

## 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 × 3 = 24)

	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 × 12 = 48)

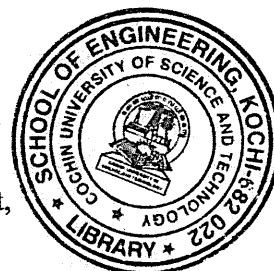
II. Consider the scenario given below:

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.)**

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		Marks	BL	CO	PO
III. (a)	<p>Consider the following C programs P1 and P2 executed on a UNIX/Linux system:</p> <pre> /* P1 */ int main { fork(); fork(); fork(); printf("Happy\n"); }  /* P2 */ int main { fork(); printf("Happy\n"); fork(); printf("Happy\n"); fork(); printf("Happy\n"); } </pre> <p>Calculate the number of times "Happy" gets displayed by P1 and P2 with suitable explanation.</p> <p>Note:</p> <p>(i) <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.</i></p> <p>(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.</p>	8	L3	1	1,2
IV.	<p>Consider a main memory with five page frames and the following sequence of page references:</p> <p>3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3.</p> <p>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?</p>	12	L3	4	1,2
<b>OR</b>					
V. (a)	<p>In the paging scheme:</p> <p>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.</p>	7	L3	4	1,2
(b)	<p>When does internal fragmentation occur? How does it differ from external fragmentation? Explain with an example.</p>	5	L2	4	1,2

(Continued)

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		Marks	BL	CO	PO
VI.	Explain in detail on the different disk scheduling policies (any four) with an example.	12	L2	5	1,2
<b>OR</b>					
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
<b>OR</b>					
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

Process	Assignment			Max Need			Available		
	E	F	G	E	F	G	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			

Blooms's Taxonomy Levels

L1 – 36.36%, L2 – 27.27%, L3 – 36.36%.

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