ONE YEAR DIPLOMA IN NETWORKING PROFESSIONAL CERTIFICATE

Course Outline:

S.L.	Modules	Durations	Vendor Certification	Techlight Certification
1.	CompTIA A+	36 Hours	A+	**One Year** **Diploma in Networking Professional Certificate**
2.	Cisco Certified Natwork Associate (CCNA)	72 Hours	CCNA	
3.	MicroTik + OLT	36 Hours	MTCNA	
4.	Red Hat (RHCSA & RHCE)	90 Hours	RHCSA & RHCE	
5.	Cisco Certified Network Professional (CCNP)	100 Hours	CCNP	
6.	Windows Server 19	40 Hours	Active Directory	
		374 Hours		

TECHLIGHT LAB CONFIGURATION:

PC Configuration:

1. CPU: Core i5, 3.20GHz
2. SSD: 2 x 1TB
3. RAM: 8-16 GB DDR4

Practical Class Requirements:

1. Extra 02 PCs for Assembling (Those can be Backdated such as: Core i3)
2. Some Damaged Hardware
3. CISCO ISR Router (No. 01), That can be 2nd Hand but 100% working
4. CISCO Manageable Switch (No. 02), Those can be 2nd Hand but 100% working
5. MikroTik Router (No. 05) Low cost for 15 students.

Notes:

1. **For every topic, there will be one midterm and one final test. Short question and multiple-choice questions make up the exam type.**
2. **For every module, we will also take a midterm and final practical test.**
3. **90% attendance is required of each trainee for the whole course.**
4. **Exam retakes are not permitted for any unjustified cause.**
5. **Only one opportunity to retake an exam in a module for a legitimate cause.**
6. **If there are two or more retakes throughout the whole course, the trainee's admittance will be terminated.**
7. **For every retake exam, punishment will be added.**

Exam Grading System:

SL	Letter Grade	Percentage	GPA
1	**A+**	90-100	**5**
2	**A**	80-89	**4.5**

3	**B+**	70-79	**4**
4	**B**	60-69	**3.5**
5	**C**	50-59	**3**
6	**D**	40-50	**2**
7	**F**	30-40	**1**

Marks Distribution of Exam:

SL	Module	Midterm Exam (40 %)	Final Exam (60%)	Total Marks
1	**CompTIA A+**	Written Exam	Written Exam	100
		Practical Exam	Practical Exam	
2	**CCNA**	Written Exam	Written Exam	100
		Practical Exam	Practical Exam	
3	**MicroTik + OLT**	Written Exam	Written Exam	100
		Practical Exam	Practical Exam	
4	**Red Hat (RHCSA & RHCE)**	Written Exam	Written Exam	200
		Practical Exam	Practical Exam	
5	**CCNP (Core + concentration)**	Written Exam	Written Exam	200
		Practical Exam	Practical Exam	
6	**Windows Server 19**	Written Exam	Written Exam	100
		Practical Exam	Practical Exam	

Exam Planning:

SL	Module	Midterm Exam Schedule	Midterm Exam Marks distribution	Final Exam Schedule	Final Exam Marks distribution
1	CompTIA A+	After 6 classes	Written -20	After 12 classes of this module	Written -30
			Practical -20		Practical - 30
2	CCNA	After 10 classes	Written -20	After 29 classes of this module	Written -30
			Practical -20		Practical - 30
3	MicroTik + OLT	After 6 classes	Written -40	After 12 classes of this module	Written -60
4	Red Hat (RHCSA & RHCE)	After 15 classes	Written -20	After 31 classes of this module	Written - 30
			Practical -20		Practical - 30
5	CCNP(CORE)	After 15 classes	Written -20	After 31 classes of this module	Written - 30
			Practical -20		Practical - 30
	CCNP (concentration)	After 15 classes	Written -20	After 31 classes of this module	Written - 30
			Practical -20		Practical - 30
6	Windows Server 19	After 16 classes	Written -20	After 31 classes of this module	Written - 30
			Practical -20		Practical - 30

Module Details

CompTIA A+ (COMPUTER HARDWARE, Operation & Network)

