AI-DS Extra

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

May-June 2024
(B.Tech / M.Tech.) Program: B.Tech. (Artificial Intelligence and Data Science) Scheme I/II/IIB/III: IIB
Regular/Supplementary Examination: SY Semester: IV
Course Code: AIC 404 and Course Name: Operating System
Date of Exam:21/05/2024 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)	Explain Process creation using fork () system call.	2	CO 1	U
ii)	List types of scheduling algorithms and briefly define anyone.	2	CO 2	R
iii)	Explain thread with help of suitable examples.	2	CO 2	U
iv)	What is Interprocess Communication?	2	CO 3	U
v)	What are the four conditions that create deadlock?	2	CO 3	U
vi)	Explain the concept of virtual memory.	2	CO 4	U
vii)	What are typical operations that may be performed on a directory?	2	CO 5	U
viii)	What delay elements are involved in a disk read or write?	2	CO 6	U
Q.2	**Solve any four questions out of six.**	**16**		
i)	What is OS? What is the need of an OS? Discuss major functions of OS with examples?	4	CO 1	U
ii)	Describe the differences among short-term, medium term and long-term scheduling.	4	CO 2	U
iii)	What is the wait() and signal() in semaphore?	4	CO 3	U
iv)	Explain two level paging schemes with suitable diagrams.	4	CO 4	U
v)	Explain in detail different types of file organizations in detail?	4	CO 5	U

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<table>
<tr><td>vi)</td><td>What is the difference between block-oriented devices and stream oriented devices? Give a few examples of each.</td><td>4</td><td>CO 6</td><td>U</td></tr>
<tr><td>Q.3</td><td>Solve any two questions out of three.</td><td>16</td><td></td><td></td></tr>
<tr><td>i)</td><td>List types of operating system structures and explain them with suitable diagrams.</td><td>8</td><td>CO 1</td><td>U</td></tr>
<tr><td>ii)</td><td>Considering a system with four processes P_0 through P_3 and three resources of type A, B, C. Suppose at time t_0 following snapshot of the system has been taken:
<table>
<tr><td></td><td colspan="3">Allocation Matrix</td><td colspan="3">Max Matrix</td><td colspan="3">Available Matrix</td></tr>
<tr><td></td><td>A</td><td>B</td><td>C</td><td>A</td><td>B</td><td>C</td><td>A</td><td>B</td><td>C</td></tr>
<tr><td>P0</td><td>2</td><td>1</td><td>0</td><td>8</td><td>6</td><td>3</td><td>4</td><td>3</td><td>2</td></tr>
<tr><td>P1</td><td>1</td><td>2</td><td>2</td><td>9</td><td>4</td><td>3</td><td colspan="3" rowspan="3"></td></tr>
<tr><td>P2</td><td>0</td><td>2</td><td>0</td><td>5</td><td>3</td><td>2</td></tr>
<tr><td>P3</td><td>3</td><td>0</td><td>1</td><td>4</td><td>2</td><td>3</td></tr>
</table>
a. What will be the content of the Need matrix?
b. Calculate total number of resources?
c. Is the system in a safe state? If Yes, then what is the safe sequence?</td><td>8</td><td>CO 3</td><td>Ap</td></tr>
<tr><td>iii)</td><td>Explain file access methods with suitable diagrams.</td><td>8</td><td>CO 5</td><td>U</td></tr>
<tr><td>Q.4</td><td>Solve any two questions out of three.</td><td>16</td><td></td><td></td></tr>
<tr><td>i)</td><td>Discuss round robin scheduling policy with its merits and demerits. What is the impact of the quantum of time slice on the system performance?</td><td>8</td><td>CO 2</td><td>U</td></tr>
<tr><td>ii)</td><td>What is the need of page replacement? Consider the following reference string 9, 0 , 1 ,3 ,0,4,0,4,5,7,9,3,0,3,6,1,2,3,1,2,0,1.
Find the number of Page Faults with FIFO, optimal page replacement and LRU with four frames. Which algorithm gives the minimum number of page faults.</td><td>8</td><td>CO 4</td><td>Ap</td></tr>
<tr><td>iii)</td><td>Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO is ordered as 80, 1470, 913, 1777, 948, 1022, 1750,130. What is the total distance that the disk arm moves for following by applying FCFS, SSTF, LOOK and SCAN algorithms?</td><td>8</td><td>CO 6</td><td>Ap</td></tr>
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