Certificate Course Introduction to Computer Networking

Offered by Centre for Innovative Skill-Based Courses
Open Learning Development Centre, University of Delhi

Duration: 03 Months/48 Hours
Mode of Conduct: Offline
Eligibility: 12th Pass with Basic familiarity with computers is sufficient. No prior networking knowledge or professional experience is required.

Attendance Requirement: Minimum 80% attendance is compulsory for certification.

Target Audience

- Aspiring IT Professionals
- Experienced IT Professionals seeking skill enhancement
- Networking Engineers and technical support professionals

Course Introduction

This certificate course combines theoretical concepts with hands-on practical training to develop foundational skills in computer networking and network system configuration. The course introduces learners to networking principles, network devices, LAN/WAN technologies, wireless networking, IP addressing, subnetting, switching, VLANs, routing, and remote access.

The programme is designed to help learners understand how computer networks are planned, connected, configured, maintained, and supported. It also introduces current networking technologies and provides a foundation for pursuing further learning and professional certifications in networking and IT.

Course Objectives

The course aims to:

- Introduce fundamental concepts of computer networking.
- Develop an understanding of network devices and their functions.
- Understand LAN, WAN and wireless networking technologies.
- Introduce OSI and TCP/IP networking models.
- Develop knowledge of IPv4 addressing and subnetting.
- Understand switching, VLANs and trunking.
- Introduce static and dynamic routing concepts.
- Develop basic knowledge of wireless networking technologies.
- Provide practical understanding of network configuration and troubleshooting.
- Prepare learners for further professional certifications in networking.

Detailed Course Structure

Module	Module Title	Major Topics
Module 1	**Introduction to Computer Networks**	Definition, goals and characteristics of networks; need for networking; network topologies; types of networks; protocols and standards; network performance metrics; client-server computing
Module 2	**Network Fundamentals**	Repeaters, hubs, bridges, switches, VLANs, PoE, routers, routing tables, wireless access points, transmission media, connectors and NICs
Module 3	**Network Models**	Network models; OSI model; TCP/IP model; comparison of OSI and TCP/IP; protocols at different layers; Internet Protocol and IP versions; introduction to LANs
Module 4	**LAN & Subnetting**	Network cables and connectors; MAC address learning; PoE; IPv4 classes; binary numbers; subnetting; CIDR; FLSM; VLSM
Module 5	**Remote Access**	Introduction to Telnet; introduction to SSH
Module 6	**Switching, VLAN & Trunks**	Switching; VLANs; trunking; access ports; trunk ports; inter-VLAN routing; Spanning Tree Protocol; CST, PVST, PVST+; STP port states
Module 7	**Routing – Static & Dynamic**	Introduction to routing; router memories; static and dynamic routing; RIP; OSPF; BGP; EIGRP; Access Lists; NAT
Module 8	**Wireless Technology**	Wireless devices; AP and WLC; wireless standards; wireless communication; BSS, ESS and IBSS; wireless network extension types; radio frequency; WLAN frequency bands; 2.4 GHz vs 5 GHz

Module-wise Detailed Curriculum

Module 1: Introduction to Computer Networks

- Definition, goals and characteristics of computer networks
- Need for computer networks:
    - Resource sharing
    - Communication
    - Internet access
    - Remote access
- Network topologies:
    - Bus
    - Ring
    - Star
    - Mesh
    - Hybrid
    - Tree
- Types of networks:
    - LAN
    - WAN
    - MAN
    - PAN
    - CAN
    - SAN
    - EPN
- Network protocols and standards:
    - IEEE
    - IETF
    - ISO
- Network performance metrics:
    - Throughput
    - Latency
    - Jitter

    - Packet loss
- Client-server computing:
    - 2-Tier
    - 3-Tier

Module 2: Network Fundamentals

- Repeaters, hubs and bridges
- Switches:
    - Functions
    - Types
    - VLANs
    - Power over Ethernet (PoE)
- Routers:
    - Functions
    - Types
    - Routing tables
    - Configurations
- Wireless Access Points:
    - Functions
    - Standards
    - Configurations
- Transmission media:
    - Twisted-pair cables
    - Coaxial cables
    - Fibre optics
    - Wireless media
- Network connectors
- Network Interface Cards (NICs)

Module 3: Network Models

- Introduction to network models
- OSI Model
- TCP/IP Model

- Difference between OSI and TCP/IP models
- Protocols over different layers
- Internet Protocol (IP)
- Versions of IP
- Introduction to LANs

Module 4: LAN & Subnetting

- Cables used in networking
- Network connectors:
    - RJ-45
    - SFP
- How a switch learns MAC addresses
- Power over Ethernet (PoE)
- IPv4 classes and their uses
- Introduction to subnetting
- Basics of binary numbers
- Subnetting in binary
- Classless Inter-Domain Routing (CIDR)
- Fixed Length Subnet Mask (FLSM)
- Variable Length Subnet Mask (VLSM)

Module 5: Remote Access

- Introduction to Telnet
- Introduction to SSH
- Basic concepts of remote network access

Module 6: Switching, VLAN & Trunks

- Introduction to switching
- Introduction to VLANs
- Trunks
- Access ports
- Trunk ports
- Inter-VLAN routing
- Introduction to Spanning Tree

- Types of STP:
    - CST
    - PVST
    - PVST+
- Per-VLAN Spanning Tree
- Spanning Tree port states

Module 7: Routing – Static & Dynamic

- Introduction to routing
- Router memories
- Types of routing:
    - Static routing
    - Dynamic routing
- Routing protocols:
    - RIP
    - OSPF
    - BGP
    - EIGRP
- Operations of routing protocols
- Access Lists
- Network Address Translation (NAT)

Module 8: Wireless Technology

- Wireless devices:
    - Access Point (AP)
    - Wireless LAN Controller (WLC)
- Common wireless standards
- Basics of wireless communication
- Wireless topologies:
    - BSS
    - ESS
    - IBSS
- Wireless Network Extension Types:

    - Wireless Repeater
    - Workgroup Bridge
    - Outdoor Bridge
    - Mesh Network
- Radio Frequency (RF) and its working
- WLAN frequency bands
- Difference between:
    - 2.4 GHz
    - 5 GHz

Career Opportunities

After successful completion of the course, learners may explore entry-level and support-oriented opportunities such as:

- Technical Support Engineer
- IT Support Specialist
- Network Support Engineer
- Network Engineer
- Network Administrator
- Systems Administrator
- Cybersecurity Support/Specialist roles
- Network Consultant
- Wireless Network Engineer

Future Learning & Certification Pathways

The course can provide a foundation for pursuing advanced networking certifications such as:

1. Certified Network Associate
2. CompTIA Security+
3. CompTIA Network+
4. AWS Certified Advanced Networking – Specialty
5. VMware Certified Technical Associate – Network Virtualisation (VCTA-NV)

Overall Course Outcome

On successful completion, learners will have a foundational understanding of **computer networking, network devices, network models, IP addressing, subnetting, switching, VLANs, routing and wireless technologies**, providing a base for further studies and career development in the IT and networking sector.