Department of Information Technology
B.Tech VII semester
(Professional Elective-VI)

Course Details:

COURSE TITLE	**Multi core Programming**
COURSE CODE	15CT1138
PROGRAM	B.TECH
SPECIALIZATION	IT
PRE REQUISITES	NIL

Course Outcomes (COs):

CO No.	**Course outcomes**
CO1	Describe Multi-Core processor Architecture
CO2	Discuss multi core processors
CO3	Discuss Parallel Programming Concepts
CO4	Differentiate Threading API's
CO5	Use OpenMP programming and MPI programming

Course Outcome-PO matrix

Subject: Middleware Technologies

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	3	2			2			2				
CO-2	2	2			3							
CO-3	2		2		2			3				
CO-4	2											
CO-5	2				2		2					

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Teaching- Learning & Evaluation

Week	**Topic / Contents**	**Course Outcomes**	**Sample Questions**	**Teaching Learning Strategy**	**Assessment method and Schedule**
1	Unit-1: Parallel Computing Platforms (SIMD & MIMD systems, an overview of Single-Core, Multi Processor,Multi-Core Architectures),	CO1	1. Differentiate SIMD and MIMD systems. 2. Define the term "Multi core *Architecture"*	Lecture	Assignment-1, Test- 1 Quiz-1

2	Parallel Computing in Microprocessors, Differentiating Multi-Core Architectures from Hyper Threading Technology	CO1	1. Write short notes on micro processors. Explain Hyper Threading Technology	Lecture	Assignment-1, Test- 1 Quiz-1
3	Multi-threading on Single-Core versus Multi Core Platforms, Understanding Performance, Amdahl's Law, Gustafson's Law	CO1	1.Differentiate Multi-threading on Single-Core versus Multi Core Platforms	Lecture	Assignment-1, Test- 1 Quiz-1
4	Unit-2: An Overview of Software Threading Defining Threads, System View of Threads: Threading above the Operating System, Threads inside the OS, Threads inside the Hardware	CO2	1. What is Software Threading What is the role of threads inside the Hardware	Lecture	Assignment-1, Test- 1 Quiz-1
5	Application Programming Models and Threading, Virtual Environment: Virtual Machines and Platforms, Runtime Virtualization, System Virtualization	CO2	1. Explain Virtualization, 2. Write about Runtime Virtualization	Lecture	Assignment-1, Test- 1 Quiz-1
6	UNIT-3: Designing for threads, parallel programming patterns	CO3	1. parallel programming patterns	Lecture	Assignment-1, Test- 1 Quiz-1
7	Threading and parallel programming constructs: Synchronization,	CO3	1.Explain Synchronization,.	Lecture	Assignment-1, Test- 1 Quiz-1
8	Test1	**CO1,CO2 and CO3**			
10	Critical sections, Deadlock, Synchronization Primitives, and Messages	CO3	1.Differentiate between Critical sections and Deadlock	Lecture	Assignment -2, Test - 2 Quiz - 2
11	UNIT-4: Threading APIs for Microsoft Windows, Threading APIs for Microsoft.NET Framework: Creating Threads, Managing Threads, Thread Pools, Thread Synchronization,	CO4	1. What Framework 2. How are threads managed?	Lecture	Assignment -2, Test - 2 Quiz - 2
12	POSIX Threads: Creating Threads, Managing Threads, Thread Synchronization, Signaling, Compilation and Linking.	CO4	1.What are POSIX Threads 2. Explain Signaling, Compilation and Linking.	Lecture	Assignment -2, Test - 2 Quiz - 2
13	UNIT-5: OPENMP PROGRAMMING: Open MP Challenges in threading a loop, Minimizing Threading overhead, Performance oriented Programming, Library Functions. Solutions to parallel programming problems:	CO5	What are Open MP Challenges in threading a loop, Write a short notes on Performance oriented Programming	Lecture	Assignment -2, Test - 2 Quiz - 2

	Data races, deadlocks and Live locks Non-blocking algorithms, Memory and cache related issues.				
14	MPI PROGRAMMING: Message-Passing Model, Message-Passing Interface, MPI functions, Compiling and running MPI Programs, collective communication, data decomposition, Point-to-point communication – MPI Library..	CO5	1.What is collective communication, and data decomposition.	Lecture	Assignment -2, Test - 2 Quiz - 2
15	**Test2**	**CO3, CO4 and CO5**			