Subject 1: **Cloud Technology AWS & Microsoft Azure**

UNIT-I

Cloud Computing basics: Introduction to cloud computing, Advantages of Cloud computing, public, private & hybrid cloud, SAAS, PAAS & IAAS.

Global Infrastructure: Backbone network, Regions & Availability zone

Identity & Access Management: Users, Groups, Roles, Policies, Custom Policies, Multi Factor Authentication, API Key

EC2: Virtualization in AWS, EC2 Instance Types, EC2 Instance Families, EC2 Purchasing Options: (On Demand, Spot, Reserved, Dedicated), Creating AMI Images.

Elastic Block Storage: EBS Types, EBS vs Instance Storage, Volume, EBS Snapshots, Backups & Replications, Mounting EBS Volumes, Elastic File Storage, Managing EFS File Systems, Mounting EFS File Systems, EFS vs EBS.

Load balancers: HA and Scalability Intro, ELB overview, Classic Load balancer, Application Load Balancer, Network Load Balancer, Load Balancer Sticky sessions, Cross zone load balancing, SSL Certificates

UNIT-II

Amazon Relational Database Services: Overview of Relational Databases: RDS Instances and RDS Instance Sizes, Supported Databases, Option Groups, Subnet Groups, Parameter Groups, Why Aurora Database? Snapshots, Automated Backups, Reserved Instances, Replications, Encryption, DynamoDB, NoSQL Overview, DynamoDB Concepts, Tables, Backups, Reserved Capacity, Indexes, Transactions, DocumentDB, Elastic Cache.

Simple Storage Service (S3): Architectural Overview, Buckets, Objects and Folders, Storage Tiers, Lifecycle policies, Versioning, Locking, Access to S3 Buckets, Static Website Hosting, S3 Cross Region Replications, S3 Bucket Policies, Storage classes + Glacier, Lifecycle rules, events notifications and hands on.

CDN, CloudFront and Global Accelerator: Cloud Front overview, CloudFront Signed URL/Cookies, CloudFront Advanced Concepts, AWS Global Accelerator, AWS Global Accelerator.

Serverless: Serverless Intro, Lambda overview, Lambda, Lambda Limits and Edge, DynamoDB overview, API Gateway Overview, API Gateway Security, Cognito overview.

Monitoring Auditing, CloudWatch Metrics, CloudWatch Custom Metric, CloudWatch Dashboard and logs, CloudWatch agent and CloudWatch log agent.

Cloud Formation: Concepts: How CloudFormation Works, Templating Basics, Json/YAML, Template Anatomy, Resources, Intrinsic Functions, Helper Scripts, Template Macros, Expressions.

UNIT-III

VPC: CIDR, Private and Public IP, Default VPC Overview, Subnet overview, Internet gateway and route tables, NAT Instance and Gateways, DNS resolution and Route53 Private zones, NACL and SG, VPC peering, VPC Endpoints, VPC Flow Logs, Bastion hosts, Site to Site VPN, Virtual Private Gateway, and Customer gateway, Direct connect and direct connect gateway, Transit Gateway.

Microsoft Azure

Azure Active Directory: Overview, what is Azure Active Directory, Group and Access Management Group-based licensing, Azure AD architecture, Default User Permissions, Organization, Groups, Users, Authentication (Multifactor &Self-Service Password Reset), Azure RBAC, Custom Roles in Azure, Privileged Identity Management.

Azure Virtual Machines: How Azure VM's Work internally, VM Types & Sizes, Virtualization technologies in azure, Creation & Management of VM's, Creating VM Images, High Available

VM's, Availability Sets & Availability Zones, VM Scale Sets, VM Scale Sets with Load balancers & application gateways, Dedicated hosts, Maintenance & Updates, VM Extensions, Cloud-Init
Operations: Azure Batch, Azure Monitor, Azure Site Recovery, Azure Backup Service, Azure Policies.

UNIT-IV

Azure Storage: Azure Storage Accounts Overview, Storage account types, Blob Storage, Page Blobs, Block Blobs, Table Storage, Queue Storage, File Storage, Data Redundancy, Access Tiers, Performance & Scaling, Concurrency, Static Websites using Storage Accounts, Event Handling, Page Blobs, Transferring Data using AzCopy.
Azure Managed Disks, Azure StorSimple and Data Box
Azure SQL, Azure MySQL, Azure Redis Cache, Azure Cosmos DB.
ARM Templates: Overview, JSON, Resources, Parameters, Variables, Functions, Resources, Outputs, Template File Structure, Template reference, Template Functions, Azure Migrate.

UNIT-V

Networking: Networking Basics, Virtual Network, Subnets, Network Security Groups, Application Security Groups, Routing, Service Endpoints, Service Endpoint Polices, VNET Peering, Virtual Network TAP, Virtual Networking for Azure Services, Container & Kubernetes networking, VNET Replication for Business Continuity, IP Addressing, Public IP prefix, IpV6 for Azure VNet, Cross network Connectivity, Backend Connectivity Interoperability
Azure DNS: Public DNS (Zones & Records, Alias Records, Reverse DNS and Disaster Recovery)
Azure Load balancers & Application Gateway: Azure Load Balancer Overview, Basic Load Balancer, Standard Load Balancer, Health probes, High Availability ports, Multiple frontends, Outbound Connections, Outbound Rules, Load Balancer Metrics, Azure Application Gateway Overview, Application Gateway Components, Routing, SSL.

