Vivekananda College of Engineering & Technology,Puttur
[A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]
Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08	Rev 1.10	CSE	20/06/2021

CONTINUOUS INTERNAL EVALUATION- 2

Dept:CSE	Sem / Div:4th A&B	Sub:**Operating Systems**	S Code:**18CS43**
Date:25/06/2021	Time: 9:30-11:00 am	Max Marks: 50	Elective:N
Note: Answer any 2 full questions, choosing one full question from each part.			

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<table>
<tr><th colspan="2">Q N</th><th>Questions</th><th>Marks</th><th>RBT</th><th>COs</th></tr>
<tr><td colspan="2"></td><td>PART A</td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>a</td><td>Using Banker's algorithm determine whether the following system is in a safe state.
<table>
<tr><th rowspan="2">Process id</th><th colspan="3">Allocation</th><th colspan="3">Max</th><th colspan="3">Available</th></tr>
<tr><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th><th>A</th><th>B</th><th>C</th></tr>
<tr><td>P_0</td><td>0</td><td>0</td><td>2</td><td>0</td><td>0</td><td>4</td><td>1</td><td>0</td><td>2</td></tr>
<tr><td>P_1</td><td>1</td><td>0</td><td>0</td><td>2</td><td>0</td><td>1</td><td></td><td></td><td></td></tr>
<tr><td>P_2</td><td>6</td><td>3</td><td>2</td><td>8</td><td>4</td><td>2</td><td></td><td></td><td></td></tr>
<tr><td>P_3</td><td>1</td><td>3</td><td>5</td><td>1</td><td>3</td><td>7</td><td></td><td></td><td></td></tr>
<tr><td>P_4</td><td>1</td><td>4</td><td>3</td><td>1</td><td>5</td><td>7</td><td></td><td></td><td></td></tr>
</table>
i) Find NEED Matrix.
ii) Find safe sequence for the above snapshot.
iii) If a request for P_3(0, 0, 1) arrives, can it be granted immediately?</td><td>10</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>b</td><td>i) What are the necessary conditions to be hold good for a deadlock to occur? Explain.
ii) Define Resource Allocation Graph. Draw Resource Allocation Graph for the following scenario and check for the existence of deadlock. If there exists deadlock, write the sequence of processes and resource types involved in deadlock.
P={P_1, P_2, P_3, P_4}, R={R_1,R_2,R_3} and Process states are defined as follows:
P_1 is holding an instance of Resource type R_2 and is waiting for an instance of resource type R_1.
Process P_2 holding an instance of Resource type R_1 and is waiting for an instance of resource type R_2 and R_3.
Process P_3 is holding an instance of Resource type R_3 and is waiting for an instance of resource type R_2
Process P_4 is holding an instance of Resource type R_3</td><td>8</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>c</td><td>Illustrate with example, the Peterson's solution for critical section problem and prove that the mutual exclusion property is preserved.</td><td>7</td><td>L2</td><td>CO2</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>2</td><td>a</td><td>Using Banker's algorithm determine whether the following system is in a safe state.</td><td>10</td><td>L3</td><td>CO3</td></tr>
</table>

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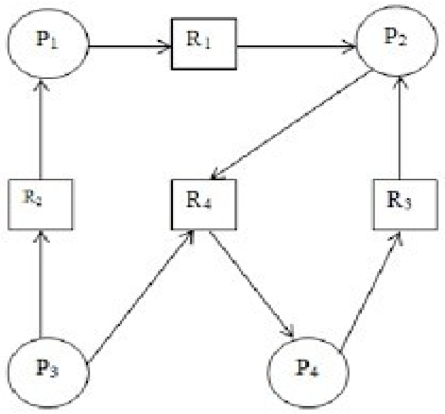
<table>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="2">Process id</td><td colspan="3">Allocation</td><td colspan="3">Max</td><td colspan="3">Available</td></tr>
<tr><td>A</td><td>B</td><td>C</td><td>A</td><td>B</td><td>C</td><td>A</td><td>B</td><td>C</td></tr>
<tr><td>P_0</td><td>0</td><td>1</td><td>0</td><td>7</td><td>4</td><td>3</td><td>2</td><td>3</td><td>0</td></tr>
<tr><td>P_1</td><td>3</td><td>0</td><td>2</td><td>0</td><td>2</td><td>0</td><td></td><td></td><td></td></tr>
<tr><td>P_2</td><td>3</td><td>0</td><td>2</td><td>6</td><td>0</td><td>0</td><td></td><td></td><td></td></tr>
<tr><td>P_3</td><td>2</td><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td></tr>
<tr><td>P_4</td><td>0</td><td>0</td><td>2</td><td>4</td><td>3</td><td>3</td><td></td><td></td><td></td></tr>
</table>
i) Find NEED Matrix.
ii) Find safe sequence for the above snapshot.
iii) If a request for P_0 (0, 2, 0) arrives, can it be granted immediately?
</td><td></td><td></td><td></td></tr>
<tr><td></td><td>b</td><td>i) Existence of cycle in Resource Allocation Graph indicates a deadlock. Yes or No? Justify your answer with example.
ii) Define wait -for graph with example. Convert the following Resource Allocation Graph to wait-for graph.


</td><td>8</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>c</td><td>What is a Monitor? Explain the solution to the classical Dining Philosopher's Problem, using Monitor.</td><td>7</td><td>L2</td><td>CO2</td></tr>
<tr><td colspan="6">PART B</td></tr>
<tr><td>3</td><td>a</td><td>What are Translation load aside buffer (TLB)? Explain TLB in detail with a simple paging system with a neat diagram.</td><td>10</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>b</td><td>Following is a system using simple segmentation. Logical address is given in the following segment table.
<table>
<tr><th>Segment</th><th>Base</th><th>Length(limit)</th></tr>
<tr><td>0</td><td>330</td><td>124</td></tr>
<tr><td>1</td><td>876</td><td>211</td></tr>
<tr><td>2</td><td>111</td><td>99</td></tr>
<tr><td>3</td><td>498</td><td>302</td></tr>
</table>
Compute the physical addresses for each of the logical address given</td><td>8</td><td>L3</td><td>CO3</td></tr>
</table>

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<table>
<tr><td></td><td></td><td>in the table. Segment number and offset are given in the table below. If the address generates a segment fault, indicate it as “Segmentation fault”.
<table>
<tr><th>Segment Number</th><th>Offset</th></tr>
<tr><td>1</td><td>247</td></tr>
<tr><td>3</td><td>300</td></tr>
<tr><td>2</td><td>85</td></tr>
<tr><td>0</td><td>114</td></tr>
</table>
</td><td></td><td></td><td></td></tr>
<tr><td></td><td>c</td><td>Write a note on Race Condition. What are the requirements for Critical Section Problem? Explain.</td><td>7</td><td>L2</td><td>CO2</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>4</td><td>a</td><td>What are the principles behind paging? Explain its operation, clearly indicating how the logical address are converted to physical address.</td><td>10</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>b</td><td>Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order), how would each of the first fit, best fit and worst fit algorithms place processes of 232KB, 437KB, 132KB and 456KB?</td><td>8</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>c</td><td>Explain semaphores with its types and implementation.</td><td>7</td><td>L2</td><td>CO2</td></tr>
</table>