

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

April – May 2023

(B.Tech / M.Tech.) Program: Artificial Intelligence and Data Science Scheme I/II: __ II __

Examination: SY Semester: IV

Course Code: AIC404 and Course Name: Operating System

Date of Exam: 20/05/2023

Duration: 2.5 Hours

Max. Marks: 60

Instructions:

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

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	What is a system call? State different types of system calls.	02	CO1	U
ii)	What is a PCB?	02	CO2	U
iii)	Explain resource allocation graph.	02	CO3	U
iv)	What is the effect of page size on the performance of an OS?	02	CO4	U
v)	What is a file? What are various operations of the file.	02	CO5	U
vi)	Define seek time and rotational latency in disk scheduling.	02	CO6	U
vii)	What is the critical section problem? State various solutions to Critical Section Problem.	02	CO3	U
viii)	What is thrashing?	02	CO4	U
Q.2	Solve any four questions out of six.	16		
i)	Define OS. Explain various functions of the OS.	04	CO1	U
ii)	What is multithreading? With suitable diagrams explain its models.	04	CO2	U
iii)	Define deadlock. Explain necessary conditions for occurrence of deadlock.	04	CO3	U
iv)	Explain various memory allocation strategies in dynamic partition.	04	CO4	U
v)	List various file directory structures. Explain any one in detail.	04	CO5	U

2

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

April – May 2023

(B.Tech / M.Tech.) Program: Artificial Intelligence and Data Science Scheme I/II: II

Examination: SY Semester: IV

Course Code: AIC404 and Course Name: Operating System

Date of Exam: 20/05/2023

Duration: 2.5 Hours

Max. Marks: 60

vi)	Write a short note on DMA.	04	CO6	U																		
Q.3	Solve any two questions out of three.	16																				
i)	Explain in detail monolithic and layered OS structure.	08	CO1	U																		
ii)	Calculate number of page faults and page hits for the page replacement policies FIFO, Optimal and LRU for given reference string 6, 0, 5, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 5, 2, 0, 5, 6, 0, 5 (assuming three frame size).	08	CO4	Ap																		
iii)	Explain file access methods with suitable diagrams.	08	CO5	U																		
Q.4	Solve any two questions out of three.	16																				
i)	Consider the following set of processes, with the length of the CPU burst given in milliseconds: <table border="1"> <thead> <tr> <th>Process</th> <th>Priority</th> <th>Burst Time</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>3</td> <td>10</td> </tr> <tr> <td>P2</td> <td>1</td> <td>1</td> </tr> <tr> <td>P3</td> <td>3</td> <td>2</td> </tr> <tr> <td>P4</td> <td>4</td> <td>1</td> </tr> <tr> <td>P5</td> <td>2</td> <td>5</td> </tr> </tbody> </table> <p>The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.</p> <p>a. Draw Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, Non-preemptive priority (a smaller priority number implies a higher priority).</p> <p>b. What is the turnaround time and waiting time of each process for each of the scheduling algorithms in part a?</p> <p>c. Calculate total TAT and AWT.</p>	Process	Priority	Burst Time	P1	3	10	P2	1	1	P3	3	2	P4	4	1	P5	2	5	08	CO2	Ap
Process	Priority	Burst Time																				
P1	3	10																				
P2	1	1																				
P3	3	2																				
P4	4	1																				
P5	2	5																				

April – May 2023

(B.Tech / M.Tech.) Program: Artificial Intelligence and Data Science Scheme I/II: __ II __

Examination: SY Semester: IV

Course Code: AIC404 and Course Name: Operating System

Date of Exam: 20/05/2023

Duration: 2.5 Hours

Max. Marks: 60

ii)	<p>Considering a system with five processes P_0 through P_4 and three resources of type A, B, C. Suppose at time t_0 following snapshot of the system has been taken:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Processes</th> <th>Allocation</th> <th>Max</th> <th>Available</th> </tr> <tr> <th>A B C</th> <th>A B C</th> <th>A B C</th> </tr> </thead> <tbody> <tr> <td>P0</td> <td>1 1 2</td> <td>4 3 3</td> <td>2 1 0</td> </tr> <tr> <td>P1</td> <td>2 1 2</td> <td>3 2 2</td> <td></td> </tr> <tr> <td>P2</td> <td>4 0 1</td> <td>9 0 2</td> <td></td> </tr> <tr> <td>P3</td> <td>0 2 0</td> <td>7 5 3</td> <td></td> </tr> <tr> <td>P4</td> <td>1 1 2</td> <td>1 1 2</td> <td></td> </tr> </tbody> </table> <p>a. What will be the content of the Need matrix? b. Is the system in a safe state? If Yes, then what is the safe sequence?</p>	Processes	Allocation	Max	Available	A B C	A B C	A B C	P0	1 1 2	4 3 3	2 1 0	P1	2 1 2	3 2 2		P2	4 0 1	9 0 2		P3	0 2 0	7 5 3		P4	1 1 2	1 1 2		08	CO3	Ap
Processes	Allocation		Max	Available																											
	A B C	A B C	A B C																												
P0	1 1 2	4 3 3	2 1 0																												
P1	2 1 2	3 2 2																													
P2	4 0 1	9 0 2																													
P3	0 2 0	7 5 3																													
P4	1 1 2	1 1 2																													
iii)	Discuss various disk scheduling algorithms with examples.	08	CO6	U																											
