

GUJARAT TECHNOLOGICAL UNIVERSITY

INSTRUMENTATION AND CONTROL (APPLIED INSTRUMENTATION) (03)

PARALLEL AND DISTRIBUTED COMPUTING

SUBJECT CODE: 2740303

M.E. 4TH SEMESTER

Type of course: Major Elective-V

Prerequisite: Microprocessor, Object oriented Programming, JAVA, C,C++

Rationale:

This course provides an overview and fundamentals of various types of algorithms for Parallel and Distributed Computing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
		ESE			OEP	PA	RP			
3	2#	0	4	70	30	30	0	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction to High Performance Computing Overview of high performance computing and Java Framework, Concurrent techniques, The benefits of parallel programming, The benefits of distributed programming, The basic layers of Concurrent techniques, Categories of computers.	5	15 %
2	Parallel Computer System Architecture Overview of Parallel Computing, Central processing unit design, Instruction set architecture and design, some general parallel terminology.	3	10 %
3	Microprocessor technologies Overview of Microprocessors, Silicontechnology, Intel multi core technology	3	10%
4	Parallel Computer memory architecture Parallel Computer memory architectures,SMPs,MPPS and parallel processing	3	5 %
5	Parallel and Distributed Programming Model: Parallel and Distributed Programming Models,Shared memory model,Threads models,Message passing model,Data Parallel model,Hybrid Programming Model,Flynn's Programming model,Embarrassingly parallel computation,Pipeline computations.	10	20 %
6	Designing Parallel and Distributed Programs: Automatic vs Manual Parallelization,Understand the problem and the	5	10 %

	programme,Partitioning,Communications,Synchronization,Data dependencies,Load balancing,Granularity Parallel input and output,Limits and costs of parallel programming,Performance analysis and tuning.		
7	Client/Server based distributed programming through socket: TCP/IP layers and protocols,Transport layer protocol,TCP vs UDP,Introduction to Java socket programming,The socket class ,The server socket class,The datagram packet class,The datagram socket class,The InetAddress class.	5	10 %
8	Middleware based distributed Programming Overview of middleware, remote method invocation,Common object request broker architecture.	5	10 %
9	Introduction to cloud computing What is cloud computing, cloud components,wab application framework,cloud web services,service oriented architectures towards to cloud computing.	5	10%

Reference Books:

1. BalaDhandayuthapaniVeerasamy, “Parallel and distributed computations through JAVA,” Penram Publications
2. Sunita Mahajan, Seema Shah, “ Distributed Computing, Second Edition”, Oxford University Press
3. Vijay K. Garg, “Elements of Distributed computing”, Wiley

Course Outcome:

After learning the course the students should be able to

1. Understand High Performance Computing
2. Understand Parallel Computer System Architecture
3. Understand Parallel Computer memory architecture
4. Understand Parallel and Distributed Programming Model
5. Designing Parallel and Distributed Programs
6. Understand and designing Client/Server based distributed programming
7. Understand Middleware based distributed Programming
8. Understand cloud computing

List of Tutorials:

- Student has to prepare various programs for parallel and distributed computing techniques covered in this course with any computing tools (JAVA,C,C++, etc...).

Prepare research paper and submit report of various for parallel and distributed computing techniques covered in this course

Major Equipment:

Computer Laboratory

List of Open Source Software/learning website:

- JAVA,C,C++
- NPTEL

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.