Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister's Hunarmand Pakistan Program

"Skills for All"

Course Contents / Lesson Plan

Course Title: Certificate in Cisco Network Administration

Duration: 3 Months

Revised Edition

Trainer Name	
Course Title	**Certificate in Cisco Network Administration**
Objectives and Expectations	**Employable skills and hands-on practice for Certificate in Cisco Network Administration** This Course will cover the theory, design, engineering, and installation of networks to connect digital computers. The course will prepare students to plan and implement a network. Also includes peer-to-peer networks, the client-server model, network operating systems, and an introduction to wide-area networks. Understanding with different Network Architecture, Designing Techniques, Management and configuration techniques with hands on experience. Troubleshooting and monitoring a network while providing High Availability to Organization/Company. Also Securing network form unauthorized access and attackers by implementing Security levels and access. The Course Objectives and Expectations are: • Understand the principles and concepts on computer networks. • Understand general-purpose computer networks. • Understand the computer network applications. • Understand the knowledge on designing and building a complete Network system. • Understanding of Networking techniques • Campus Design & Enterprise Network • Configuration of Advance Routing • Management of Network • Troubleshooting Skills • Network Monitoring Skills • Network Designing • High Availability of Network • Remote Site Management • Programmability and Automation **Main Expectations:** In short, the course under reference should be delivered by professional instructors in such a robust hands-on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion. This course thus clearly goes beyond the domain of the traditional training practices in vogue and underscores an expectation that a market-centric approach will be adopted as the main driving force while delivering it. The instructors should therefore be experienced enough to be able to identify the training needs for the possible market roles available out there. Moreover, they should also know the strengths and weaknesses of each trainee to prepare them for such market roles during/after the training. • Specially designed practical tasks to be performed by the trainees have been included in the Annexure-I to this document. The record of all tasks performed individually or in groups must be preserved by the management of the training Institute clearly labeling name, trade, session, etc. so that these are ready to be physically inspected/verified through monitoring visits from time to time. The weekly distribution of tasks has also been indicated in the weekly lesson plan given in this document. • To materialize the main expectations, a special module on **Job Search & Entrepreneurial Skills** has been included in the latter part of this course through which, the trainees will be made aware of the Job search techniques in the local as well as international job markets (Gulf countries). Awareness around the visa process and immigration laws of the most favored labor destination countries also form a part of this module. Moreover, the trainees would also be encouraged to venture into self-employment and exposed to the main requirements in this regard. It is also expected that a sense of civic duties/roles and responsibilities will also be inculcated in the trainees to make them responsible citizens of the country. • A module on **Work Place Ethics** has also been included to highlight the importance of good and positive behavior in the workplace in the line with the best practices elsewhere in the world. An outline of such qualities has been given in the Appendix to this document.

Its importance should be conveyed in a format that is attractive and interesting for the trainees such as through PPT slides +short video documentaries. Needless to say that if the training provider puts his heart and soul into these otherwise non-technical components, the image of the Pakistani workforce would undergo a positive transformation in the local as well as international job markets.

To maintain interest and motivation of the trainees throughout the course, modern techniques such as:

- Motivational Lectures
- Success Stories
- Case Studies

These techniques would be employed as an additional training tool wherever possible (these are explained in the subsequent section on Training Methodology).

Lastly, evaluation of the competencies acquired by the trainees will be done objectively at various stages of the training and a proper record of the same will be maintained. Suffice to say that for such evaluations, practical tasks would be designed by the training providers to gauge the problem-solving abilities of the trainees.

- **Motivational Lectures**

The proposed methodology for the training under reference employs motivation as a tool. Hence besides the purely technical content, a trainer is required to include elements of motivation in his/her lecture. To inspire the trainees to utilize the training opportunity to the full and strive towards professional excellence. Motivational lectures may also include general topics such as the importance of moral values and civic role & responsibilities as a Pakistani. A motivational lecture should be delivered with enough zeal to produce a deep impact on the trainees. It may comprise of the following:

- Clear Purpose to convey the message to trainees effectively.
- Personal Story to quote as an example to follow.
- Trainees Fit so that the situation is actionable by trainees and not represent a just idealism.
- Ending Points to persuade the trainees on changing themselves.

A good motivational lecture should help drive creativity, curiosity, and spark the desire needed for trainees to want to learn more.

The impact of a successful motivational strategy is amongst others commonly visible in increased class participation ratios. It increases the trainees' willingness to be engaged on the practical tasks for a longer time without boredom and loss of interest because they can see in their mind's eye where their hard work would take them in short (1-3 years); medium (3 -10 years) and long term (more than 10 years).

As this tool is expected that the training providers would make arrangements for regular well planned motivational lectures as part of a coordinated strategy interspersed throughout the training period as suggested in the weekly lesson plans in this document.

