Parshvanath Charitable Trust's
A. P. SHAH INSTITUTE OF TECHNOLOGY
(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)
(Religious Jain Minority)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATA SCIENCE

UNIT TEST-I

Class: SE **Semester: IV** **Subject: Operating System**

Date:28/02/2023 **Time:2.00 PM to 3.30 PM** **Max marks: 40**

Note the following instructions

1. **Attempt all questions.**
2. **Draw neat diagrams wherever necessary.**
3. **Write everything in Black ink (no pencil) only.**
4. **Assume data, if missing, with justification.**

<table>
<tr><th>Q1</th><th>Attempt any two</th><th>Marks</th><th>CO</th><th>Blooms Taxonomy Level</th><th>PO</th></tr>
<tr><td></td><td>A] Define operating system and explain the functions of operating system.</td><td>[5]</td><td>CO1</td><td>L2</td><td>-</td></tr>
<tr><td></td><td>B] Explain layered structure and microkernel structure of operating system with appropriate diagrams.</td><td>[5]</td><td>CO1</td><td>L2</td><td>-</td></tr>
<tr><td></td><td>C] Write a detailed note on system calls.</td><td>[5]</td><td>CO1</td><td>L2</td><td>-</td></tr>
<tr><td></td><td>D] Explain the following terms with diagram
a) Kernel
b) Shell</td><td>[5]</td><td>CO1</td><td>L2</td><td>-</td></tr>
<tr><td>Q2</td><td>Attempt any two</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>A] Apply Round Robin (with time Quantum=2) algorithm and Priority Scheduling (Non-Preemptive) algorithm to solve the following:
<table>
<tr><th>Process</th><th>Arrival Time</th><th>Priority</th><th>Burst Time</th></tr>
<tr><td>P1</td><td>0</td><td>10</td><td>5</td></tr>
<tr><td>P2</td><td>1</td><td>20</td><td>4</td></tr>
<tr><td>P3</td><td>2</td><td>30</td><td>2</td></tr>
<tr><td>P4</td><td>4</td><td>40</td><td>1</td></tr>
</table>
Draw the Gantt chart for the execution of the processes, showing their start time and end time. Calculate average waiting time (AWT) and Average Turnaround Time (ATAT).</td><td>[10]</td><td>CO2</td><td>L3</td><td>PO1</td></tr>
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<tr><td></td><td>B] Sketch 7 State process model and illustrate the states in which a process can be in, and also define the flow in which a particular state can be achieved by the Process.</td><td>[10]</td><td>CO2</td><td>L3</td><td>PO1</td></tr>
<tr><td></td><td>C] Compare user level threads and kernel level threads with example.</td><td>[10]</td><td>CO2</td><td>L3</td><td>PO1</td></tr>
<tr><td>Q3</td><td>Attempt any one</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>A] Demonstrate Bankers Algorithm and consider the following system snapshot using data structures in the Banker’s algorithm.
<table>
<tr><th>Process</th><th colspan="4">Allocation</th><th colspan="4">Max</th><th colspan="4">Available</th></tr>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>A</th><th>B</th><th>C</th><th>D</th><th>A</th><th>B</th><th>C</th><th>D</th></tr>
<tr><td>P0</td><td>0</td><td>0</td><td>1</td><td>2</td><td>0</td><td>0</td><td>1</td><td>2</td><td>1</td><td>5</td><td>2</td><td>0</td></tr>
<tr><td>P1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>7</td><td>5</td><td>0</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P2</td><td>1</td><td>3</td><td>5</td><td>4</td><td>2</td><td>3</td><td>5</td><td>6</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P3</td><td>0</td><td>6</td><td>3</td><td>2</td><td>0</td><td>6</td><td>5</td><td>2</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P4</td><td>0</td><td>0</td><td>1</td><td>4</td><td>0</td><td>6</td><td>5</td><td>6</td><td></td><td></td><td></td><td></td></tr>
</table>
Apply Banker’s Algorithm and answer the following questions:
1. How many resources to type A, B, C and D are there?
2. What are the contents of Need matrix?
3. Determine whether the system is in safe state. If yes then state the safe sequence.</td><td>[10]</td><td>CO3</td><td>L3</td><td>PO1</td></tr>
<tr><td></td><td>B] Demonstrate Producer Consumer problem and discover the solution to it using semaphores.</td><td>[10]</td><td>CO3</td><td>L3</td><td>PO1</td></tr>
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