VIT
Vellore Institute of Technology

Continuous Assessment Test-II – March 2023

Programme	: B.Tech(CSE)	Semester	: Winter 22-23
Course	:	Code	: BCSE303L
	Operating Systems	ClassNbr	: CH2022235000822 CH2022235000826 CH2022235000830 CH2022235000831 CH2022235000829 CH2022235000828
Faculty	: R. K. Singh, L. Shyamala, Bharathiraja S, Abdul Quadir Md, Pradeep K, & M. Sivagami	Slot	: F2+TF2
		Max. Marks	: 50
Time	: 90 Minutes		

Mark

Answer all Questions

1.

a) Consider an University with the following five departments: CSE, ECE, EEE, Civil & Mech. There are a total of 10 projectors, 12 printers, and 8 scanners available in the University. Each department has its own requirement on the above mentioned resources which is dynamic over time based on the demand. But, the maximum number of resources that each department can utilize at any point in time is restricted by the overall administrator and it is given below.

Dept.	Projectors	Printers	Scanners
CSE	4	2	1
ECE	5	2	5
EEE	2	3	1
Civil	1	4	2
Mech.	3	6	6

At present, the CSE department is allocated with 2 projectors. ECE department is allocated with 3 projectors, 1 printer and 2 scanners. EEE department is allocated with 2 projectors and 1 printer. Civil department is allocated with 1 projector, 3 printers and 1 scanner, and the Mechanical department is allocated with 1 projector, 4 printers and 3 scanners.

i. Ilustrate that the current allocation is safe or not, by demonstrating an order in which the departments may be served. (4 marks)

ii. If the Mech. department requests for 2 printers and 2 scanners can the request be granted immediately? Justify.(4 marks)

iii. If the CSE department requests for 1 printer and 1 scanner, will it be possible for the administrator to grant immediately? Justify.(4 marks)

b) There are seven friends staying in a house. They planned to prepare food, each one preparing a unique dish. To prepare the dish apart from the ingredients, they need certain kitchen items (resources); only one resource of each type is available, they are plate, spoon, knife, oven and a pressure cooker. All the friends like to prepare the dish at the same time in parallel. Assume that the friends are named as Raj, John, Anil, Kiran, Sunil, Kumar and Victor. Following is the state with the resource they are holding and requesting.

- Raj is holding Plate and want a pressure cooker.
- John holds nothing but want a spoon
- Anil holds nothing but want a knife.

- Kiran holds oven and wants a knife and spoon.
- Sunil holds spoon and want a pressure cooker.
- Kumar holds Knife and want a spoon.
- Victor holds pressure cooker and want oven.

For the above scenario:
  i.   Sketch the Resource Allocation Graph(RAG). (2 Marks)
  ii. Draw the wait for graph for the above RAG, check whether the state is in deadlock or not and do the recovery for deadlock if any.(6 Marks)

2.	Consider two processes P1 & P2 on a system. P1 has high priority over P2. Both P1 & P2 share a single memory address space. Assume Peterson's solution is used for providing mutual exclusive access to the shared memory space. The request for the shared resource by P1 and P2 should follow an order as P1 then P2. Modify the pseudo code of Peterson's solution to include ordering. Justify your answer.	10

3	a)	Consider a main memory in the system with 8 partitions, where 4 partitions are already loaded with user processes and remaining four partitions are free. The memory map of the system is given below:	10

300 MB	750 MB	2000 MB	1500 MB	1000 MB	2500 MB	2800MB	3500 MB

The processes with different sizes have to be loaded into the main memory at Time T_0 are given as (in order): 1550MB, 600MB, 200MB, and 2750MB. Implement the partition allocation strategies for the given input and determine which strategy can optimally satisfy this requirements. Justify your answer with a proper explanation. At Time T_1 a new process makes a request of 2250 MB. Will it be allocated, if all the previous processes are utilising memory for the above mentioned memory map. Justify your answer for request at T_1.

Note: the free partitions are 750MB, 1500MB, 2500MB and 3500MB and remaining partitions are in use by other processes.For the above mentioned scenario in (a), will it cause fragmentation? Discuss a solution if fragmentation occurs. (7 Marks)

b) Explain with diagram how the memory protection is ensured by OS. The process P1 is demanding for a variable to be printed from a memory space of 2823, provided the base register value of P1 is 2500 and the limit register is 550, is it possible? Justify.(3 Marks)

4.	There are 33 total tickets available in server. Now Mr. Amal wants to book 5 tickets and Ms. Githa wants to cancel 3 tickets at the same time. Two persons are doing reservation and cancellation concurrently with out synchronization. So discuss the possible data inconsistency in this scenario with the help of appropriate pseudo code or program. Also provide any two solutions for this scenario to achieve data consistency. Write the solutions as pseudo code or program for this scenario and justify your answer. Also discuss the constraints or disadvantages of your suggested solutions and how will you overcome the same.	10