

**Subject Code: PEIT-115**  
**Subject Name: Cloud Infrastructure and Services**

<b>Programme:</b> B.Tech.	<b>L: 3 T: 0 P: 0</b>
<b>Semester:</b> 8 (Choice- I )	<b>Teaching Hours:</b> 36 Hours
<b>Theory/Practical:</b> Theory	<b>Credits:</b> 3
<b>Internal Marks:</b> 40	<b>Percentage of Numerical/Design Problems:</b> 30%
<b>External Marks:</b> 60	<b>Duration of End Semester Exam(ESE):</b> 3hours
<b>Total Marks:</b> 100	<b>Elective Status:</b> Professional Elective-III

**Prerequisites: Basics of Networking, Operating System, Virtualization**

**Additional Material Allowed in ESE: NIL**

**Course Outcomes:**

After completing this course students will be able

1. To assess existing hosting platforms and computing paradigms currently being used in industry and academia.
2. To comprehend need of data centre, its virtualization techniques and types of clouds.
3. To demonstrate the implementation of cloud by using commercial and open source cloud platforms and its virtualization.
4. To implement cloud-based data storage by considering issues of task partitioning, data partitioning, data synchronization, distributed file system, data replication etc.
5. To teach the distributed computing fundamentals in the context of cloud infrastructure
6. To provide an insight into managing and scheduling of various cloud resources

**Detailed Contents:**

**Part-A**

**Defining Cloud Computing:** Utility Computing, Cloud Types, Examining the characteristics of Cloud Computing, Cloud Computing vs. Cluster computing vs. Grid computing, Assessing the roles of Open Standards [6]

**Virtualization:** Using virtualization Technologies, Load balancing and Virtualization, Understanding Hypervisors, Machine Imaging, Porting applications [5]

**Capacity Planning:** Defining Baseline and Metrics, Network Capacity, Scaling [3]

**Overview of OpenStack:** Architecture of OpenStack, project, services, mode of deployment, workflow. [4]

**Cloud Storage:** Object storage and Block storage [2]

**Part-B**

**Cloud Network:** Software-defined networking with OpenStack, Architecture, Protocols, Network functions virtualization (NFV) [4]

**Cloud Management:** Monitoring, Management, Maintenance, Troubleshooting, Backup, Recovery, Service Level Agreement [4]

**Cloud Security:** Cloud Security: Role of Security, Types of Attack, Network Security, Survey on Potential Cloud Barriers in adopting Cloud Computing, New Threats related to Cloud Computing, Security Stack, Gartner's Seven Cloud Computing Security Risks. Other Cloud Security Issues: Virtualization, Access Control & Identity Management, Application Security, Data Life Cycle Management. OpenStack security -

Role-Based Access Control (RBAC), Identity service, Application security, data security.  
[6]

**Containers and Edge Computing:** Introduction to Edge computing, Containers and Edge Computing with OpenStack [2]

#### Textbooks:

1. Barrie Sosinsky (2013), Cloud Computing Bible, Wiley India Pvt. Ltd.
2. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski (2011), Cloud Computing: Principles and paradigms, Wiley India Pvt. Ltd.
3. Anthony Velte, Toby Velte, Robert Elsenpeter (2009), Cloud Computing: A practical Approach, Tata McGrawHill

#### Reference Books:

1. Michael Miller (2008), Cloud Computing, Que Publishing
2. Anthony Velte, Toby Velte and Robert Elsenpeter (2014), Cloud Computing: A practical Approach by Tata McGrawHill
3. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper (2009), Cloud Computing for dummies.

#### Online Courses and Video Lectures

1.Cloud computing By Prof. Soumya Kanti Ghosh | IIT Kharagpur  
Available at: [https://swayam.gov.in/nd1\\_noc20\\_cs20/preview](https://swayam.gov.in/nd1_noc20_cs20/preview)

2.Google Cloud Computing Foundations Course  
By Prof. Soumya Kanti Ghosh, Multifaculty | IIT Kharagpur, Google Cloud  
Available at : [https://swayam.gov.in/nd1\\_noc20\\_cs55/preview](https://swayam.gov.in/nd1_noc20_cs55/preview)