Name:

Enrolment No:

UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

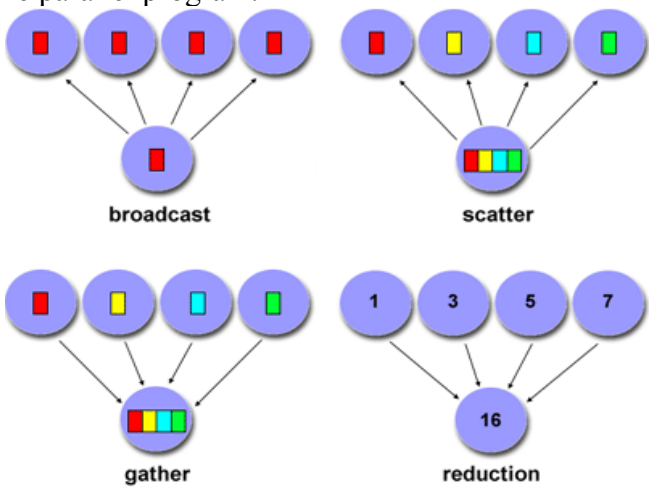
Course: M.Tech CFD **Semester: II**
Program: High Performance and Parallel Computing CFD **Time 03 hrs.**
Course Code: ASEG7030 **Max. Marks: 100**

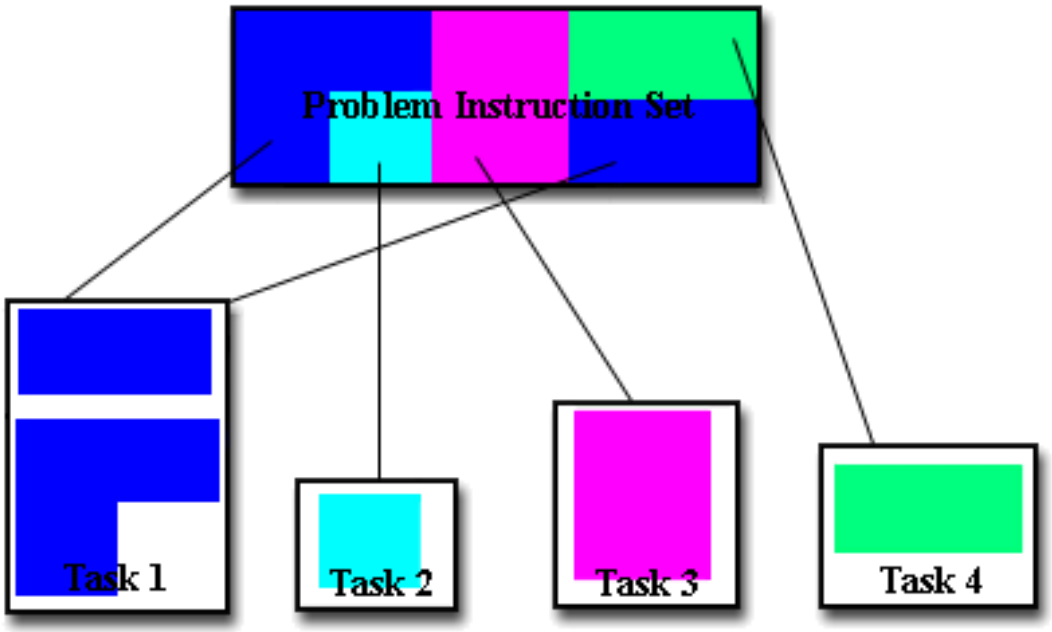
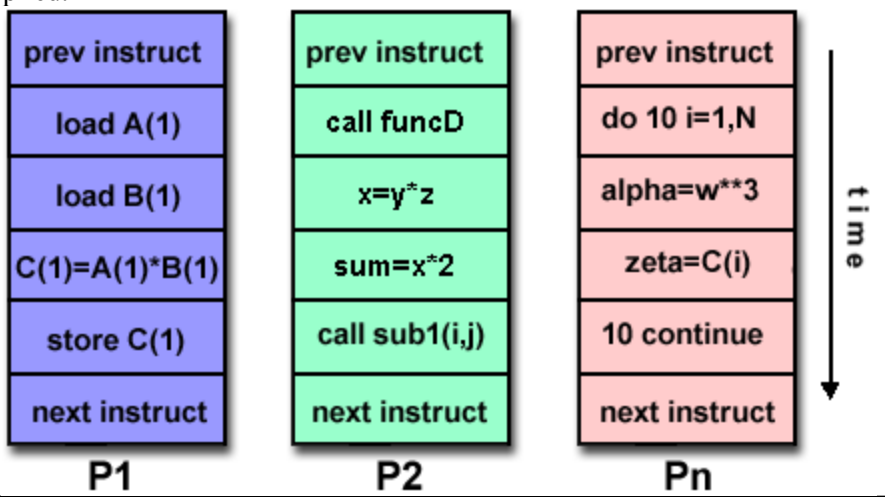
Instructions:
1. Attempt all questions
2. Section B is having internal choice
3. Section C is having internal choice

