**Cloud Computing**
**CS704B**
**Contracts: 3L**
**Credits- 3**

**Module 1: Definition of Cloud Computing and its Basics (Lectures : 9)**

**1. Definition of Cloud Computing:**
Defining a Cloud, Cloud Types - NIST model, Cloud Cube model, Deployment models (Public , Private, Hybrid and Community Clouds), Service models - Infrastructure as a Service, Platform as a Service, Software as a Service with examples of services/ service providers, Cloud Reference model
Characteristics of Cloud Computing - a shift in paradigm
Benefits and advantages of Cloud Computing

**2. Cloud Architecture:**
A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients

**3. Services and Applications by Type**
IaaS - Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos
PaaS - Basic concept, tools and development environment with examples
SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS platform
Identity as a Service (IDaaS)
Compliance as a Service (CaaS)

**Module 2 : Use of Platforms in Cloud Computing (Lectures : 12)**

**1. Concepts of Abstraction and Virtualization**
Virtualization technologies : Types of virtualization (access, application, CPU, storage), Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D)
Load Balancing and Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network), Mention of The Google Cloud as an example of use of load balancing
Hypervisors: Virtual machine technology and types, VMware vSphere
Machine Imaging (including mention of Open Virtualization Format - OVF)
Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance

2. **Concepts of Platform as a Service**
Definition of services, Distinction between SaaS and PaaS (knowledge of Salesforce.com and Force.com), Application development
Use of PaaS Application frameworks

3. **Use of Google Web Services**
Discussion of Google Applications Portfolio - Indexed search, Dark Web, Aggregation and disintermediation, Productivity applications and service, Adwords, Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engine service.

4. **Use of Amazon Web Services**
Amazon Web Service components and services: Amazon Elastic Cloud, Amazon Simple Storage system, Amazon Elastic Block Store, Amazon SimpleDB and Relational Database Service

5. **Use of Microsoft Cloud Services**
Windows Azure platform: Microsoft's approach, architecture, and main elements, overview of Windows Azure AppFabric, Content Delivery Network, SQL Azure, and Windows Live services

**Module 3 : Cloud Infrastructure (Lectures : 7)**
Types of services required in implementation  - Consulting, Configuration, Customization and Support

**1. Cloud Management**
An overview of the features of network management systems and a brief introduction of related products from large cloud vendors, Monitoring of an entire cloud computing deployment stack  - an overview with mention of some products, Lifecycle management of cloud services (six stages of lifecycle)

**2. Concepts of Cloud Security**
Cloud security concerns, Security boundary, Security service boundary
Overview of security mapping
Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance
Identity management (awareness of Identity protocol standards)

**Module 4 : Concepts of Services and Applications (Lectures : 8)**

**1. Service Oriented Architecture:** Basic concepts of message-based transactions, Protocol stack for an SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs

**2. Applications in the Cloud:** Concepts of cloud transactions, functionality mapping, Application attributes, Cloud service attributes, System abstraction and Cloud Bursting, Applications and Cloud APIs

**3. Cloud-based Storage:** Cloud storage definition  - Manned and Unmanned

**4. Webmail Services:** Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo mail, concepts of Syndication services

**Books Recommended**:
1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd, 2013
2. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, McGraw Hill Education (India) Private Limited, 2013
3. Cloud computing: A practical approach, Anthony T. Velte, Tata Mcgraw-Hill
4. Cloud Computing, Miller, Pearson
5. Building applications in cloud:Concept, Patterns and Projects, Moyer, Pearson

**References**:
1. Cloud Computing  - Second Edition by Dr. Kumar Saurabh, Wiley India