

CISCO Certified Network Associate-I (CCNA-I):

Course Objectives	<ul style="list-style-type: none">• Fundamental networking concepts, including components, types, and reliable internet connections.• Configure Cisco IOS devices and network components using CLI for initial setup and IP addressing.• Implement physical and data link layer protocols, including cabling and Ethernet switching.• Master network layer addressing and routing, including IPv4, IPv6, subnetting, and VLSM schemes.• Apply transport and application layer protocols, including TCP/UDP operations, ICMP, DNS, DHCP, and security measures for network devices.
Course Outcomes	<ul style="list-style-type: none">• Configure Cisco IOS devices using the CLI.• Assign IP addresses to host devices.• Set up initial settings on Cisco IOS routers.• Implement initial settings, including passwords, IP addressing, and default gateway parameters on network switches and end devices.• Set up devices to use the default gateway.• Configure two active interfaces on Cisco IOS routers.• Deploy a VLSM addressing scheme.• Assign link-local addresses dynamically and implement a subnetted IPv6 addressing scheme.• Enhance security by configuring switches and routers with device hardening features.• Mitigate security threats by configuring network devices with advanced security features.• Diagnose and resolve network device issues.

Course Duration: 45 Hours

Course Curriculum:

UNIT I Basics of Networking and Protocols

Networking – Components, types, Internet Connections, Requirements of a reliable network, Internet Connections – LAN, WAN Interconnection Network trends - BYOD, online collaboration, video, and cloud computing, Network security threats, Basic Switch and End Device Configuration - Cisco IOS Access, IOS Navigation, command structure of Cisco IOS software, Basic Device Configuration - Configuring a Cisco IOS device using CLI, Save Configurations, Ports and Addresses, Configuring IP Addressing, Verify Connectivity Network Protocols – Rules, protocol suites, role of standards organizations in establishing protocols for network interoperability, TCP/IP model and the OSI model in standardization of communication process, Data Encapsulation, Data Access

UNIT II Introduction to data layer, physical layer

Physical layer protocols, services, and network media support communications across data networks, Physical Layer Characteristic, Copper Cabling, UTP Cabling, Fiber-Optic Cabling, Connection using wired and wireless media Number systems: decimal, binary, and hexadecimal systems - Data Link Layer- media access control in the data link layer in communication across networks - The characteristics of media access control methods on WAN and LAN topologies, the characteristics and functions of the data link frame - Ethernet Switching - Ethernet Frame, Ethernet MAC Address, MAC Address Table, Switch Speeds and Forwarding Methods

UNIT III Introduction to Network layer and Addressing

Network Layer: Network Layer Characteristics, IPv4 & IPv6 Packet, routing tables to direct packets to a destination network in network devices , function of fields in the routing table of a router. MAC & IP addressing, ARP, Operation of IPv6 neighbor discovery - Basic Router Configuration- Configure Initial Router Setting, Interfaces on a Cisco IOS router, default Gateway IPv4 Addressing - IPv4 Address Structure - public, private, and reserved IPv4 addresses., IPv4 Unicast, Broadcast, and Multicast, Types of IPv4 Addresses, Network Segmentation, Subnet an IPv4 Network - a /24 prefix, a /16 and /8 prefix - Variable Length Subnet Masking,

VLSM addressing scheme - IPv6 Addressing – Implementation & the need for IPv6 addressing, Representation, IPv6 Address types. GUA and LLA Static Configuration - configuring static global unicast and linklocal IPv6 network addresses. Dynamic Addressing for IPv6 LLAs – Configuration of link-local addresses, IPv6 Multicast Addresses, Subnetting an IPv6 Network

UNIT IV Introduction to Transport layer

ICMP Messages- how ICMP is used to test network connectivity, Ping and Traceroute Testing - Transport Layer - Operations of transport layer protocols in supporting end-to-end communication. Transportation of Data - the purpose of the transport layer in managing the transportation of data in end-to-end communication - Characteristics of the TCP & UDP, Port Numbers of TCP & UDP, TCP Communication Process - TCP session establishment and termination processes facilitate reliable communication, Reliability and Flow Control, UDP Communication - the UDP client processes to establish communication with a server.

UNIT V Introduction to Application Layer & Network Security

Application Layer - operation of application layer protocols in providing support to end-user applications - Application, Presentation, and Session - functions of the application layer, session layer, and presentation layer work together to provide network services to end user applications. - Operation of end user application in a peer-to-peer network, Web and Email Protocols, IP Addressing Services - DNS and DHCP operation, File Sharing Services – File transfer Protocols - Network Security Fundamentals - Security Threats and Vulnerabilities, Network Attacks – security vulnerabilities, Network Attack Mitigation - general mitigation techniques, Device Security - Configuring network devices with device hardening features to mitigate security threats. – Building a Small Network - Devices in a Small Network, protocols and applications used in a small network, Scale to Larger Network - how a small network serves as the basis of larger networks – Verify Connectivity – Using the output of the ping and tracert commands to verify connectivity and establish relative network performance - Host and IOS Commands, Troubleshooting Methodologies & Scenarios

Test Projects:

Use Cases:

Industry Use-Cases

(<https://docs.google.com/document/d/1fq18Fzt4Uf-TgWxwhOkjj-GSsCUwAPSR/edit?usp=sharing&oid=109616979950429013745&rtpof=true&sd=true>)

1. Packet Tracer - Basic Switch and End Device Configuration
2. Packet Tracer - Examine the ARP Table
3. Packet Tracer - Subnet an IPv4 Network
4. Packet Tracer - Configure Secure Passwords and SSH
5. Packet Tracer - Use Ping and Traceroute to Test Network Connectivity
6. Packet Tracer - VLSM Design and Implementation Practice
7. Packet Tracer - Design and Implement a VLSM Addressing Scheme
8. Packet Tracer - Implement a Subnetted IPv6 Addressing Scheme
9. Packet Tracer - Use ICMP to Test and Correct Network Connectivity
10. Packet Tracer - IPv6 Neighbor Discovery
11. Packet Tracer - Subnetting Scenario
12. Packet Tracer - TCP and UDP Communications
13. Packet Tracer - Investigate the TCP/IP and OSI Models in Action
14. Packet Tracer - Interpret show Command Output
15. Packet Tracer - Troubleshoot Default Gateway Issues
16. Packet Tracer - Secure Network Devices
17. Packet Tracer - Configure Secure Passwords and SSH
18. Packet Tracer - Configure IPv6 Addressing
19. Packet Tracer - Configure Initial Router Settings
20. Packet Tracer - Basic Device Configuration