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| **Name:**<br>**Enrolment No:** | |

**UPES**

**End Semester Examination, May 2024**

**Course: Operating Systems** **Semester: II**

**Program: MCA** **Time: 03 hrs.**

**Course Code: CSEG 7016** **Max. Marks: 100**

**Instructions:**

1. **Attempt all the questions wisely.**
2. **All questions in section A, B and C are compulsory.**
3. **However, an internal choice to attempt any one question has given in question 9 of section B and question 11 of section C.**

**SECTION A**
**(5Qx4M=20Marks)**

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Explain the difference between cooperating process and independent process. Also list how different inter process communication methods. | **4** | **CO2** |
| Q 2 | Discuss file, file attributes and file system in OS. | **4** | **CO5** |
| Q 3 | Enlighten the term internal and external fragmentation. | **4** | **CO4** |
| Q 4 | Describe the resource allocation graph and its usage in OS. | **4** | **CO3** |
| Q 5 | Discuss multithreading and its advantage over process. | **4** | **CO1** |
| | **SECTION B**<br>**(4Qx10M= 40 Marks)** | | |
| Q 6 | Discuss the condition to be followed for achieving process synchronization. Also explain the term critical section. | **10** | **CO2** |
| Q 7 | Explain virtual memory and page fault with reference to memory management. | **10** | **CO4** |
| Q 8 | Consider a system has N process and 6 tape drivers. Each process requires 3 tape drivers to complete their execution. Then what is the maximum value of N which ensure deadlock free operation. | **10** | **CO3** |
| Q 9 | Suppose a disk drive has 400 cylinders, numbered 0 to 399.The driver is currently serving a request at cylinder 143 and previous request was at cylinder 125. The queue of pending request in FIFO order is: 86,147,312,91,177,48,309,222,175,130. Starting from the current head position what is the total distance in cylinders that the disk to satisfy all the pending request for each of the following disk scheduling algorithms?<br>A] SSTS B] SCAN C] C-SCAN<br>**OR**<br>Explain the following concepts. | **10** | **CO5, CO1** |

<table>
<tr><td></td><td>A) Distributed Operating system<br>B) Real time operating system<br>C) Embedded operating system</td><td></td><td></td></tr>
<tr><td colspan="4">SECTION-C<br>(2Qx20M=40 Marks)</td></tr>
<tr><td>Q 10</td><td>Consider a paged memory system with 32-bit logical address, 64 MB physical address space and 4KB size page. Furthermore, each page table entry contains an additional 1 bit for valid/invalid bit and 1 bit for memory protection besides frame number. Then calculate the following.<br>A) Bits in page offset<br>B) Number of pages in process<br>C) Bits for page number<br>D) Number of frames in physical memory<br>E) Bits for frame<br>F) Page table size.<br>Further explain why there is need of paging in memory management technique. Also explain how and which type of fragmentation occurs in paging.</td><td>20</td><td>CO4</td></tr>
<tr><td>Q 11</td><td>Consider the following system with 5 processes and 4 resources. A has total of 3 instances, B has 14 instances, C has 12 instances and D has 12 instances. In the table given below, column entry from 2 to 5 denotes the current resource allocation to each process and last four column represent the maximum resource required by a process of each type to complete.<br><br>
<table>
<tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>A</td><td>B</td><td>C</td><td>D</td></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></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></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></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></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></tr>
</table>
Answer the following questions using banker’s algorithm:<br>A) What are contents of remaining need matrix?<br>B) Is the system in a safe state? If yes, provide the different safe sequence (at least 2) if more than one safe sequence is possible.<br>C) If request for process p1 arrives for (0,4,2,0). Can the request be granted immediately?<br>OR<br>Explain the following concepts.<br>A) Linked File allocation.<br>B) Convoy Effect<br>C) Race Condition<br>D) Operating system functions</td><td>20</td><td>CO1, CO2, CO3, CO5</td></tr>
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