S. L	Content	Hours
1	What Is Computer and history Information On PC & How It Works Basic Electronics & Measuring Instruments	3 Hours
2	Architecture Of the System Hard drive disk details Computer Hardware details	3 Hours
3	Personal Computer Components System Unit Components Storage Devices	3 Hours
4	PC Assembling	3 Hours
5	Installing and Configuring Operating Systems and Software Create Bootable Disk How To Activate Windows Managing Users and Groups Change Password Break Administrator Password Software Uninstall	3 Hours
6	Virtualization Software Installation & Configuration Installing and Configuring Virtual Machine	3 Hours
7	Hard Drive Partition, Format File System Change BASIC Disk to Dynamic Disk & Vice-Versa Create Virtual Memory HDD Partition Resize RAID Configuration	3 Hours
8	IPv4 Addressing	3 Hours
9	Configure LAN Network Configure Printer Share	3 Hours
10	Configure LAN Network Configure Printer Share	3 Hours
11	Antivirus Software Firewall	3 Hours
12	Troubleshoot CPU Troubleshoot RAM Troubleshoot Startup Troubleshoot Power Supplies	3 Hours

CCNA (200-301)

SL	Name of Contents	Hours
1	1. Introduction of Networking 2. Network Basic (LAN/MAN/WAN) Theory	3 Hours
2	1. Network Topology Theory 2. Network Devices Details Theory	3 Hours
3	1. Connection Mode, Type and media Theory 2. Router Introduction Theory	3 Hours
4	1. Router Feature Theory 2. Network Protocols & Port Theory 3. Gateway Theory	3 Hours
5	1. Domains (Collision/Broadcast) Theory 2. Cable Description (STP/UTP/Optical Fiber) & Configuration	3 Hours
6	1. OSI Model Theory 2. TCP/IP Model Theory	3 Hours
7	1. OSI Model Encapsulation Process 2. How ARP Protocol work in LAN/MAN/WAN (Details)	3 Hours
8	1. IPv4 Address: IPv4 Construction, Classes, Differences Theory	3 Hours
9	1. Subnetting CIDR (Subnet Mask, Wild Mask, Prefix)	3 Hours
10	1. Subnetting (VLSM)	3 Hours
11	1. IPv4 Summarization, IPv4 Supper netting, Network Identification Process	3 Hours
12	1. Router Basic Details 2. Router Basic Configuration 3. Routing Table	3 Hours
13	1. Network Route Details 2. Static Routing 3. Default Routing	3 Hours
14	1. DHCP Server & DHCP Relay Agent Configuration 2. Remote Access Configuration (Telnet/SSH)	3 Hours
15	1. Dynamic Routing Protocols (IGP & EGP) 2. Difference between Major Dynamic Routing Protocols	3 Hours
16	1. OSPF Configuration (Theory & Practical) 2. OSPF Virtual Link Configuration	3 Hours
17	1. Standard ACL Configuration 2. Extended ACL Configuration	3 Hours
18	1. Switch Basic (STP/RSTP) 2. Switch Configuration	3 Hours
19	1. VLAN Configuration 2. Inter-VLAN Configuration	3 Hours
20	1. Switch Load Balancing & Fail Over (Ether Channel) Configuration 2. Layer 2 Security	3 Hours

21	1. NAT Configuration 2. PAT Configuration 3. VPN Configuration	3 Hours
22	1. Router Administrative Password Break 2. NTP Configuration 3. Backup & Recovery Configuration	3 Hours
23	1. WAN Authentication (HDLC, PPP, PAP & CHAP) Configuration 2. PPPoE Server and PPPoE Client Configuration	3 Hours
24	1. IPv6 Details Theory	3 Hours
25	1. OSPFv3 configuration with IPV6	3 Hours
26	1. WLAN Theory & Configuration 2. Router Fail Over and Load Balancing Configuration	3 Hours
27	**Network Automation & Programmability:** 1. GNS3 Lab Setup for Network Automation 2. Python 3 Basic 3. Basic Network Automation using Python 3 4. Full Project Network Automation using Python 3	6 Hours