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Subject 2: **Continuous Integration/ Continuous deployment with Git, Jenkins and Ansible**

UNIT-I

Why DevOps, what is DevOps, what is SDLC, what is Agile and Scrum

Linux Basics: Linux Introduction Terminals and command structure and shells, Linux File system, Navigation in file system, Creating files and folders, Permissions for files and folders CHMOD, Deleting files and folders, Copying and moving and renaming files and folders, Vi editor commands, Find command, Viewing files using cat tail head, Compare files diff and cmp, awk and sed command and its usage, File archiving and compressions, Searching files in vi and grep, wc usage, Commands (ps, kill, top, systemctl, free, df, iostat, netstat, /var/log, hostnamectl, uname)

UNIT-II

Git: Version Control Basics, Commits and Revisions, Branches, Stashing, Branching in Depth, Rebase, Tagging, Sub-Projects with Sub-Modules and Subtrees, Git Hooks, Git Flow.

CI/CD: Continuous Integration, Continuous Delivery, Continuous Deployment and Importance of CI/CD Engines in Building DevOps Pipelines.

UNIT-III

Jenkins: Key Constructs of Jenkins

a. Job

b. Build

c. Version Control System

d. Test Executions, Plugins

e. CLI

f. Rest API

g. Security

h. Distributed Builds

Jenkins Internals:

a. Jenkins's execution under the hood

b. Importance of Environment Variables

c. Why Jenkins is called as Cron on Steroids

Jenkins Installation, Jenkins Distributed Build Setup (Multi node configuration), Jenkins Administration, Jenkins Views and Free Style Projects, Parametrization and Up/DownStream Projects, Jenkins Pipelines, Groovy and Jenkins DSL, Jenkins Integrations with other tools

Continuous Integration (Ansible)

UNIT-IV

System Architecture and Design of Ansible:

a. Installation and Configuration

b. Core Concepts of Ansible

i. Inventory

ii. Module

iii. Adhoc Command

iv. Playbooks

v. YAML

c. Inventory and Playbook Parsing

d. Module transport and Execution

e. Variable Types
f. Variable Precedence
g. External data access

UNIT-V

Ansible Essentials:
a. Static Inventories
b. Dynamic Inventories
c. Common Modules
d. Playbook syntax
e. Conditionals
f. Error Handling
g. Variables and Facts
h. Templates
i. Roles and Ansible Galaxy
j. Parallelism

Protecting Secrets with Ansible (Encrypting data at rest & Mixing Encrypting with plain YAML), Controlling Task Conditions (Failure, change, Error recovery & Iterative tasks with loops), Reusable Ansible Content with Roles (Task, handler, variable and playbook inclusion concepts & Roles), Troubleshooting Ansible (Playbook logging and verbosity, Variable introspection & Debugging code execution)

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Subject 3. **Infrastructure provisioning with Docker, Kubernates and Terraform**

UNIT-I

b. Understanding Docker
c. Difference between Physical Servers, Virtual Machines and Docker
d. Docker Installation
e. Docker CLI Overview
f. Docker and container

Building Container Images

a. Docker file

Shell Scripting: Shell scripting intro, Input and output of scripting, variables and arguments, if then scripts, for loop scripts, do while scripts, case statement scripts, functions, exit functions.

Docker:

a. Docker Overview
b. Docker file instructions
c. Multi stage Docker build

UNIT-II

Storing and Distributing Images

a. Docker Hub
b. Docker Store
c. Docker Registry
d. Docker Trusted Registry
e. Azure Container Registry
f. Amazon ECR

Managing Containers

a. Docker container Commands
b. Docker Network and Volumes

Docker Networking, Docker Volumes (Storage), Docker Compose (Installation& Docker Compose Yaml, Docker Compose Commands, Docker App)

UNIT-III

Kubernetes:

Overview

• Introduction to Microservices
• Clustering and Orchestration
• Kubernetes Architecture
• Kubernetes Core Concepts
o Pods
o Namespaces
o API primitives

Kubernetes runtime

• Health checks
• Application Scheduling
• Kubernetes Networking
• Service Discovery

- DNS
- Multitenancy

Native Kubernetes on Amazon Cloud using Elastic Kubernetes Services (EKS)

Terraform

UNIT-IV

Packer: What is Packer, Why Use Packer, Installing Packer, Packer Constructs (Artifacts, Builds, Builders, Commands, Post-Processor, Provisioners, Templates), Packer CLI

Terraform:

Infrastructure Provisioning

a. What is Infrastructure as Code

b. Infrastructure as Code in the Cloud

c. How Terraform Does Infra Provisioning

Installation

Terraform Constructs

a. Terraform DSL

b. Providers

c. Resource

d. Arguments

e. Attributes

f. Variables

g. Maps and Lookups

h. Modules

i. Local State

j. Remote State

UNIT-V

Terraform DSL

a. Declaring Variables

b. Working with Resources

c. Nested Blocks

d. Dynamic Nested Blocks

e. Expressions and functions

Resources and Providers

a. Null Resource

b. Local Exec

Using Terraform to create a AWS/Azure Cloud Deployment

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