

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

~~July, Aug~~ ~~May June~~ 2025
 (B. Tech) Program: Computer Engineering Scheme III
~~Supp~~ Regular Examination: SY Semester: IV
 Course Code: CEC403 and Course Name: Operating systems
 Date of Exam: ~~23/5/25~~ 01-08-25 Duration: 02.5 Hours Max. Marks: 60

- Instructions:
 (1) All questions are compulsory.
 (2) Draw neat diagrams wherever applicable.
 (3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level												
Q 1	Solve any two questions out of three: (05 marks each)	10														
a)	Explain the Microkernel structure of OS with a neat diagram		CO1	U												
b)	Draw and Explain Process life cycle		CO2	U												
c)	Explain Inter Process communication with diagram		CO3	U												
Q 2	Solve any two questions out of three: (05 marks each)	10														
a)	Write a shell script for finding the factorial of a number.		CO1	U												
b)	Explain file directory structure of OS		CO5	U												
c)	Explain RAID levels		CO6	U												
Q.3	Solve any two questions out of three. (10 marks each)	20														
	Consider 6 processes with their arrival time and CPU Burst time in milliseconds as follows. Draw Gantt Chart and calculate Completion time, Average Turnaround time and Average Waiting time using FCFS and SJF non-preemptive scheduling algorithm.		CO2	AP												
<table border="1"> <thead> <tr> <th>Process</th> <th>Arrival Time</th> <th>CPU Burst Time</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>0</td> <td>6</td> </tr> <tr> <td>P2</td> <td>2</td> <td>8</td> </tr> <tr> <td>P3</td> <td>4</td> <td>7</td> </tr> </tbody> </table>		Process	Arrival Time	CPU Burst Time	P1	0	6	P2	2	8	P3	4	7			
Process	Arrival Time	CPU Burst Time														
P1	0	6														
P2	2	8														
P3	4	7														

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

~~July - Aug~~ ~~May - June~~ 2025

(B. Tech) Program: Computer Engineering Scheme III

~~Supp~~ - Regular Examination: SY Semester: IV

Course Code: CEC403 and Course Name: Operating systems

Date of Exam: ~~23/5/25~~ **01-08-25** Duration: 02.5 Hours

Max. Marks: 60

b)	<p>Consider a system with 5 processes (P0 to P4) and 3 resource types (A, B, and C). The total available instances of each resource are: A = 12, B = 10, C = 10 The Allocation matrix is given below. Calculate the need-matrix and check if the system is in safe state. Determine the total sum of each type of resource?</p> <table border="1" data-bbox="215 730 911 1010"> <thead> <tr> <th rowspan="2">PROCESS</th> <th colspan="3">ALLOCATION</th> <th rowspan="2">MAX A B C</th> <th rowspan="2">AVAILABLE A B C</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>P0</td> <td>2</td> <td>1</td> <td>2</td> <td>5 3 4</td> <td>3 4 0</td> </tr> <tr> <td>P1</td> <td>1</td> <td>1</td> <td>3</td> <td>2 2 3</td> <td></td> </tr> <tr> <td>P2</td> <td>1</td> <td>2</td> <td>1</td> <td>3 3 3</td> <td></td> </tr> <tr> <td>P3</td> <td>3</td> <td>0</td> <td>2</td> <td>4 2 2</td> <td></td> </tr> <tr> <td>P4</td> <td>2</td> <td>2</td> <td>2</td> <td>5 3 3</td> <td></td> </tr> </tbody> </table>	PROCESS	ALLOCATION			MAX A B C	AVAILABLE A B C	A	B	C	P0	2	1	2	5 3 4	3 4 0	P1	1	1	3	2 2 3		P2	1	2	1	3 3 3		P3	3	0	2	4 2 2		P4	2	2	2	5 3 3			CO3	AP
PROCESS	ALLOCATION			MAX A B C	AVAILABLE A B C																																						
	A	B	C																																								
P0	2	1	2	5 3 4	3 4 0																																						
P1	1	1	3	2 2 3																																							
P2	1	2	1	3 3 3																																							
P3	3	0	2	4 2 2																																							
P4	2	2	2	5 3 3																																							
c)	Explain Translation Look-aside Buffer (TLB) with a neat diagram. Also state the advantages and disadvantages of TLB		CO4	U																																							
Q.4	Solve any two questions out of three. (10 marks each)	20																																									
a)	Given Logical address space = 8GB, physical address space = 512MB and page size = 8KB. Find out the number of pages, number of frames, and number of entries in the page table and size of the page table.		CO4	U																																							
b)	Explain File allocation methods in detail with diagrams		CO5	U																																							
c)	Consider the following disk request sequence for a disk s 98,183,41,122,14,124,65,67 . R/W head is starting at 53 and the cylinders are numbered from 0 to 199 . Find the number of movements using FCFS disk scheduling and SSTF disk scheduling algorithm.		CO6	AP																																							
