College of IT and Management Education

Lesson Plan

Sub : Parallel Computing (MCE-506)
Branch : MCA
Semester : 5th Semester MCA(Jul-Dec,2016)
Period : June2016 to December 2016
Name of the Faculty : Shesha Shankar Gnanindranath Mishra

Total Credit Point: 3   Total Number of Classes: 40

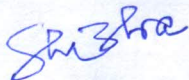| Sl. No.	TOPIC PLANNED	SESSION
	MODULE-I	**15 Hours**
1	Parallel Computing: Introduction. Example showing need of parallel computing	1
2	Scope/application area of parallel computing.	1
3	Implicit parallelism: Pipelining, superscalar execution	1
4	Superscalar execution. VLIW processors	1
5	Improving performance of memory latency using cache, increasing bandwidth.	1
6	Alternative approach of hiding memory latency: multithreading, pre fetching.	1
7	Dichotomy of Parallel Computing Platforms : Control Structure of parallel platform, Communication Model	1
8	Physical organization of parallel Platform: Parallel computer architecture	1
9	Network Topologies / interconnection network	1
10	Network Topologies	1
11	Evaluation of Static and dynamic interconnection network	1
12	Cache coherence	1
13	Communication Cost Parallel Machines: message passing cost	1
14	Routing mechanism Parallel computer	1
15	Processor-processor Mapping techniques	1
	MODULE-II	**14 Hours**
16	Principles of Parallel Algorithm Design: Preliminaries: Task, granularity, concurrency.	1
17	Decomposition techniques	1
18	Decomposition techniques	1
19	Characteristics of Tasks and Interactions	1
20	Mapping Techniques for Load Balancing: Static mapping, Dynamic mapping	1

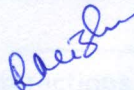| 21	Methods for containing interaction Overheads	1
22	Models of Parallel algorithm	1
23	Models of Parallel algorithm	1
24	Sources of overhead	1
25	Performance metrics	1
26	Effect of Granularity on Performance	1
27	Scalability of Parallel Systems	1
28	Minimum Execution time and minimum cost-optional Execution Time	
29	Doubt Clearing classes	
MODULE-III		**11 Hours**
30	Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction. Process	1
31	Algorithm One-to-All Broadcast & reduction	1
32	All-to-All Broadcast and Reduction	1
33	Scatter and Gather	1
34	All-to-All Personalized Communication	1
35	Circular Shift.	1
36	Introduction to MPI Principles of Message Passing Programming	1
37	The Building Blocks (Send and Receive Operations)	1
38	MPI (the Message Passing Interface), Collective Communication and Computation Operations	1
39	Examples of Matrix - Matrix multiplication, One dimensional Matrix Vector Multiplication using MPI.	1
40	Doubt clearing class.	1

Text Books:

1. Ananth **Grama**, George **Karypis**, Vipin **Kumar**, Anshul **Gupta**, "*Introduction to Parallel Computing*", 2nd Edition, 2004, Pearson Education, Inc.

2. Michael J. **Quinn**, "*Parallel Computing: Theory and Practice*", 1994, McGraw-Hill Education (India),

Reference Books:

1. Calvin **Lin**, Larry **Snyder**, "*Principles of Parallel Programming*", Pearson Education, Inc.

2. Michael J. **Quinn**, "*Parallel Programming in C with MPI and OpenMP*", 2004, McGraw-Hill Education.

3. Barry **Wilkinson**, "*Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers*", Pearson Education, Inc.

4. Yves **Robert**, Henri **Casanova**, Armand **Legrand**, "*Parallel Algorithms*", 1st Edition, 2009, CRC Press.

5. Harry F. **Jordan**, Gita **Alagband**, "*Fundamentals of Parallel Processing*", PHI Learning Pvt. Ltd.

Faculty **Course Coordinator** **Principal**