Course-related motivational lectures online link is available in **Annexure-II**.

- **Success Stories**

Another effective way of motivating the trainees is using Success Stories. Its inclusion in the weekly lesson plan at regular intervals has been recommended till the end of the training.

A success story may be disseminated orally, through a presentation, or using a video/documentary of someone that has risen to fortune, acclaim, or brilliant achievement. A success story shows how a person achieved his goal through hard work, dedication, and devotion. An inspiring success story contains compelling and significant facts articulated clearly and easily comprehendible words. Moreover, it is helpful if it is assumed that the reader/listener knows nothing of what is being revealed. The optimum impact is created when the story is revealed in the form of:

- Directly in person (At least 2-3 cases must be arranged by the training institute)
- Through an audio/ videotaped message (2-3 high-quality videos must be arranged by the training institute)

It is expected that the training provider would collect relevant high-quality success stories for inclusion in the training as suggested in the weekly lesson plan given in this document.

The suggestive structure and sequence of a sample success story and its various shapes can be

	seen in **Annexure III**. • **Case Studies** Where a situation allows, case studies can also be presented to the trainees to widen their understanding of the real-life specific problem/situation and to explore the solutions. In simple terms, the case study method of teaching uses a real-life case example/a typical case to demonstrate a phenomenon in action and explain theoretical as well as practical aspects of the knowledge related to the same. It is an effective way to help the trainees comprehend in depth both the theoretical and practical aspects of the complex phenomenon in depth with ease. Case teaching can also stimulate the trainees to participate in discussions and thereby boost their confidence. It also makes the classroom atmosphere interesting thus maintaining the trainee interest in training till the end of the course. Depending on suitability to the trade, the weekly lesson plan in this document may suggest case studies be presented to the trainees. The trainer may adopt a PowerPoint presentation or video format for such case studies whichever is deemed suitable but only those cases must be selected that are relevant and of a learning value. The Trainees should be required and supervised to carefully analyze the cases. For this purpose, they must be encouraged to inquire and collect specific information/data, actively participate in the discussions, and intended solutions to the problem/situation. Case studies can be implemented in the following ways: - • A good quality trade-specific documentary (At least 2-3 documentaries must be arranged by the training institute) • Health &Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute) • Field visits(At least one visit to a trade-specific major industry/ site must be arranged by the training institute)
Entry-level of trainees	**Intermediate**
Learning Outcomes of the course	By the end of this course, the trainees should gain the following competencies: • Understanding of Networking techniques • Campus Design & Enterprise Network • Configuration of IP Connectivity • Configuration of Advance Routing and Routing Protocols • Management of Network • Security of Network • Problems Solving Skills • Troubleshooting Skills • Network Monitoring Skills • Network Designing • High Availability of Network • Remote Site Management • Secure and Encrypted traffic b/w branches • Implementation of Network Policies • Programmability and Automation
Course Execution Plan	The total duration of the course: **3 months (12 Weeks)** Class hours: **4 hours per day** Theory: **20%** Practical: **80%** Weekly hours: **20 hours per week** Total contact hours: **240 hours**
Companies offering jobs in the respective trade	There are thousands of Job opportunities in the field of networking. Few of them are mentioned below: • PTCL • Jazz (Mobilink) • Telenor • Zong

	• Huawei • Wateen • NetSole • Storm Fiber • Multinet • Nescom • Transworld • Netcom • Worldcall • Aplha Enterprises • Amigo Technology
Job Opportunities	• Network Administrator • System Administrator • Network Engineer • IT Support Officer • Manager / Assistant Manager Networks • Network support technician
No of Students	20
Learning Place	Classroom / Lab
Instructional Resources	**Video Links:** https://www.youtube.com/watch?v=H8W9oMNSuwo&list=PLxbwE86jKRgMpuZuLBivzlM8s2Dk5lXBQ https://www.youtube.com/watch?v=n2D1o-aM-2s&list=PLh94XVT4dq02frQRRZBHzvj2hwuhzSByN **https://www.youtube.com/@iptrainers https://www.cisco.com/c/en/us/training-events/training- certifications.html** **https://www.netacad.com/ https://skillsforall.com/** **https://learningcontent.cisco.com/games/binary/index.html** **The daily lectures for the class will be recorded and made available on OneDrive, and the link to access them will be shared with the students.** **The whiteboard activities from each day will be converted to PDF formatand shared with students via an OneDrive link.**