MikroTik + OTL

S.L.	Content	Hours
1	Introduction MikroTik Lab on Virtual Environment	3 Hours
2	MikroTik Basic Configuration DHCPServer Configuration DHCPClient Configuration Default Routing Network Address Translation NAT	3 Hours
3	User & Group Configuration Firewall Configuration	3 Hours
4	Bandwidth Management Backup & restore	3 Hours
5	NTP Client Configuration Wireless Configuration Bridge Configuration	3 Hours
6	VLAN Configuration Hotspot Configuration	3 Hours
7	PPPoE Server PPPoE client	3 Hours
8	Static Route OSPF Routing	3 Hours
9	BGP Configuration	3 Hours
10	VPN Configuration	3 Hours
11	Proxy Server	3 Hours
12	MikroTik Load Balancing Over Multiple Gateway Load Balancing & Failover	3 Hours

Red Hat (RHCSA & RHCE)

S.L.	Content	Hours
1	Introduction & History of Linux	3 Hours
2	Working withLinux CLI	3 Hours
3	Linux File System Hierarchy	3 Hours
4	Managing Directory, Files Search String Find Keyboard Shortcut Commands	3 Hours
5	Creating, Viewing, and Editing Text Files Using VIM/Echo Creating Hard Link & Symbolic Link	3 Hours
6	Managing Local Linux Users and Groups Search String GREP	3 Hours
7	Linux File System Permissions Management	3 Hours
8	Access Control List Archive Scheduling Future Linux Tasks using Crontab	3 Hours
9	Monitoring and Managing Linux Processes Controlling the Boot Process Linux Root Password Break Protect GRUB2 Bootloader Controlling Services and Daemons	3 Hours
10	Static Network Configuration IPv4 ipv6 network Bridge Configuration	3 Hours
11	DHCP Server Configuration Link Aggression	3 Hours
12	Configuring and Securing Open SSH Service Archiving and Copying Files Between Systems	3 Hours
13	Automated Installation DNF/YUM ServerConfiguration Installing and Updating Software Packages	3 Hours
14	Adding Disks, Partitions, and File Systems to a Linux System	3 Hours
15	Logical Volume Management	3 Hours
16	Managing SELinux Security IPA Client Configuration NTP Serverand Client Configuration	3 Hours
17	Automating Installation with Kickstart	3 Hours
18	Ansible Automation	3 Hours
19	Ansible Automation	3 Hours
20	Ansible Automation	3 Hours
21	Default Web Server Virtual Web Server Applying Security on Web Server	3 Hours
22	Secure Web Server HTTPS Dynamic Web Server	3 Hours
23	FTP Server & Secure FTP	3 Hours

24	NFS Server& Client SAMBA Server & Client	3 Hours
25	iSCSI Target and Initiator Configuration	3 Hours
26	DNS Server Configuration POSTFIX Mail Server	3 Hours
27	Installing & Configuring MariaDB Database Apache, MariaDB & PHP My-Admin Collaboration	3 Hours
28	Configuring User Environment Bash Scripting	3 Hours
29	Firewall Configuration IP Tables Configurations	3 Hours
30	Zimbra Mail Server Configuration	3 Hours
31	IPA Server Configuration	3 Hours

Cisco Certified Network Professional (CCNP)

- # 1.0 Architecture
  - 1.1 Explain the different design principles used in an enterprise network
    - 1.1.a High-level enterprise network design such as 2-tier, 3-tier, fabric, and cloud
    - 1.1.b High availability techniques such as redundancy, FHRP, and SSO
  - 1.2 Describe wireless network design principles
    - 1.2.a Wireless deployment models (centralized, distributed, controller-less, controller-based, cloud, remote branch)
    - 1.2.b Location services in a WLAN design
    - 1.2.c Client density
  - 1.3 Explain the working principles of the Cisco SD-WAN solution
    - 1.3.a SD-WAN control and data planes elements
    - 1.3.b Benefits and limitations of SD-WAN solutions
  - 1.4 Explain the working principles of the Cisco SD-Access solution
    - 1.4.a SD-Access control and data planes elements
    - 1.4.b Traditional campus interoperating with SD-Access
  - 1.5 Interpret wired and wireless QoS configurations
    - 1.5.a QoS components
    - 1.5.b QoS policy
  - 1.6 Describe hardware and software switching mechanisms such as CEF, CAM, TCAM, FIB, RIB, and adjacency tables
- # 2.0 Virtualization
  - 2.1 Describe device virtualization technologies
    - 2.1.a Hypervisor type 1 and 2
    - 2.1.b Virtual machine
    - 2.1.c Virtual switching

