BE5-R4: PARALLEL COMPUTING

NOTE:

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours **Total Marks: 100**

1.

a) Explain Sun and Nils's Law of memory bounding.

b) Write down the short comings of sequential computational model vis-a-vis the parallel computing model.

c) Explain why usage of execution time as a performance measure has pitfalls?

d) Write the difference between cooperative versus competitive interactions.

e) Explain implicit Parallelism with its advantages and disadvantages.

f) What is synchronization? Explain different types of synchronization operations.

g) Write down the shortcomings in Bus interconnection.

(7x4)

2.

a) Write down the characteristics of classic CISC processor.

b) Define the following terms related to processor technology:

i) Instruction issue rate

ii) Addressing modes

iii) Unified cache versus split cache

iv) Hard wired control versus micro programmed control

c) What is application benchmark? Explain four classes of benchmarks?

(5+8+5)

3.

a) Advantages and Disadvantages of the different network topologies.

b) Explain optional features of HiPPI channels.

c) Name and explain the parameters used to define/build network performance metrics.

(6+6+6)

4.

a) Which are the three ways to connect cluster nodes? Why shared memory architecture is more difficult to implement than others?

b) What is data-parallel model? Write a program to compute the value of pi (π).

c) Explain the characteristics of Message Passing Model and Data Parallel Model.

(6+6+6)

5.

a) Explain granularity in terms of process size on a processor.

b) Explain Symmetric Multiple Processor (SMP) Architecture with its advantages and disadvantages.

c) Explain the basic thread management primitives in pthread.

(3+10+5)

6.

a) List the features of massively parallel processing.

b) How Selection Sort works? Write a General program for it.

c) Compare Amdahl's Law and Gustafson's Law.

(4+10+4)

7.

a) Compare Crossbar and Multistage Switches.

b) Threads are known as a light weight process. Explain the difference between thread and process.

c) In parallel computation various signals are passed between processes known as a message passing. Write down the difference between Asynchronous message passing (AMP) and Synchronous message passing (SMP).

(6+6+6)