MODULES

Scheduled Weeks	Module Title	Days	Hours	Learning Units	Home Assignment
Week 1	**Introduction To Networks**	**Day 1**	**Hour 1**	• Trainer's Introduction • General Guidelines • Course Introduction • Course Scope	
			Hour 2	• How Networks Affect our Lives • Network Components • Network Topologies • Internet connections • Reliable Networks	
			Hour 3	• Network Trends • Network Security Threats & Solution	
			Hour 4	• Need of Communication Protocols • Standards Organizations	
		Day 2	**Hour 1**	• Reference Models • OSI Model	• **Task 1** *Details may be seen at Annexure-I*
			Hour 2	• OSI Model	
			Hour 3	• OSI Model	
			Hour 4	• TCP/IP Model	
		Day 3	**Hour 1**	• Revision of OSI Model and TCP/IP Model	
			Hour 2	• Basic Networking Terms • Introduction to Network Devices	
			Hour 3	• Download and Install Recommended Software: • Putty/Secure CRT • Cisco Packet Tracer • GNS3	
			Hour 4	• Practice and Evaluation	
		Day 4	**Hour 1**	• Physical Layer Characteristics • LAN and WAN cables • Make Straight,	

				Cross and rollover cable	
			Hour 2	• Wireless Media	
			Hour 3	• Binary Number System • Hexadecimal Number System	
			Hour 4	• Practice & Evaluation	
		Day 5	**Hour 1**	• Physical Overview of Routers and Switches	
			Hour 2	• IOS, RAM, ROM, NVRAM • Flash Memory	
			Hour 3	• Practice & Evaluation	
			Hour 4	• Practice & Evaluation	
Week 2	**Addressing Schemes** **Subnetting and Supernetting**	**Day 1**	**Hour 1**	• IPv4 Packet • IPv4 Unicast, Broadcast, and Multicast • IPv6 Packet	• **Task 2** *Details may be seen at Annexure-I*
			Hour 2	• Format of IPv4 Addressing • Format of IPv6 Addressing	
			Hour 3	• Classification of IPv4 Addressing	
			Hour 4	• Practice and Evaluation	
		Day 2	**Hour 1**	• Calculating Number of networks in classes • Practice & Evaluation	
			Hour 2	• Calculation number of hosts per network	
			Hour 3	• Concept of Network-id and Broadcast-id	
			Hour 4	• Practice and Evaluation	
		Day 3	**Hour 1**	• Subnet Mask and Wildcard Mask • Routed & Non-Routed Ports	
			Hour 2	• Practice & Evaluation	

			Hour 3	• Concept of Default Gateway • Practice & Evaluation	
			Hour 4	• Rules of IP addressing for Routed Ports • Practice & Evaluation	
		Day 4	**Hour 1**	• Classless IP addressing: • Network Segmentation • Subnetting and Supernetting	
			Hour 2	• Subnetting of Class A IP addressing with example	
			Hour 3	• Practice & Evaluation	
			Hour 4	• Subnetting of Class B IP addressing with example	
		Day 5	**Hour 1**	• Subnetting of Class C IP addressing with example	
			Hour 2	• Supernetting • Practice & Evaluation	
			Hour 3	• MAC Addressing • Format of MAC addresses	
			Hour 4	• Types of MAC addresses • Practice & Evaluation	
Week 3	**Lab Setup with Cisco**	**Day 1**	**Hour 1**	• Basic Lab Setup with Cisco	• **Task 3** • **Task 4** *Details may be seen at Annexure-I*
			Hour 2	• Cisco IOS Access • IOS Navigation	
			Hour 3	• The Command Structure • Basic Device Configuration • Save Configurations	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• How to access network devices locally?	

				• Difference between local and remote access.	
			Hour 2	• Introduction to terminal applications such as Putty, Hyper terminal and Secure CRT etc.	
			Hour 3	• Introduction to Cisco IOS and CLI. • Initial Configuration of Cisco IOS. • Introduction of different modes of Cisco IOS.	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• Configure and verify clock • Configure and verify hostname. • Configure and verify user access • Practice & Evaluation	
			Hour 2	• verification or login password • Practice & Evaluation • Configure and verify enable password • Configure and verify enable secret	
			Hour 3	• Learn how to modify, copy, write and erase configuration. • Verify running-config and startup-config	
			Hour 4	• Practice & Evaluation	
		Day 4	**Hour 1**	• Create username, password and their privileges • Practice & Evaluation	
			Hour 2	• IOS and Configuration Backup with TFTP	
			Hour 3	• Configure and verify NTP: Network Time Protocol	

			Hour 4	• Password Recovery • Practice & Evaluation	
		Day 5	**Hour 1**	• Configure banners: ✓ motd ✓ login ✓ exec • Practice & Evaluation	
			Hour 2	• How to comment any command and	
			Hour 3	• configure interface description	
			Hour 4	• Practice & Evaluation	
Week 4	**Advanced Configurations Of Cisco IOS**	**Day 1**	**Hour 1**	• How to configure and troubleshoot Ethernet and Serial interfaces.	
			Hour 2	• Configure description on interfaces.	
			Hour 3	• Configure ipv4 and ipv6 addresses on interfaces.	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• Configure Keepalive, clock rate and encapsulation on interfaces. • Practice & Evaluation	• **Task 5** • **Task 6** • **Task 7**
			Hour 2	• How to make admin up and down interfaces? • Verify connectivity with test traffic.	*Details may be seen at Annexure-I*
			Hour 3	• Introduce ICMP-echo and echo-reply.	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• Use of ping command and understand output. • Practice & Evaluation	
			Hour 2	• Impact of round-trip time.	

