**12.Google Cloud Syllabus**

**(Name : V.Dinesh Kumar, Duration : 12weeks – 100 Hours, lessons - 14)**

Here’s a **general employability-focused syllabus for Google Cloud (GCP)**, designed to prepare you for roles like **Cloud Engineer**, **Solutions Architect**, **DevOps Engineer**, or **Cloud Administrator**. This syllabus aligns with certifications like **Google Associate Cloud Engineer**, **Professional Cloud Architect**, and **Professional Data Engineer**, focusing on practical, hands-on skills.

**Topics Covered:**

**1. Introduction to Google Cloud Platform (GCP)**

* What is Google Cloud?
* Key Features and Advantages
* GCP Global Infrastructure (Regions and Zones)
* GCP Pricing Models and Billing
* Introduction to Cloud Computing Models
* IaaS, PaaS, SaaS
* Hybrid and Multi-Cloud Strategies

**2. GCP Identity and Access Management (IAM)**

* IAM Basics
* Users, Groups, Roles, and Policies
* Service Accounts and OAuth2
* Managing Permissions and Policies
* Setting Up Multi-Factor Authentication (MFA)
* Implementing Role-Based Access Control (RBAC)
* IAM Best Practices and Security Auditing

**3. Compute Services**

**Compute Engine**

* Virtual Machine Instances
* Instance Types and Configurations
* Custom Machine Types and Preemptible VMs
* Creating and Managing Instances
* Persistent Disks and SSDs
* Instance Groups and Auto-Scaling
* Load Balancing and Traffic Distribution

**Google Kubernetes Engine (GKE)**

* Kubernetes Concepts and Architecture
* Creating and Managing Clusters
* Deploying Applications on GKE
* Scaling and Load Balancing Pods
* Monitoring and Logging with Stackdriver

**App Engine**

* Standard vs. Flexible Environment
* Deploying Applications
* Autoscaling and Traffic Splitting
* Managing App Versions and Rollbacks

**Cloud Functions**

* Serverless Computing with Cloud Functions
* Event-Driven Architecture
* Integrating with Pub/Sub and Cloud Storage

**4. Networking and Content Delivery**

* Virtual Private Cloud (VPC) Fundamentals
* Subnets, Routes, and Firewalls
* VPC Peering and Shared VPC
* Load Balancers and Traffic Distribution
* HTTP(S), TCP/UDP, and Internal Load Balancing
* Hybrid Connectivity
* Cloud VPN and Cloud Interconnect
* Cloud DNS for Domain Name Management
* Content Delivery with Cloud CDN
* Network Performance and Troubleshooting

**5. Storage and Database Services**

**Cloud Storage**

* Buckets and Object Management
* Storage Classes (Standard, Nearline, Coldline, Archive)
* Data Encryption and Security
* Versioning and Lifecycle Policies

**Cloud SQL**

* Managed Relational Databases
* PostgreSQL, MySQL, SQL Server
* High Availability and Read Replicas
* Automated Backups and Point-in-Time Recovery

**Cloud Spanner**

* Globally Scalable Relational Database
* Horizontal Scaling and Consistency Models

**Firestore and Datastore**

* NoSQL Databases for Real-Time Data
* Firestore Modes: Native and Datastore

**Bigtable**

* Low-Latency NoSQL Database for Big Data
* HBase Compatibility and Use Cases

**6. Data Processing and Analytics**

**BigQuery**

* Data Warehousing and Analytics
* Writing and Running SQL Queries
* Data Ingestion and Export
* BigQuery ML for Machine Learning
* Integrating with Data Studio for Visualization

**Dataflow**

* Stream and Batch Data Processing
* Apache Beam Pipelines

**Dataproc**

* Managed Apache Hadoop and Spark Clusters
* Data Processing with Pig, Hive, and Spark

**Pub/Sub**

* Real-Time Messaging and Event Streaming
* Integrating Pub/Sub with Cloud Functions

**7. Machine Learning and AI on GCP**

* AI Platform (Vertex AI)
* Training and Deploying ML Models
* Model Monitoring and Versioning
* AutoML for No-Code Model Building
* Pre-trained ML APIs
* Vision API
* Speech-to-Text and Text-to-Speech APIs
* Natural Language Processing (NLP) APIs
* Building Predictive Models with BigQuery ML

**8. Monitoring and Logging**

* Cloud Monitoring and Operations
* Creating Dashboards and Alerts
* Monitoring System Performance
* Cloud Logging
* Analyzing and Exporting Logs
* Log-Based Metrics and Alerts
* Cloud Trace for Latency Monitoring
* Cloud Profiler for Performance Optimization

**9. DevOps and Automation**

* Infrastructure as Code (IaC) with Terraform and Deployment Manager
* CI/CD Pipelines with Cloud Build
* Integrating with GitHub and GitLab
* Cloud Scheduler for Automated Tasks
* Cloud Run for Containerized Applications
* Artifact Registry for Storing Container Images

**10. Security and Compliance**

* Security Best Practices on GCP
* Data Encryption with Cloud KMS (Key Management Service)
* Identity-Aware Proxy (IAP) for Application Security
* DLP (Data Loss Prevention) API for Sensitive Data Protection
* VPC Service Controls for Data Security

**11. Automation and Infrastructure Management**

* Terraform for IaC (Infrastructure as Code)
* Cloud Deployment Manager for Automated Configurations
* Cloud Shell and Cloud SDK for Command Line Operations
* Automating Workflows with Cloud Composer (Apache Airflow)

**12. Real-World Projects and Hands-On Labs**

* **Project 1:** Building a Scalable Web Application with Compute Engine and Load Balancer
* **Project 2:** Deploying a Microservices Architecture on GKE
* **Project 3:** Real-Time Data Streaming with Pub/Sub and Dataflow
* **Project 4:** Serverless Event-Driven Architecture with Cloud Functions
* **Project 5:** Machine Learning Model Deployment on Vertex AI

**13. Certification Preparation**

* **Associate Cloud Engineer (ACE)**
* **Professional DevOps Engineer**
* Practice Tests and Exam Strategies
* Mock Exams and Real-Life Scenario Practices

**14. Soft Skills and Interview Preparation**

* Problem-Solving Techniques for Cloud Challenges
* Communicating Cloud Solutions to Non-Technical Stakeholders
* Troubleshooting Scenarios and Root Cause Analysis
* Resume Building and Cloud Portfolio Presentation

**Educational Background**

* **Bachelor’s Degree in:**
* **BE / B.Tech / B.Sc / BCA in CS, IT, or Networking**
* **Master’s Degree**
* **MCA / M.Tech in Systems, Networking, Cloud**