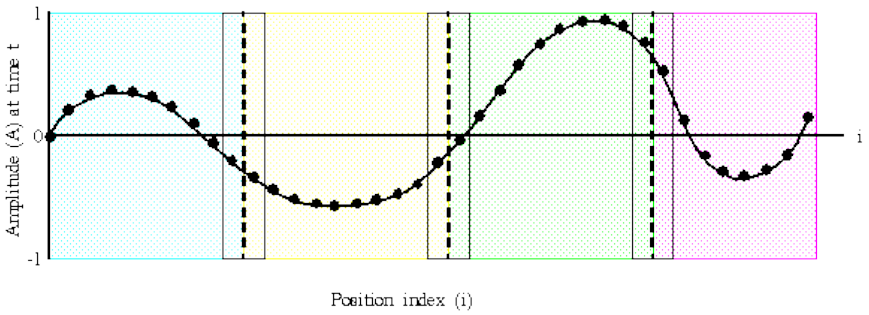
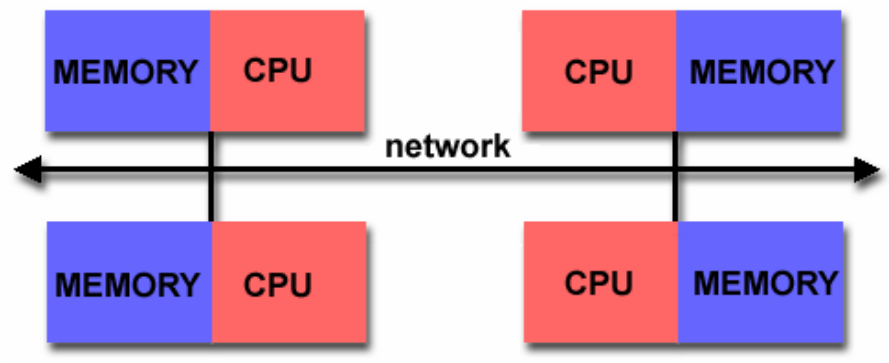
SECTION A

S. No.		Marks	CO
Q 1	Discuss about the limitations of the serial computing	**4**	**CO1**
Q 2	Explain about the various applications of parallel computing in Engineering.	**4**	**CO1**
Q 3	Explain about - Parallel Task - SIMD - Shared memory - Observed Speedup	**4**	**CO1**
Q 4	What do you understand about Open MP? How is it used? What are the advantages and disadvantages of Open MP?	**8**	**CO2**

SECTION B

Q 5	Explain about the import factors to consider when designing a parallel program for inter task communications. Explain the type of communication and how will it help while designing the parallel program. 	**10**	**CO4**

	(Or) Discuss about the role of the decomposition or partitioning in designing the parallel program. What are the basic ways to partition the computational work? Explain the type of decomposition is below figure and how to do apply it in CFD problem.  		
Q 6	Explain the parallel processing concept below in relation to a CFD problem. Give a specific example of a CFD Numerical Method or a solution algorithm where this particular concept can be applied.  	**10**	**CO2 & CO3**
Q 7	Classify each of the sorting methods in FORTRAN in view of Parallel Coding Algorithms and explain which methods are more suitable for Parallel Applications?	**10**	**CO3**
Q 8	Write the algorithm and flowchart for each sorting methods and compare the methods with each other.	**10**	**CO3**
	SECTION-C		
Q 9	Write the parallel algorithm for the 1 D Wave Equation given below? Which method of parallelization can you use for the solution of this problem? (10)	**20**	**CO4**

	
	`A(i,t+1) = (2.0 * A(i,t)) - A(i,t-1)`
	`+ (c * (A(i-1,t) - (2.0 * A(i,t)) + A(i+1,t)))`
	Explain the memory architecture below. What does it signify? How is the architecture formed? In what types of computational situation will it be advantageous? In what cases would it be disadvantageous? Explain how it can be implemented in CFD problems? (10)
	 
	(Or)
	To design a parallel programming what are the parameters we have to consider, list all of them. Take the Relaxation Technique in CFD for the solution of 2D Inviscid, Incompressible Flow problem as based upon time step as an example, explain in detail about all the parameters to design a parallel program. (20 Marks)		

Q 10	(a) Explain Bubble Sort with an example of an array with 12 elements and show how the sort works by showing the breakdown of the array in each step. **(10 Marks)** (b) Develop a FORTRAN code for sorting an array of 12 elements by using Circle Sort Method. **(10 Marks)**	**20**	**CO3**