- 2.2 Configure and verify data path virtualization technologies
  - 2.2.a VRF
  - 2.2.b GRE and IPsec tunneling
- 2.3 Describe network virtualization concepts
  - 2.3.a LISP
  - 2.3.b VXLAN

3.0 Infrastructure

- 3.1 Layer 2
  - 3.1.a Troubleshoot static and dynamic 802.1q trunking protocols
  - 3.1.b Troubleshoot static and dynamic EtherChannels
  - 3.1.c Configure and verify common Spanning Tree Protocols (RSTP, MST) and Spanning Tree enhancements such as root guard and BPDU guard
- 3.2 Layer 3
  - 3.2.a Compare routing concepts of EIGRP and OSPF (advanced distance vector vs. link state, load balancing, path selection, path operations, metrics, and area types)
  - 3.2.b Configure simple OSPFv2/v3 environments, including multiple normal areas, summarization, and filtering (neighbor adjacency, point-to-point, and broadcast network types, and passive-interface)
  - 3.2.c Configure and verify eBGP between directly connected neighbors (best path selection algorithm and neighbor relationships)
  - 3.2.d Describe policy-based routing
- 3.3 Wireless
  - 3.3.a Describe Layer 1 concepts, such as RF power, RSSI, SNR, interference, noise, bands, channels, and wireless client devices capabilities
  - 3.3.b Describe AP modes and antenna types
  - 3.3.c Describe access point discovery and join process (discovery algorithms, WLC selection process)
  - 3.3.d Describe the main principles and use cases for Layer 2 and Layer 3 roaming
  - 3.3.e Troubleshoot WLAN configuration and wireless client connectivity issues using GUI only
  - 3.3.f Describe wireless segmentation with groups, profiles, and tags
- 3.4 IP Services
  - 3.4.a Interpret network time protocol configurations such as NTP and PTP
  - 3.4.b Configure NAT/PAT
  - 3.4.c Configure first hop redundancy protocols, such as HSRP, VRRP
  - 3.4.d Describe multicast protocols, such as RPF check, PIM and IGMP v2/v3

- # 4.0 Network Assurance
  - 4.1 Diagnose network problems using tools such as debugs, conditional debugs, traceroute, ping, SNMP, and syslog
  - 4.2 Configure and verify Flexible NetFlow
  - 4.3 Configure SPAN/RSPAN/ERSPAN
  - 4.4 Configure and verify IPSLA
  - 4.5 Describe Cisco DNA Center workflows to apply network configuration, monitoring, and management
  - 4.6 Configure and verify NETCONF and RESTCONF
- # 5.0 Security
  - 5.1 Configure and verify device access control
    - 5.1.a Lines and local user authentication
    - 5.1.b Authentication and authorization using AAA
  - 5.2 Configure and verify infrastructure security features
    - 5.2.a ACLs
    - 5.2.b CoPP
  - 5.3 Describe REST API security
  - 5.4 Configure and verify wireless security features
    - 5.4.a 802.1X
    - 5.4.b WebAuth
    - 5.4.c PSK
    - 5.4.d EAPOL (4-way handshake)
  - 5.5 Describe the components of network security design
    - 5.5.a Threat defense
    - 5.5.b Endpoint security
    - 5.5.c Next-generation firewall
    - 5.5.d TrustSec and MACsec
    - 5.5.e Network access control with 802.1X, MAB, and WebAuth
- # 6.0 Automation
  - 6.1 Interpret basic Python components and scripts
  - 6.2 Construct valid JSON-encoded files
  - 6.3 Describe the high-level principles and benefits of a data modeling language, such as YANG
  - 6.4 Describe APIs for Cisco DNA Center and vManage
  - 6.5 Interpret REST API response codes and results in payload using Cisco DNA Center and RESTCONF
  - 6.6 Construct an EEM applet to automate configuration, troubleshooting, or data collection

6.7 Compare agent vs. agentless orchestration tools, such as Chef, Puppet, Ansible, and SaltStack

Details Course Outlines- ENARSI (300-410)

