Name:

Enrolment No:

UPES

End Semester Examination, May 2025

Course: Operating Systems **Semester: IV**

Program: BCA_BSC All Program **Time: 03 hrs.**

Course Code: CSEG 2060 **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**	**CO4**
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 advantages over process.	**4**	**CO1**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Discuss the conditions to be followed for achieving process synchronization. Also explain the critical term section.	**10**	**CO2**
Q 7	Explain the following concepts. A) Real-time operating system B) Embedded operating system.	**10(5+5)**	**CO1**
Q 8	Consider a system that 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 requests 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? A] SSTS B] SCAN	**10(5+5)**	**CO4**

<table>
<tr><td></td><td>OR
Explain virtual memory and page fault with reference to memory management</td><td>OR
10</td><td></td></tr>
<tr><td colspan="4">SECTION-C
(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.
A) Bits in page offset
B) Number of pages in process
C) Bits for page number
D) Number of frames in physical memory
E) Bits for frame
F) Page table size.
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 a 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 the last four columns represent the maximum resource required by a process of each type to complete.
<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:
A) What are contents of remaining need matrix?
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.
C) If request for process p1 arrives for (0,4,2,0). Can the request be granted immediately?
OR
Explain the following concepts.
A) Livelock
B) Convoy Effect
C) Race Condition
D) Operating system functions</td><td>20(10+5+5)
OR
20(5+5+5+5)</td><td>CO1, CO2, CO3</td></tr>
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