			Hour 3	• Remote-access with TELNET and SSH	
			Hour 4	• Practice & Evaluation	
		Day 4	**Hour 1**	• Introduction of DNS.	
			Hour 2	• Configure DNS in Cisco	
			Hour 3	• Configure DNS in Cisco	
			Hour 4	• Practice & Evaluation	
		Day 5	**Hour 1**	• Introduction to DHCP server.	
			Hour 2	• How to configure DHCP on Cisco IOS	
			Hour 3	• Practice & Evaluation	
			Hour 4	• Practice & Evaluation	
Week 5	**Basic Routing**	**Day 1**	**Hour 1**	• Introduction to Routing for reachability.	• **Task 8** • **Task 9** • **Task 10** • **Task 11** • **Task 12** *Details may be seen at Annexure-I*
			Hour 2	• Understand next hop. • Practice & Evaluation	
			Hour 3	• How to configure next hop with: - Outgoing interface - Next Hop IP address	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• Understand static routing.	
			Hour 2	• Configure and verify static routing for IPv4	
			Hour 3	• Practice & Evaluation	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• Introduction to Dynamic Routing	
			Hour 2	• Types of routing protocols	
			Hour 3	• Define IGP & EGP	

			Hour 4	• Practice & Evaluation	
		Day 4	**Hour 1**	• Interior gateway protocols: • RIP • EIGRP • OSPF	
			Hour 2	• RIP: Routing Information Protocol	
			Hour 3	• EIGRP: Enhanced Interior Gateway Routing Protocol	
			Hour 4	• EIGRP: Enhanced Interior Gateway Routing Protocol	
		Day 5	**Hour 1**	• OSPF: Open Shortest Path First	
			Hour 2	• Administrative Distance or reference of routing methods.	
			Hour 3	• Configure and verify Default Routing.	
			Hour 4	• Practice & Evaluation	
Week 6	**Deep Dive into Dynamic Routing**	**Day 1**	**Hour 1**	• Types of RIP	
			Hour 2	• AD Value of RIP explain	
			Hour 3	• Basic Configuration of RIP	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• EIGRP	• **Task 13** *Details may be seen at Annexure-I*
			Hour 2	• Basic Configuration of EIGRP	
			Hour 3	• AD Value of EIGRP and metric Calculation • Path Selection Procedure • Routing table of EIGRP	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• OSPF: Open Shortest Path First	
			Hour 2	• Link State Algorithm	

			Hour 3	• OSPF Process-id	
			Hour 4	• OSPF Router-id	
		Day 4	**Hour 1**	• Configure Loopback Interfaces • OSPF Area-id	
			Hour 2	• OSPF contiguous wildcard mask	
			Hour 3	• OSPF Metric: cost	
			Hour 4	• Practice & Evaluation	
		Day 5	**Hour 1**	• OSPF Tables	
			Hour 2	• Configure and verify single area OSPF.	
			Hour 3	• Design and implement multiple area OSPF	
			Hour 4	• Practice & Evaluation	
Week 7	**OSPF and Policy Based Routing**	**Day 1**	**Hour 1**	• Regular and transit area	
			Hour 2	• •Define Internal Router, Backbone Router, Backbone	
			Hour 3	• Define Internal Router, Area Border Router and ASBR.	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• Introduce and configure redistribution	• **Task 14** *Details may be seen at Annexure-I*
			Hour 2	• Practice & Evaluation	
			Hour 3	• Define seed/external metric. • Type 1 and Type 2 seed metric.	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• Introduction to PBR tools: - Route-map - IP prefix-list - Distribute-list - ACL	
			Hour 2	•	

			Hour 3	• Example1: • Industry Scenario-1 to implement PBR	
			Hour 4	• Practice & Evaluation	
		Day 4	**Hour 1**	• Example2: • Industry Scenario-2 to implement PBR	
			Hour 2	• Practice & Evaluation	
			Hour 3	• OSPF Packet types	
			Hour 4	• OSPF neighbor states	
		Day 5	**Hour 1**	• OSPF over multi-access networks	
			Hour 2	• Practice & Evaluation	
			Hour 3	• DR, BDR and DRO roles in multi-access networks	
			Hour 4	• Practice & Evaluation	
Week 8	**OSPF Design constraints and filtering**	**Day 1**	**Hour 1**	• OSPF Over Multi-access LAB	
			Hour 2	• Practice & Evaluation	
			Hour 3	• Introducing OSPF LSA types 1 to 7.	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• Regular area types: • Stub Area • Totally Stubby area • NSSA: Not So Stubby Area • Totally NSSA	• **Task 16** • **Task 17** • **Task 18**
			Hour 2	• Regular area types: • Stub Area • Totally Stubby area • NSSA: Not So Stubby Area • •Totally NSSA	*Details may be seen at Annexure-I*
			Hour 3	• Practice & Evaluation	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• Configure and verify OSPF Virtual Links	