Module-01

Foundation Class

- Recall TCP/IP and OSI Model
- Packet Encapsulation over IP Network
- Address Resolution Protocol (ARP)
- Learning and Forwarding Mechanism of Switch
- Routing Fundamentals
- Cisco Express Forwarding (CEF)

Module-02

IPv6 Fundamental

- Introduction to IPv6
- IPv6 Address Types
- IPv6 Addressing and Subnetting
- EUI-64 Process
- IPv6 Neighbor Discovery Protocol
- IPv6 Stateless Auto configuration
- IPv6 Router Advertisement Preference
- IPv6 Static Routing

Module-3 & 4

EIGRP

- Overview of EIGRP
- Basic EIGRP Configuration
- EIGRP Neighbor and Topology Table
- EIGRP Neighbor Adjacency
- EIGRP Authentication
- EIGRP Static Neighbor
- EIGRP Summarization Configuration
- EIGRP Dual Finite State Machine (FSM)
- EIGRP Named Mode
- EIGRP Authentication per Neighbor
- EIGRP Variance
- EIGRP Unequal Cost Load Balancing
- EIGRP K values Formula
- EIGRP K Values Configuration
- EIGRP Stub
- EIGRP IPv6 Configuration

- EIGRP IPv6 Route Summarization
- Troubleshoot EIGRP Neighbor Adjacency
- EIGRP Queries and Stuck in Active (SIA)

Module-5 & 6

OSPF

- Overview of Link State Routing Protocol
- OSPF Basic
- OSPF Packets and Neighbor Discovery
- OSPF Router ID
- OSPF DR/BDR Election
- OSPF LSA Types
- OSPF Plain-Text Authentication
- OSPF MD5 Authentication
- OSPF Stub Area
- OSPF Totally Stub Area
- OSPF Not-So-Stubby-Area (NSSA)
- OSPF Totally NSSA Area
- OSPF Path Selection Process
- OSPF Virtual Link
- OSPF Virtual Link Authentication
- OSPF Summarization Configuration
- Troubleshooting OSPF Neighbor Adjacency
- Troubleshooting OSPF Route Advertisement
- OSPFv2 vs OSPFv3
- OSPFv3 IPv6 Configuration
- BGP Neighbor Adjacency States
- BGP Messages BGP Private and Public AS Range eBGP Configuration iBGP Configuration BGP Synchronization eBGP Multi-Hop
- BGP Next Hop Self
- BGP Next Hop Self Address Tracking
- BGP Peer Groups
- BGP Extended Access-list Filtering
- BGP Prevent Transit AS
- BGP 4-byte AS Number
- BGP Remove Private AS
- BGP Route Reflector
- BGP Route Refresh Capability
- Multi-Protocol BGP (MP-BGP)
- BGP IPv6 Route Filtering
- BGP Prefix Independent Convergence (PIC)
- BGP Attributes and Path Selection
- BGP Weight Attribute
- BGP Local Preference Attribute
- BGP AS Path Prepending
- BGP Origin Code Attribute

- BGP Metric (MED) Attribute
- BGP Additional Paths
- Troubleshooting BGP Neighbor Adjacency
- Troubleshooting BGP Route Advertisement

Module-07

Redistribution

- Introduction to Redistribution
- Metric Redistribution
- AD Redistribution
- Route Tagging to Prevent Routing Loop
- Troubleshooting IPv4 and IPv6 Redistribution

Module-8 & 9

- Policy Based Routing (PBR)
- IPSLA
- VRF Lite
- GRE
- DMVPN
- IPSec

Module-10, 11 & 12

Overview of BGP

Module-13 & 14

MPLS

- Introduction to MPLS
- MPLS Labels and Devices
- MPLS Label Distribution Protocol (LDP)
- MPLS LDP Label Filtering
- MPLS Layer 3 VPN
- MPLS L3 VPN Configuration
- MPLS VPN L3 BGP Allow AS-In
- MPLS L3 VPN BGP Override
- MPLS L3 VPN PE-CE EIGRP
- MPLS L3 VPN PE-CE OSPF
- IPv6 over MPLS 6PE 6VPE
- MPLS L2 VPN: VPWS

