and waiting time:

(i) First come first served
(ii) Shortest Job First(Non preemptive)
(iii) Round Robin (Q = 2).

OR

(P.T.O.)

		Marks	BL	CO	PO
III.	(a) Consider the following C programs P1 and P2 executed on a UNIX/Linux system:	8	L3	1	1,2

```
        /* P1  * /
int main
{
fork();
fork();
fork();
printf("Happy\n");
}
        /* P2  * /
int main
{
fork();
printf("Happy\n");
fork();
printf("Happy\n");
fork();
printf("Happy\n");
}
```

Calculate the number of times "Happy" gets displayed by P1 and P2 with suitable explanation.

Note:

(i) *Fork is the primary method of process creation in UNIX-like operating systems. Fork system call is used for creating a new process, which is called the child process. Child process runs concurrently with the process that makes the fork() call (parent process). Assume that the system call fork() never fails.*

		Marks	BL	CO	PO
	(b) In a certain computation, the value of counting semaphore is initialized to 13. The following operations were done in given order: 10P, 15V, 20P, 14V, 10P, 12V, 15P, 10V. Find the value of the computation.	4	L3	3	1,2
IV.	Consider a main memory with five page frames and the following sequence of page references: 3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. What can you say about the number of page faults that occur when you follow First-In-First Out (FIFO) and Least Recently Used (LRU) page replacement policies? What happens when you increase the number of page frames in First-In-First Out (FIFO) page replacement policy?	12	L3	4	1,2
	OR				
V.	(a) In the paging scheme: You have a total of 1024 pages. Main Memory is divided into 2048 frames. Assume the page size to be 1 Byte. Find the size of your page table. Are you able to load your page table into main memory frames? If not, why? Explain what can be done in such a situation with suitable examples.	7	L3	4	1,2
	(b) When does internal fragmentation occur? How does it differ from external fragmentation? Explain with an example.	5	L2	4	1,2

(Continued)

BTS–VI(R/S)–06–23–1819

			Marks	BL	CO	PO
VI.		Explain in detail on the different disk scheduling policies (any four) with an example.	12	L2	5	1,2
		OR				
VII.	(a)	Write a short note on DMA.	5	L1	5	1,2
	(b)	What are the characteristics of a real time operating system?	4	L1	7	1,2
	(c)	Find the disk size for the given data: Number of platters = 8 Number of tracks = 256. Tracks are further divided into 512 sectors where each sector holds 512 bytes of data.	3	L2	5	1,2
VIII.	(a)	Explain Banker's algorithm with an example.	7	L2	6	1,2
	(b)	You are given four number of processes and three types of resources: E, F and G. Check whether the system is deadlock free? If so, find the safe sequence.	5	L3	6	1,2

Process	Assignment E F G	Max Need E F G	Available E F G
P0	1 0 1	4 3 1	3 3 0
P1	1 1 2	2 1 4	
P2	1 0 3	1 3 3	
P3	2 0 0	5 4 1	

OR

			Marks	BL	CO	PO
IX.	(a)	Consider a system having three processes. Each requires two units of resource R. Find the minimum value of R such that no deadlock occurs.	5	L3	6	1,2
	(b)	What is the need for resource allocation graph in deadlock? Explain in detail.	7	L3	6	1,2

Blooms's Taxonomy Levels
L1 – 36.36%, L2 – 27.27%, L3 – 36.36%.

***