			Hour 2	• Practice & Evaluation	
			Hour 3	• •Continuous and discontinuous OSPF backbones	
			Hour 4	• Practice & Evaluation	
		Day 4	**Hour 1**	• OSPF filters: • IP prefix-lists	
			Hour 2	• Practice & Evaluation	
			Hour 3	• OSPF filters: • Area filters	
			Hour 4	• Practice & Evaluation	
		Day 5	**Hour 1**	• Passive interface	
			Hour 2	• Practice & Evaluation	
			Hour 3	• Route Summarization	
			Hour 4	• Practice & Evaluation	
Week 9	**Introduction to ACL** **Extended ACL**	**Day 1**	**Hour 1**	• Introduction to Access Control List • Purpose of ACLs	
			Hour 2	• Wildcard Masks in ACLs	
			Hour 3	• Guidelines for ACL Creation	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• Types of IPv4 ACLs	
			Hour 2	• Configure and verify standard ACL	• **Task 9** *Details may be seen at Annexure-I*
			Hour 3	• Modify IPv4 ACLs	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• Secure VTY Ports with a Standard IPv4 ACL	
			Hour 2	• Secure VTY Ports with a Standard IPv4 ACL	
			Hour 3	• Configure and verify extended ACL	
			Hour 4	• Contiguous and dis-	

				contiguous wildcard mask	
		Day 4	**Hour 1**	• Implement named and numbered ACL	
			Hour 2	• Practice & Evaluation	
			Hour 3	• Practice & Evaluation	
			Hour 4	• Practice & Evaluation	
		Day 5	**Hour 1**	• VPN Technology	
			Hour 2	• Types of VPNs	
			Hour 3	• IPsec	
			Hour 4	• Practice & Evaluation	
Week 10	**Network Address Translation** **NAT**	**Day 1**	**Hour 1**	• Introduction to public and private IP addresses	• **Task 10** *Details may be seen at Annexure-I*
			Hour 2	• NAT Characteristics	
			Hour 3	• Types of NAT • Static NAT • Dynamic NAT	
			Hour 4	• NAT Advantages and Disadvantages	
		Day 2	**Hour 1**	• Introduction to PAT	
			Hour 2	• Configuration of PAT	
			Hour 3	• Practice & Evaluation	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• Configure and verify NAT	
			Hour 2	• Practice & Evaluation	
			Hour 3	• Configure and verify PAT/NAT Overloading	
			Hour 4	• Practice & Evaluation	
		Day 4	**Hour 1**	• Configure and verify network address translation	
			Hour 2	• Practice & Evaluation	

			Hour 3	• Configure and verify PAT/NAT Overloading	
			Hour 4	• Practice & Evaluation	
		Day 5	**Hour 1**	• Revision of NAT	
			Hour 2	• Revision of NAT	
			Hour 3	• Revision of PAT	
			Hour 4	• Revision of PAT	
Week 11	**Ethernet Switching** **and** **VLANS/ Inter VLAN Routing**	**Day 1**	**Hour 1**	• Forwarding on the basis of MAC Addresses • Address Resolution Protocol	• **Task 11** *Details may be seen at Annexure-I*
			Hour 2	• Address Resolution Protocol	
			Hour 3	• ARP Table/Cache	
			Hour 4	• Switch port Modes • Access Ports • Trunk Ports	
		Day 2	**Hour 1**	• Dynamic Trunking Protocol DTP	
			Hour 2	• Introduction to VLAN	
			Hour 3	• ● Configure and verify basic VLAN	
			Hour 4	• Practice & Evaluation	
		Day 3	**Hour 1**	• • Configure VTP: VLAN Trucking Protocol	
			Hour 2	• VTP mode server • VTP mode client • VTP mode Transparent • VTP Updates	
			Hour 3	• Types of VLANs	
			Hour 4	• Practice & Evaluation	
		Day 4	**Hour 1**	• Inter VLAN routing with Access ports	
			Hour 2	• Inter VLAN routing with Access ports	
			Hour 3	• Inter VLAN routing with Router on a	

