SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in AIML & AIDS **Academic Year: 2022** **Duration: 3 hours**

Date: 27.01.2023
Time: 09:00 am to 12:00 pm
Subject: Operating Systems (Semester III) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the questionpaper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 pages.
2. **All Questions are Compulsory**.
3. **Answer to each new question is to be started on a fresh page.**
4. **Figures in the brackets on the right indicate full marks.**
5. **Assume suitable data wherever required, but justify it.**
6. Draw the neat labelled diagrams, wherever necessary.

<table>
<tr><th>Question No.</th><th></th><th>Max. Marks</th></tr>
<tr><td>Q1 (a)</td><td>Differentiate between multiprogramming and Timesharing operating systems.

OR

Brief the file access methods.</td><td>[05]

[05]</td></tr>
<tr><td>Q1 (b)</td><td>Define the concept of multithreading. Explain user level and kernel level threads in detail.</td><td>[10]</td></tr>
<tr><td>Q2 (a)</td><td>Differentiate between fixed and variable partitioning techniques.

OR
What is the role of monitor in concurrency control? Draw a diagram depicting the structure of monitor.</td><td>[05]

[05]</td></tr>
<tr><td>Q2 (b)</td><td>Consider the following set of processes, with length of CPU bursts given in Millisecond as follows:

<table>
<tr><th>Process</th><th>Burst Time</th><th>Arrival time</th><th>Priority</th></tr>
<tr><td>P1</td><td>8</td><td>0</td><td>3</td></tr>
<tr><td>P2</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>P3</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>P4</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td>P5</td><td>6</td><td>4</td><td>4</td></tr>
</table>
1. Draw the Gantt Charts for FCFS, SJF, Preemptive priority and Round Robin(Quantum=2)
2. What is the turnaround time of each process for above algorithm?</td><td>[10]</td></tr>
</table>

3. What is the waiting time of each process for each of the above algorithm?
4. Which algorithm results in minimum average waiting time.

Q3 (a) What is virtual memory? Explain the role of paging and segmentation in virtual memory. [10]

Q3 (b) Define the following terms: [05]

a. Mutual Exclusion
b. Starvation
c. Race Condition
d. Critical Section
e. Deadlock

OR

Explain the five-process states with a neat transition diagram [05]

Q4 (a) Using the banker's algorithm, determine whether or not each of the following states is unsafe. If the state is safe, illustrate the order in which the threads may complete. Otherwise, illustrate why the state is unsafe. [10]

• Available = (4, 2, 5, 3)

Process	Allocation				Max			
	A	B	C	D	A	B	C	D
P0	1	2	0	2	4	3	2	6
P1	0	1	1	2	2	4	1	4
P2	0	2	4	0	3	6	5	1
P3	1	2	0	1	2	6	2	4
P4	1	0	0	2	3	1	1	3

OR

i. Explain memory management requirements

ii. Given Memory Partition = 150 KB, 500 KB, 200 KB, 300 KB, and 550 KB (in order), how would each of the best fit, first fit and worst fit algorithm place processes of size 220 KB, 430 KB, 110 KB & 425 KB (in order)? [05] [05]

Q4 (b) Compare test-set and swap instruction sets. [05]

Q5 (a) Compare and Contrast FCFS, SSTF, SCAN, CSCAN disk scheduling algorithms. [10]

Q5 (b) Brief the concept of Resource Allocation Graph with a neat diagrammatic representation. [05]

OR

Write the pseudocode for Readers Writers problem and brief how it can be solved with semaphore. [05]