Module-15

DHCP

- Introduction to DHCP
- DHCP Server
- DHCP Client
- DHCP Relay Agent
- DHCP Client Identifier
- DHCP Static Binding
- Troubleshooting DHCP
- DHCPv6 Server
- DHCPv6 IPv6 Prefix Delegation

Module-16

IPv6 Security

- IPv6 Access-list Filtering
- IPv6 First Hop Security Features
- IPv6 RA Guard
- IPv6 DHCPv6 Guard
- IPv6 ND Inspection
- IPv6 Source Guard

Module-17 & 18

Device Security

- AAA Authentication
- AAA Configuration on Cisco Switch
- AAA Local Command Authorization
- Standard Access-List
- Extended Access-List
- Time-based Access-List
- IPv6 Access-List
- Unicast Reverse Path Forwarding (uRPF)
- Management Plane Protection (MPP)
- Control Plane Policing (CoPP)

Module-19

Device Management

- Router Security Policy

- User mode and Privileged mode Security
- Cisco IOS Telnet Server and Client
- SSH Configuration
- Upgrade Cisco IOS Image
- Cisco IOS Boot System Image

Module-20

Network Monitoring

- Introduction to SNMP
- SNMPv2 Configuration
- SNMPv3 Configuration
- Configuration Change Notification Logging
- Syslog Messages
- Conditional Debug
- Introduction to Cisco NetFlow
- Configuring NetFlow

Windows Server 19

S.L.	Content	Hours
Chapter 1	**Install Windows Servers in host and compute environments**	3 Hours
1	Skill 1.1: Install, upgrade, and migrate servers and workloads Determine Windows Server 2016 installation requirements Determine appropriate Windows Server 2016 editions per workloads Install Windows Server 2016 Install Windows Server 2016 features and roles Install and configure Windows Server Core Skill 1.2: Install and configure Nano Server Determine appropriate usage scenarios and requirements for Nano Server	3 Hours
2	Skill 1.3: Create, manage, and maintain images for deployment Plan for Windows Server virtualization Update images with patches, hotfixes, and drivers Install Roles and Features in offline images Make Bootable USB Flash Drive Reset Administrator Password Server 2016	3 Hours
Chapter 2		3 Hours
3	Skill 2.1: Install and configure domain controllers AD DS fundamentals Install a new forest Add or remove a domain controller Install AD DS on a Server Core installation	3 Hours

4	Skill 2.2: Create and manage Active Directory users and computers Create, copy, configure, and delete users and computers Implement offline domain join Configure user rights Perform bulk Active Directory operations Skill 2.3: Create and manage Active Directory groups and organizational units Create and manage groups Create and manage OUs Delegate management of Active Directory with groups and OUs	3 Hours
Chapter 3		3 Hours
5	Skill 3.1: Configure service authentication and account policies Configure account policies Configure and apply Password Settings Objects Delegate password settings management Skill 3.2: Maintain Active Directory Manage Active Directory offline Active Directory backup and recovery Manage Read Only Domain Controllers Managing AD DS replication	3 Hours
Chapter 4		3 Hours
6	Skill 4.1: Create and manage Group Policy Objects Configure multiple local Group Policies Overview of domain-based GPOs Manage starter GPOs Configure GPO links Back up, restore, import, and copy GPOs Create and configure a migration table Reset default GPOs Delegate Group Policy management Detect health issues using the Group Policy Infrastructure Status dashboard	3 Hours
7	Skill 4.2: Configure Group Policy Processing Configure processing order and precedence Configuring inheritance Configure security filtering and WMI filtering Configure loopback processing Configure and manage slow-link processing and Group Policy caching Configure client-side extension behavior Force a Group Policy update Skill 4.3: Configure Group Policy settings Configure software installation Configure scripts Import security templates Configure folder redirection Configure administrative templates Skill 3.4: Configure Group Policy preferences	3 Hours