				Stick I	
			Hour 4	• Practice & Evaluation	
		Day 5	**Hour 1**	• Revision and Practice of VLAN's	
			Hour 2	• Revision and Practice of VLAN's	
			Hour 3	• Switch Security Configuration	
			Hour 4	• Practice & Evaluation	
Week 12	**Link Aggregation** **EtherChannel** **Gateway Redundancy**	**Day 1**	**Hour 1**	• Introduction to link aggregation	• **Task 12** *Details may be seen at Annexure-I* **Final Project**
			Hour 2	• Configure and verify EtherChannel Port Channel	
			Hour 3	• Practice & Evaluation	
			Hour 4	• Practice & Evaluation	
		Day 2	**Hour 1**	• channel Group	
			Hour 2	• Static Implementation	
			Hour 3	• Dynamic EtherChannel with • PagP • LACP	
			Hour 4	• Dynamic EtherChannel with • PagP • LACP	
		Day 3	**Hour 1**	• Practice & Evaluation	
			Hour 2	• Different Load-balancing techniques	
			Hour 3	• Introduction to First Hop Redundancy Protocol FHRP	

			Hour 4	• Types of FHRP
				  ○ HSRP
				  ○ VRRP
				  ○ GLBP	

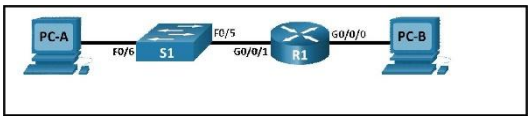
		Day 4	**Hour 1**	• Types of FHRP
				  ○ HSRP
				  ○ VRRP
				  ○ GLBP	

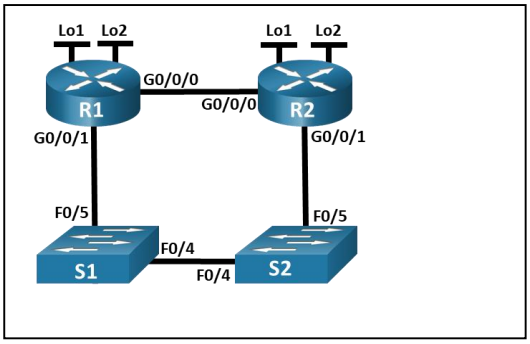
			Hour 2	• Cloud Computing	

			Hour 3	• Cloud Computing	
			Hour 4	• Virtualization	
		Day 5	**Hour 1**	• Virtual Network Infrastructure	
			Hour 2	• Virtual Network Infrastructure	
			Hour 3	• Software-Defined Networking	
			Hour 4	• Controllers	

Annexure-I:

Tasks for Certificate in CISCO Network Administration

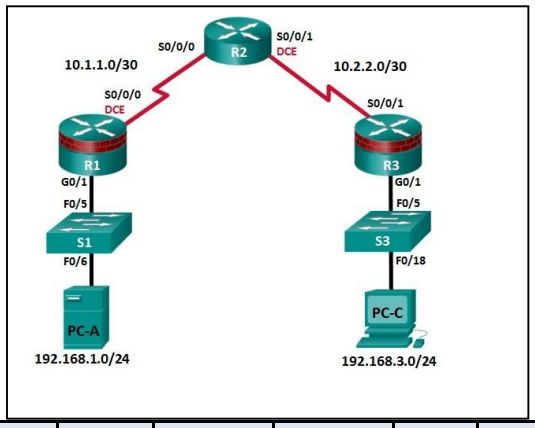
Task No.	Task	Description	Week
1	**Installation of simulators and connectivity of devices**	Attach a Router & Switch with PC via console cable Installation of Packet Tracer & GNS3 Import Router Images in GNS3Router Modes Ping & Extended Ping How to Telnet a Router	**Week-1**
2	**Configure Basic Router Settings**	 **Part 1: Set Up the Topology and Initialize Devices** • Cable equipment to match the network topology. • Initialize and restart the router and switch. **Part 2: Configure Devices and Verify Connectivity** • Assign static IPv4 and IPv6 information to the PC interfaces. • Configure basic router settings. • Configure the router for SSH. • Verify network connectivity. **Part 3: Display Router Information** Retrieve hardware and software information from the router. • Interpret the output from the startup configuration. • Interpret the output from the routing table. • Verify the status of the interfaces.	**Week-2**
3 4 5 6 7	**Configure Routersthrough CLI**	**Part 1: Build the Network and Configure Basic Device Settings** **Part 2: Configure different Modes of Router** **Part 3: Take the Console of the router & configure Basic Password** **Part 4: Recover the Console password** **Part 5: Configure encapsulation and clock rate on interfaces** **Part 6: Assign IPv4 & IPv6 addresses and verify connectivity with test traffic** **Part 7: Remote Access with Telnet**	**Week-3**

Task No.	Task	Description	Week
8 9 10 11 12	**Configure IPv4 and IPv6 Static and Default Routes**	 	**Week-4**

