**Cloud Computing Fundamentals**

**Unit 1. Introduction to Virtualization**

Traditional IT Infrastructures, Shortcomings of physical infrastructures, Benefits of Virtualization, Comparison of traditional IT infrastructures with virtualized infrastructures, Implementing Virtualization, A typical hardware/software server stack, Logical Equivalence, Pre and Post Virtualization Server Stacks, Types of Virtualization, Area and technology based classification, History of Virtualization, Time-sharing systems, IBM Mainframe Virtualization, IBM PowerVM Virtualization, Extending Virtualization to x86, Hardware support for x86 Virtualization, Impact of Virtualization, Cost Impact, Manageability Impact.

**Unit 2. Server and Storage Virtualization**

Types of Server Virtualization, Para Virtualization, Simulation, Hardware Assisted Virtualization, Hypervisors, Ring levels on x86 processors, Types of Hypervisors, IBM PowerVM Hypervisors, Common considerations in server virtualization, Desktop Virtualization, how desktop virtualization works? Benefits of Desktop Virtualization, Constraints in Desktop Virtualization, Types of Desktop Virtualization, Anatomy of server virtualization, Three major layers in Xen Server, Storage Virtualization Overview, Benefits of storage virtualization, Features in the logical layer, Types of Storage Virtualization, Host level storage virtualization, Host based mirroring, Storage level virtualization, Network based storage virtualization.

**Unit 3. Network and Application Virtualization**

Network virtualization overview, Virtual Private Network (VPN), How VPN works, Virtual LAN (VLAN), Advantages of VLAN, Application virtualization overview, Challenges in using applications in traditional install, use and update model, Solution for challenges, Architecture, Benefits of application virtualization.

**Unit 4 – Introduction to cloud computing**

Operating system and virtualization, Virtualization, Virtual Machines, Virtual Machines, Virtual Infrastructure, Advantages of virtualization, Virtualization and Cloud, Overlapping of virtualization and cloud, Areas and relative savings, What is cloud computing? Cloud computing improves service management, A service driven model, Advantages of cloud, Market point of view, Different types of services, Cloud computing helps reduce or eliminate issues, Cloud computing business value, Business impact when using a cloud, Cloud computing technologicalvalue, Cloud computing and end user, What does cloud computing change for the provider? What does cloud computing change for the administrator? Pros and cons of a cloud model, Anatomy of a cloud, Cloud components, Cloud computing solution components, Service Catalog, User self service portal, Service request management, Provisioning, Optimized infrastructure, Chargeback, What is different about cloud computing? Benefits of cloud, Cloud delivery and deployment models, Different cloud architectures, Private cloud architecture, Public cloud architecture, Hybrid cloud architecture, Pros and cons of each architecture, Delivery models, Cloud service models, Cloud transformation roadmap, History of Cloud Computing, Client-server model - evolution, Client-server model, Grid computing, Cloud Vs Grid Computing, Relationship between grid and cloud computing, Cluster, Clusters and clouds, Utility computing, Evolution of cloud computing, Cloud computing milestones.

**Unit 5. Cloud implementation, deployment and delivery models**

Cloud deployment models, Private cloud, Public cloud, Hybrid cloud, Pros and cons of each architecture, Cloud deployment decision factors, Business IT control, Business critical applications, Data and transaction security, Compliance and audit, Balance of CAPEX and OPEX, Workload characteristics, Workload lifespan preferences, Industry segment – SME and Large enterprises, Data freedom, Software characteristics, Time to deploy, Public cloud, Public cloud - Example, Important points about public cloud, Factor Matrix, Public cloud advantages, Public cloud disadvantages, Private cloud, Private cloud – Scenario, Key observations from scenario, Factor matrix, Private cloud advantages, Private cloud disadvantages, Hybrid Cloud, Hybrid cloud scenario, Observations from Hybrid scenario, Factor Matrix, Hybrid cloud advantages, Hybrid cloud disadvantages, Overview of cloud delivery models, Types of cloud delivery models, Cloud delivery infrastructure, IT Layers, IaaS overview, IaaS features, Cloudbursting, Cloudbursting definition, Multi Tenancy, Resource pooling, IaaS examples, PaaS Overview, PaaS example, Platform services infrastructure, PaaS features, PaaS components, Things to consider before choosing PaaS, PaaS examples, Common technologies and solution provided by a web hosting PaaS stack, SaaS, SaaS advantages, SaaS examples.

**Unit 6. Case study on virtualization and cloud workloads**

Case study overview, Customer IT landscape, Functions of the data centre, Triggers for virtualization, Preparation for virtualization, Server selection, Server sizing, Server criticality, Provisioning, Proximity and Locality, Transition tools for virtualization, Cost Savings, Cloud Workloads Overview, What is workload? Workload characterization, Factors that influence cloud workload, Workloads most suitable for cloud, Private cloud solution, Types of workload, Temporary non-production workloads, Mission critical production workloads, Advantages, Mission critical workloads, Mixed workloads, Production only workload most suitable for a hybrid cloud, Industry specific cloud workloads, Workloads not suitable for public cloud, Workloads not suitable for private cloud, Workloads made possible by cloud.