	Configuring Group Policy preferences Configure item-level targeting	
Chapter 5	**Implement storage solutions**	3 Hours
8	Skill 5.1: Configure disks and volumes Configure sector sizes appropriate for various workloads Configure GUID partition table (GPT) disks Create VHD and VHDX files using Server Manager or Windows PowerShell Mount Virtual Hard Disks (VHDs) Determine when to use NTFS and ReFS File Systems Configure NFS and SMB shares using Server Manager Configure SMB share and session settings using Windows PowerShell Configure SMB server using Windows PowerShell Configure file and folder permissions	3 Hours
9	Skill 5.2: Implement server storage Configure storage pools Implement simple, mirror, and parity storage layout options Configure tiered storage Configure iSCSI target and initiator Configure Datacenter Bridging (DCB)	3 Hours
10	Skill 5.3: Implement data deduplication Implement and configure deduplication Implement a backup and restore solution with deduplication	3 Hours
Chapter 6 **11**	Block USB Drives and Removable Media IE Restrict using Starter GPO Deploying Software using Group Policy	3 Hours
Chapter 7 **12**	FSRM Server 2016 Installing and Configuring Print Server	3 Hours
Chapter 8 **13**	Deploying Software using Group Policy Bit locker server 2016 Group Policy Central Store	3 Hours
Chapter 9 **14**	Deploy Remote App Configure Folder Redirection Disable Control Panel Create Home Folder Hide C Drive Using Group Policy	3 Hours
Chapter 10	**Implement Hyper-V**	3 Hours
15	Skill 11.1: Move and convert VMs from previous versions of Hyper-V to Windows Server 2016 Hyper-V Export and import VMs Implement Discrete Device Assignment (DDA) Configure MAC addresses	3 Hours
16	Skill 11.2: Configure Hyper-V storage Create VHDs and VHDX files using Hyper-V Manager Create shared VHDX files Configure differencing disks Modify virtual hard disks Configure pass-through disks Resize a virtual hard disk	3 Hours

Chapter 11	**Implement Windows containers**	3 Hours
17	Skill 12.1: Deploy Windows containers Install and configure Windows Server Container Host in physical or virtualized environments Install and configure Windows Server container host to Windows Server Core or Nano Server in a physical or virtualized environment Install Docker on Windows Server and Nano Server Configure Docker Daemon start-up options Install a base operating system Tag an image Uninstall an operating system image Create Windows Server containers Create Hyper-V containers	3 Hours
Chapter 12	**Maintain and monitor server environments**	3 Hours
18	Skill 13.1: Windows Deployment Service in Windows Server 2019	3 Hours
19	Skill 13.2: Implement Windows Server Update Services (WSUS) solutions Perform backup and restore operations using Windows Server Backup	3 Hours
Chapter 13	**Implement Domain Name System**	3 Hours
20	Skill 14.1 Install and configure DNS servers Skill 14.2: Create and configure DNS zones and records	3 Hours
21	Skill 14.3: DNS Security	3 Hours
Chapter 14	**Implement DHCP**	3 Hours
22	Skill 15.1: Install and configure DHCP Configure DHCP relay agent and PXE boot	3 Hours
23	Skill 15.2: Configure high availability using DHCP failover Backup and restore the DHCP database	3 Hours
Chapter 15	**Implement IP address management (IPAM)**	3 Hours
24	Skill 16.1: Install and configure IP address management IPAM Architecture	3 Hours
Chapter 16		3 Hours
25	Skill 17.1 Implement network connectivity solutions Implement NAT Configure routing Skill 9.2: Implement VPN and DirectAccess solutions	3 Hours
Chapter 17		3 Hours
26	Skill 18.1: Implement IPv4 and IPv6 addressing Implement IPv4 addressing Implement IPv6 addressing Configure interoperability between IPv4 and IPv6 Configure IPv4 and IPv6 routing Configure BGP	3 Hours
27	Skill 18.2: Implement DFS and branch office solutions Install and configure DFS namespaces Configure DFS replication	3 Hours
Chapter 18		3 Hours
28	Skill 19.1: Implement high performance network solutions Implement NIC teaming	3 Hours
Chapter 19		3 Hours

29	Skill 20.1: Implement high availability and disaster recovery options in Hyper-V Implement Hyper-V Replica Implement live migration Implement shared nothing live migration 3 Hours Configure CredSSP or Kerberos authentication protocol for Live Migration Implement storage migration	3 Hours
30	Skill 20.2: Manage failover clustering Configure role-specific settings, including continuously available shares	3 Hours
31	Skill 20.3: Implement Network Load Balancing (NLB)	3 Hours