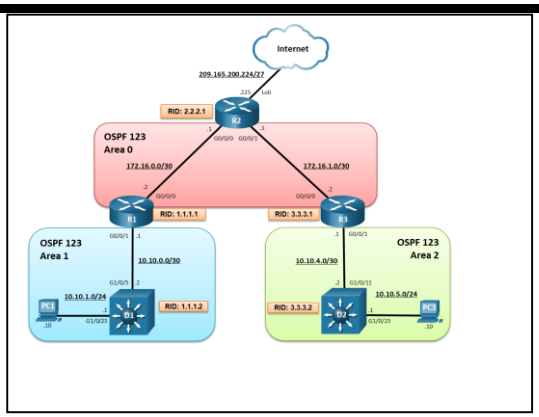
Device	Interface	IP Address / Prefix
R1	G0/0/0	172.16.1.1 /24
		2001:db8:acad:2::1 /64
		fe80::1
R1	G0/0/1	192.168.1.1 /24
		2001:db8:acad:1::1 /64
		fe80::1
	Loopback1	10.1.0.1 /24
		2001:db8:acad:10::1 /64
		fe80::1
	Loopback2	209.165.200.225 /27
		2001:db8:acad:209::1 /64
		fe80::1
R2	G0/0/0	172.16.1.2 /24
		2001:db8:acad:2::2 /64
		fe80::2
	G0/0/1	192.168.1.2 /24
		2001:db8:acad:1::2 /64
		fe80::2
	Loopback1	10.2.0.1 /24
		2001:db8:acad:11::2 /64
		fe80::2
	Loopback2	209.165.200.193 /27
		2001:db8:acad:210::1 /64
		fe80::2

Part 1: Build the Network and Configure Basic DeviceSettings
Part 2: Configure and verify IP and IPv6 addressing on R1and R2
Part 3: Configure and verify static and default routing forIPv4 on R1 and R2

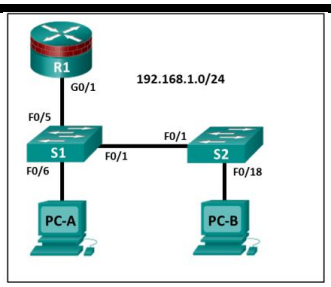
Task No.	Task	Description	Week

13 **14**	**Configure Single & Multi Area OSPF**	 **Objectives** **Part 1: Configure Basic Device Settings** • Configure hostnames, interface IP addresses, Router's ID and access passwords. • Configure the OSPF dynamic routing protocol.	**Week-5**

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	G0/1	192.168. 1.1	255.255.255.0	N/A	S1 F0/5
	S0/0/0 (DCE)	10.1.1.1	255.255.255. 252	N/A	N/A
R2	S0/0/0	10.1.1.2	255.255.255.25 2	N/A	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255. 252	N/A	N/A
R3	G0/1	192.168. 3.1	255.255.255. 0	N/A	S3 F0/5
	S0/0/1	10.2.2.1	255.255.255. 252	N/A	N/A
PC-A	NIC	192.168. 1.3	255.255.255. 0	192.168. 1.1	S1 F0/6
PC-C	NIC	192.168.3.3	255.255.255.0	192.168.3. 1	S3 F0/18

Task No.	Task	Description	Week
15 16 17	**Configuring IPv6 and advance OSPF**	 **Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing** **Part 2: Configure and Verify Multiarea OSPF for IPv4 on R1, D1, and D2** **Part 3: Exploring Link State Announcements** **Part 4: Configure area 1 stub & T.Stub**	**Week-6,7**

Device	Interface	IPv4 Address
R1	G0/0/0	172.16.0.2/30
	G0/0/1	10.10.0.1/30
R2	Lo0	209.165.200.225/27
	G0/0/0	172.16.0.1/30
	G0/0/1	172.16.1.1/30
R3	G0/0/0	172.16.1.2/30
	G0/0/1	10.10.4.1/30
D1	G1/0/11	10.10.0.2/30
	G1/0/23	10.10.1.1/24
D2	G1/0/11	10.10.4.2/30
	G1/0/23	10.10.5.1/24
PC1	NIC	10.10.1.10/24
PC2	NIC	10.10.5.10/24

Task No.	Task	Description	Week
18 19 20 21	**Securing Layer 2 Switches**		**Week-**

Device	Interface	IP address	Subnet Mask	Default Gateway	Switch Port
R1	G0/1	192.168.1.1	255.255.255.0	N/A	S1 F0/5
S1	VLAN1	192.168.1.2	255.255.255.0	N/A	N/A
S2	VLAN1	192.168.1.3	255.255.255.0	N/A	N/A
PC-A	NIC	192.168.1.10	255.255.255.0	192.168.1.1	S1 F0/6
PC-B	NIC	192.168.1.11	255.255.255.0	192.168.1.1	S2 F0/18

Part 1: Configure Basic Switch Settings

Build the topology.
Configure the hostname, IP address, and access passwords.

