



# VIT<sup>®</sup>

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

## SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Continuous Assessment Test - I, August 2018

B.Tech, Fall Semester 2018-19

Course Code	: CSE4001	Duration	: 90 Minutes.
Course Name	: Parallel and Distributed Computing	Max. Marks	: 50
School	: SCOPE	Slot	: B1

Answer All the Questions

(5\*10=50 Marks)

1. (a) Define the following terms with respect to parallel computing:

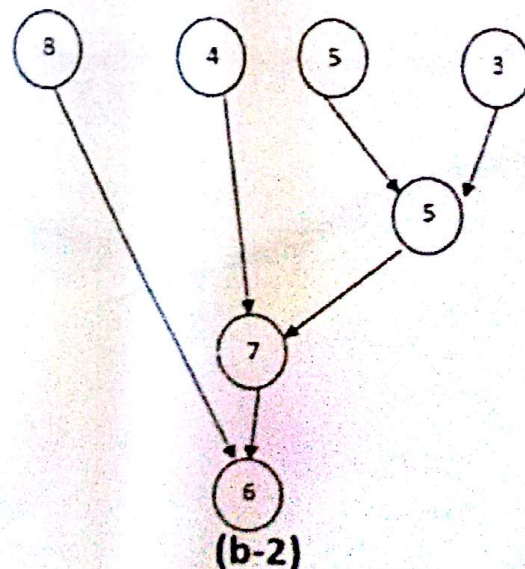
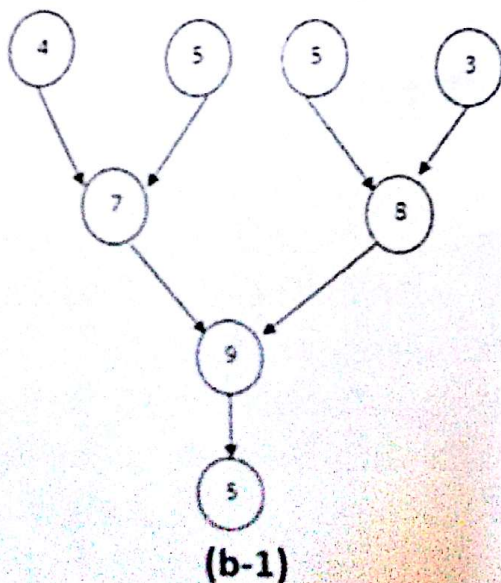
- i) Granularity- Fine Grained and Coarse grained
- ii) Decomposition
- iii) Degree of concurrency
- iv) Critical path length

(4)

(b) For the weighted task-dependency graphs given below, determine the following for each graph:

(6)

- i) Maximum degree of concurrency
- ii) Critical path length
- iii) Average degree of concurrency



2. (a) Consider a multiprocessor system with 3 processors P1, P2 and P3. Assume that they are connected either using a shared bus, linear array or a ring. At time instant 1, all three processors would like to send a message: P1 should send to P2, P2 to P3, and P3 to P1.

Assume every link of every interconnected link is of the same speed. How long does this communication take and justify your answer? (4)

(b) Answer the following questions:

(i) What is the diameter of a star network with 16 processors?

(ii) What is the bisection width of a linear array with 32 processors?

(iii) Determine the number of 2x2 switches in a 16x16 baseline multistage network?(6)

$$\left( \frac{p}{2} \times \log p \right) \quad p=16 \text{ here?}$$

3. Consider the following piece of code:

```
for (i = 0; i < 100; i++) A[i] = ((B[i] * C[i]) + D[i])/2;
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(a) Translate the above code to perform scalar and vector processing with the vector length of 64. (6)

(b) Calculate the number of cycles required for scalar and vector processing by considering the information given in the table. (4)

Number of Cycles	Description
2	Load and store instructions
4	Multiplication
4	Division
1	Addition

$$2000$$

$$100 \times (5 \times 2) + 100 \times (10 \times 2) = 2000$$

$$V =$$

4. Explain in detail on VLIW Pipelining and Superscalar Processors with its working principle. (10)

5. (a) With reference to the context of Shared and Distributed memory paradigm, discuss the following:

i) Basic architecture of these two types of machines with respect to memory access. (3)

ii) Programming models with respect to memory access. (3)

(b) Compare and contrast the NUMA and UMA Multiprocessor architecture (4)