Sub Code: (CST-311) **ROLL NO……..……..**

SEMESTER EXAMINATION, 2022 – 23

Year: 1st year

M-TECH

High Performance Scientific Computing

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	**Answer any four parts of the following.** a) Define HPC. What are the advantages & disadvantages of HPC? b) What are the three main components that determine computer performance? c) What are the techniques of high-performance computing? d) How many types of components are there in the HPC cluster? e) What are the 4 factors for good performance of a computer? f) What is parallel programming in HPC?	5x4=20
Q 2.	**Answer any four parts of the following.** a) What is the difference between molecular dynamics and Monte Carlo simulations? b) What is an example of Computational Biology? c) What is Kahn's algorithm? What can be the applications of topological sorting? d) Why is it difficult to parallelize N-body problems? e) What are the difficulties faced by parallel processing programs? f) What are the challenging problems in computational biology?	5x4=20
Q 3.	**Answer any two parts of the following.** a) How do you call IPython in Python? Describe interactive Python notebook? b) What is the difference between interactive and script in Python? c) What are the important features of high-performance computing architecture?	10x2= 20
Q 4.	**Answer any two parts of the following.** a) What is the best implementation of a Gaussian process model in Fortran 90? b) What is the best library to build an artificial neural network with Fortran 95 and with Python? c) Where can I find the latest implementations of tree codes for self-gravitating systems?	10x2= 20
Q 5.	**Answer any two parts of the following.** a) Is OpenMP parallel or concurrent? What is the structure of OpenMP? How many cores does OpenMP use? b) How to use OpenMP in Fortran? Which programming language does OpenMP support? c) What is the difference between shared and private in OpenMP?	10x2= 20

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