Part 2: Configure SSH Access to the Switches

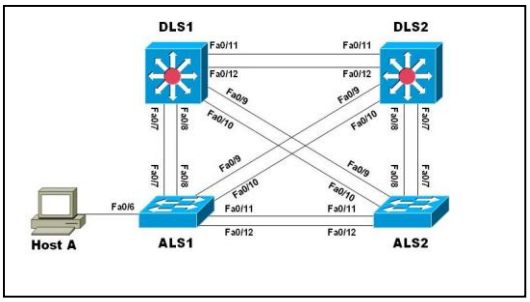
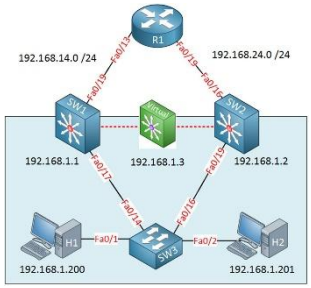
Configure SSH version 2 access on the switch.
Configure an SSH client to access the switch.
Verify the configuration.

Part 3: Configure Secure Trunks and Access Ports

Configure trunk port mode.
Change the native VLAN for trunk ports.
Verify trunk configuration.
Enable storm control for broadcasts.
Configure access ports.
Enable PortFast and BPDU guard.
Verify BPDU guard.
Enable root guard.
Enable loop guard.
Configure and verify port security.
Disable unused ports.
Move ports from default VLAN 1 to alternate VLAN.
Configure the PVLAN Edge feature on a port.

Part 4: Configure IP DHCP Snooping

Configure DHCP on R1.
Configure Inter-VLAN communication on R1.
Configure S1 interface F0/5 as a trunk.
Verify DHCP operation on PC- A and B.
Enable DHCP Snooping.
Verify DHCP Snooping.

Task No.	Task	Description	Week
22	**Implement SpanningTree Protocols**	 **Objectives** • Observe default Spanning Tree behavior • Implement Rapid Spanning Tree • Implement STP tool kit components • Configure Etherchannel • Configure Portfast and enable Protection	**Week-14 & 15**
23 24		 Part 1: Configure VRRP groups G1 & G2 and assign virtual IPs Part 2: Configure VRRP priority and enable preemption and also enable tracking	**Week-16**

Annexure-III:

Workplace/Institute Ethics Guide

Work ethic is a standard of conduct and values for job performance. The modern definition of what constitutes good work ethics often varies. Different businesses have different expectations. Work ethic is a belief that hard work and diligence have a moral benefit and an inherent ability, virtue, or value to strengthen character and individual abilities. It is a set of values-centered on the importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for student success:

1. **Attendance:**
   Be at work every day possible, plan your absences don't abuse leave time. Be punctual every day.
2. **Character:**
   Honesty is the single most important factor having a direct bearing on the final success of an individual, corporation, or product. Complete assigned tasks correctly and promptly. Look to improve your skills.
3. **Team Work:**
   The ability to get along with others including those you don't necessarily like. The ability to carry your weight and help others who are struggling. Recognize when to speak up with an idea and when to compromise by blend ideas together.
4. **Appearance:**
   Dress for success set your best foot forward, personal hygiene, good manner, remember that the first impression of who you are can last a lifetime
5. **Attitude:**
   Listen to suggestions and be positive, accept responsibility. If you make a mistake, admit it. Values workplace safety rules and precautions for personal and co-worker safety. Avoids unnecessary risks. Willing to learn new processes, systems, and procedures in light of changing responsibilities.
6. **Productivity:**
   Do the work correctly, quality and timelines are prized. Get along with fellows, cooperation is the key to productivity. Help out whenever asked, do extra without being asked. Take pride in your

work, do things the best you know-how. Eagerly focuses energy on accomplishing tasks, also referred to as demonstrating ownership. Takes pride in work.

7. **Organizational Skills:**

   Make an effort to improve, learn ways to better yourself. Time management; utilize time and resources to get the most out of both. Take an appropriate approach to social interactions at work. Maintains focus on work responsibilities.

8. **Communication:**

   Written communication, being able to correctly write reports and memos. Verbal communications, being able to communicate one on one or to a group.

9. **Cooperation:**

   Follow institute rules and regulations, learn and follow expectations. Get along with fellows, cooperation is the key to productivity. Able to welcome and adapt to changing work situations and the application of new or different skills.

10. **Respect:**

    Work hard, work to the best of your ability. Carry out orders, do what's asked the first time. Show respect, accept, and acknowledge an individual's talents and knowledge. Respects diversity in the workplace, including showing due respect for different perspectives, opinions, and suggestions.