

Name :

Reg.No:

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER M.TECH DEGREE EXAMINATION, APRIL 2018
Computer Science & Engineering
(Computer Science & Engineering)
07CS 6104 ADVANCED PARALLEL COMPUTING

Max. marks: 60

Duration: 3 hours

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

Module 1		Marks
1 a	Explain the significance of parallel computing on computational simulations for scientific & engineering applications and commercial applications.	4
Answer b or c		
b	With a neat sketch, illustrate Pipelining and Superscalar Execution. Describe the significance of Very Long Instruction Word Processors.	5
c	With a neat sketch depict the architecture of typical directory based systems.	5
Module 2		
2 a	Write an algorithm for all-to-all broadcast on a d-dimensional hypercube.	4
Answer b or c		
b	With figure explain the steps of computing prefix sums on an 8-node hypercube.	5
c	Show the communication steps for performing a circular 5-shift on a 4x4 mesh.	5
Module 3		
3 a	Write short note on the characteristics of inter-task interactions.	4
Answer b or c		
b	Write an algorithm to factor a non-singular matrix A into a lower triangular matrix L and an upper-triangular matrix U. Represent a decomposition of LU factorization into 14 tasks.	5

- c** Define hybrid decomposition. Give an example of the same for finding the minimum of an array of size 16 using 4 tasks. 5

Module 4

- 4 a** Describe various methods for containing interaction overheads. 4

Answer b or c

- b** Explain different parallel algorithm models in detail. 5
- c** Illustrate with figure the sources of overhead in parallel programs and the execution profile of a hypothetical parallel program executing on 6 processing elements. 5

Module 5

- 5 a** Enumerate Synchronization Constructs in OpenMP. 5

Answer b or c

- b** Write a MPI program to find the transpose of a matrix. 7
- c** Implement parallelism in matrix multiplication using CUDA programming. 7

Module 6

- 6 a** Describe parallel sorting with an example. 5

Answer b or c

- b** Write Dijkstra's sequential single-source shortest paths algorithm, explain parallel formulation of the same. 7
- c** Illustrate the concept of Parallel Random number generators with suitable diagrams. 7