

# GUJARAT TECHNOLOGICAL UNIVERSITY

**Subject Name: Cluster and Grid Computing**  
**Subject Code: 3725501**

## Semester II

**Type of course:** ME - Computer Engineering (HIGH PERFORMANCE COMPUTING [HPC])

### Prerequisite:

1. Object oriented Programming
2. Java programming
3. Web technologies
4. Computer Networks

**Rationale:** NA

### Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	2#	0	4	70	30	30	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment;

### Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Overview of Cluster Computing, Role of Clusters, Definition and Taxonomy, Distributed Computing, Limitations, Cluster Planning, Architecture and Cluster Software, Design Decisions Network Hardware, Network Software, Protocols, Distributed File Systems, Benchmarks, Performance Models and Simulation, Process Scheduling, Job Management, Cluster computing interface (networking)	10	20
2	Load Sharing and Load Balancing, Distributed Shared Memory, Case Studies of Cluster Systems.	10	25
3	Introduction to grid, Infrastructure of hardware and software, Main Projects and Applications, The Open Grid Forum, GARUDA, Grid Architecture, Overview of Resource Managers, Overview of Grid Systems, Application Management, Grid Application Description Languages, Application Partitioning, Meta-scheduling, Mapping, Monitoring, Web Services, Grid Portals, Job Scheduling / Submission, Grid standards, grid enabling software and application.	10	25

**Reference Books:**

1. Grid and Cluster Computing grid and cluster Computing by Prabhu, Phi learning
2. High Performance Cluster Computing: Architectures and Systems (Volume -1) 01 Edition, Rajkumar Buyya , Pearson

**Course Outcome:**

After learning the course the students should be able to:

1. Analyse the role of clusters and Compare it with other computing Technologies
2. Analyse the performance of cluster computing , models, hardware & networks simulations
3. Design and implement clustering system
4. Prepare for any upcoming grid deployment and be able to get started with a potentially available Grid setup.
5. Design and implement Grid computing applications with grid Standards

**List of Experiments: (with Open Ended Problems)**

1. Architecture and Cluster Software, Design Decisions
2. Network Protocols,
3. Distributed File Systems, Benchmarks,
4. Performance Models and Simulation,
5. Job Management,
6. Cluster computing
7. Load Sharing and Load Balancing,
8. Distributed Shared Memory,
9. Grid Systems, Application Management, Grid Application Description Languages,
10. Application Partitioning, Meta-scheduling, Mapping, Monitoring, Web Services, Grid Portals, Job Scheduling / Submission, Grid standards, grid enabling software and application.
11. Case Studies of Cluster Systems & Grid Computing

**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