Code: CST303	**Concurrent and Parallel Programming**	**Credit: 03** **L-T-P: (3-0-0)**
Course Content	Concurrent versus sequential programming. Concurrent programming constructs and race condition. Synchronisation primitives. Processes and threads. Interprocess communication. Livelock and deadlocks, starvation, and deadlock prevention. Issues and challenges in concurrent programming paradigm and current trends. Parallel algorithms – sorting, ranking, searching, traversals, prefiix sum etc., Parallel programming paradigms – Data parallel, Task parallel, Shared memory and message passing, Parallel Architectures, GPGPU, pthreads, STM, OpenMP, OpenCL, Cilk++, Intel TBB, CUDA Heterogeneous Computing: C++AMP, OpenCL	
Important Text Books/References	1. Mordechai Ben-Ari. Principles of Concurrent and Distributed Programming, Prentice-Hall International. 2. Greg Andrews. Concurrent Programming: Principles and Practice, Addison Wesley. 3. Gadi Taubenfeld. Synchronization Algorithms and Concurrent Programming, Pearson. 4. M. Ben-Ari. Principles of Concurrent Programming, Prentice Hall. 5. Fred B. Schneider. On Concurrent Programming, Springer. 6. Brinch Hansen. The Origins of Concurrent Programming: From Semaphores to Remote Procedure Calls, 7. Introduction to Parallel Computing by Ananth Grama, Anshul Gupta, Geroge Karypis, Vipin Kumar – Pearson 8. CUDA Programming – David Kirk 9. Parallel Algorithms – Joseph Ja Ja 10. Heteregeneous Computing with OpenCL by Ben Gaster, Lee Howes et al (Morgan Kaufmann)	