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Vellore Institute of Technology
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SLOT - D1

SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

CONTINUOUS ASSESSMENT TEST – II - WINTER SEMESTER 2019-2020

Programme Name & Branch: B.TECH IT **Class Number(s):** VL2019205004455

Course Name Code: ITE2002 **Course Name: Operating System**

Faculty Name(s): Dr. P.J.Kumar Dr. S.Sudha **Exam Mode: Closed book**

Semester: Winter 19-20

Exam Duration: 90 mins **Maximum Marks: 50**

S.No.	Question
1.	

ID	P1	P2	P3	P4	P5	P6
Size	40	20	60	30	50	75
Hole	1	2	3	4	5	6
Size	70	40	60	50	30	80

Given a set of processes and free holes as in the above table,

i) Apply first fit, best fit and worst fit algorithms to allocate processes into holes. (4 marks)

ii) Calculate the total amount of externally fragmented memory in each allocation scheme. (2 marks)

Iii) What happens if we partition the holes into equal size and allocate the required number of holes to processes? Does it cause external fragmentation still? (2 marks)

iv) Briefly discuss on the role of compaction in the above scenario (2 marks)

2. a) Identify the essential conditions to be met by a synchronization algorithm. (2 Marks)

b) Illustrate with a pseudocode the synchronization using Peterson solution between two processes which attempts to update a file named "weather.DB" in their critical section. Assume that the processes are going to write the process id, current time stamp and temperature measured to the file "weather.DB". (6 Marks)

c) Justify whether the above solution satisfies all the necessary conditions for synchronization algorithm. (2 marks)

3. Resource Types: A(15), B(10), C(10)

Consider the following snapshot.

Process	Allocation		Max		Available	
	A	B	A	B	A	B

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Allocation Max Available

	A	B	C	A	B	C	A	B	C
P1	2	1	2	3	3	3	3	2	1
P2	1	3	2	5	7	8			
P3	2	0	2	3	2	3			
P4	3	1	1	5	3	3			
P5	4	3	2	4	5	3			

a) Calculate the total number of resources/instances currently allocated to all processes and currently available resources/instances. (1 Mark)

b) Calculate the need matrix (1 Mark)

c) Find whether the system is in safe state or not. (4 Marks)

d) If P2 request for (3, 2, 1), is it a valid request and can it be granted immediately? Provide the safe sequence if it can be granted. (4 Marks)

4. i) Calculate the number of bits required for pages and offset for the following cases. Derive sample address ranges for each case. (5 Marks)

8KB Address space is divided into pages of size 512 bytes.

64KB address space is divided into pages of size 512 bytes

ii) What is a semaphore? Illustrate with an example implementation of semaphores with no busy waiting. (5 Marks)

5 **3 1 2 0 4 5 1 2 6 7 3 0 1**

For the above page reference string, calculate the number of page faults for each of the following page replacement algorithms with frame count as 3 and 5.

i) FIFO ii)OPR iii) LRU