Internetworking										
I. Explain common networking concepts and terminology.										
Tasks Instructions:										
Each number to the right refers to a single student/candidate (1-10). Place a check (√) in the respective column for the appropriate student/candidate number (1-10) if the skills listed below are observed as stated. Leave blank if not observed. Student/candidate will only get credit for the skills they have demonstrated.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Identify the basic characteristics of LANs and WANs										
Explain the concept of bandwidth and throughput and factors that affect them										
List and describe the components necessary to create a small LAN using wire or wireless media										
Identify the roles of various network devices in a network (NICs, hubs, switches, routers, firewalls, AP)										
Explain the concept of latency and how it can be minimized										
Describe the advantages and disadvantages associated with implementing common physical topologies: star/extended star, ring and mesh										
Explain the importance of implementing basic security in computer networks										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (9)										
II. Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity.										
Tasks Instructions:										

	1	2	3	4	5	6	7	8	9	10
Identify the pin-outs and construct a UTP (patch, console and crossover) cable for connectivity										
Specify the cable type required for the various Ethernet connections										
Configure a host with the appropriate addressing parameters to connect to a network										
Verify and troubleshoot basic connectivity using various testing tools, utilities and commands (cable testers, ping, trace, IP configuration, etc.)										
Document the physical and logical aspects of network topology										
Determine and install the appropriate network cabling and media required for connectivity between devices										
Configure, connect, verify and troubleshoot issues with the operation of an Ethernet NIC										
Determine the physical issues associated with cabling network equipment working over a WAN link										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (10)										

III. Compare and contrast various types of media used for networking.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Explain the characteristics and benefits of copper cable, fiber and wireless										

network media (air) in network applications, including data transmission speeds										
Identify the basic characteristics of UTP and fiber cables										
Identify Ethernet cabling issues that can cause degraded service										
Explain practical factors that cause attenuation of data signals over the different network media types (copper, fiber, air [radio frequency]), and identify possible solutions to a media problem										
Identify basic concerns of implementing faster Ethernet										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (7)										
IV. Explain the fundamental concepts associated with media access techniques (Ethernet operation, MAC, LLC, CSMA/CD).										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Describe the differences between full duplex and half duplex transmissions										
Describe media access considerations of full duplex and half duplex transmissions										
Explain the function of auto negotiation of speed and duplex										
Describe the function of the Data Link Layer as it applies to Ethernet, including MAC and LLC sublayers										
Explain the concept of broadcast media and the addressing of a layer 2 broadcast on an Ethernet media										
Describe and discuss CSMA/CD, including the process, listen, send, collision, jam and back off										

Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (8)										
V. Optimize network design in regard to segmentation, collision domains and broadcast domains.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Describe basic operation of hubs and repeaters as they apply to Ethernet										
Explain how collisions are detected and managed in Ethernet networks										
Explain the concepts of collision domains and network segmentation										
Explain the benefits of using a switch versus using a hub in an Ethernet network										
Explain how collisions and excessive broadcasts occur in networks										
Identify devices used to minimize collision and excessive broadcast effects										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (8)										
VI. Implement and correct problems associated with basic IP addressing and sub netting schemes.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Explain the purpose of an IP address, subnet mask and a default gateway										

Identify the appropriate address required for internetwork communication between hosts										
Categorize the different IP v4 address classes and their identifying features										
Explain the advantages and disadvantages of using public and private IP v4 addresses										
Determine whether an IP address is a network, broadcast, subnet, public or private IP v4 address										
Determine the appropriate subnet mask and IP addressing scheme required to meet network requirements for scalability and functionality										
Identify the methods for a node to obtain an IP address (include static and dynamic methods)										
Correct common problems associated with implementing basic IP addressing schemes in a network and environment										
Contrast IP v4 with IP v6										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (11)										
VII. Describe fundamental concepts of switching and routing.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Explain the major functions of a switch										
Explain the major functions of a router										
Explain the basic use of routed and routing protocols in a network										
Describe the forwarding of frames and packets in switched and routed networks										

Describe the characteristics and functions of IP (connectionless and unreliable)										
Compare the basic concepts of static and dynamic routing										
Explain the OSI model and its functionality in computer networking										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (9)										
VIII. Define the Layers of the OSI model.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Explain the benefits of using OSI model as a conceptual famework for network communication										
Explain the process of encapsulation and identify the protocol data units associated with each OSI Layer model										
Identify and describe the functions of network devices at each layer of the OSI model										
Explain ARP and when it is used										
Compare and contrast connection and connectionless delivery of packets in a network										
Describe the primary functions of the transport layer										
Compare and contrast characteristics of TCP and UDP										
Identify and describe the major TCP/IP protocols used in each layer of the OSI model										
Identify basic issues that occur at each layer using the OSI model										
Identify the fields in the headers of protocol data units										

Describe their role in propagating data in a network (MAC address, IP address, TCP port number)										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (13)										
IX. Describe the importance of a router in a WAN configuration.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Compare WAN connections to LAN connections										
Identify the role of a router in a WAN										
Describe the importance of a WAN router										
Describe router physical characteristics										
Connect all router external connections, management, LAN and WAN										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (7)										
X. Configure a router to multiple networks by using the IOS software.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Identify the workings of an operating system that works with the router										

Determine the state of the router interfaces using the LED indicators										
Identify the features of the IOS for services that will be delivered on the network										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (5)										
XI. Log in to a router, record the IOS and running configuration and use troubleshooting commands.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Describe the boot process										
Log in and navigate throughout the router IOS										
Fix errors by utilizing troubleshooting command line errors										
View the image names and memory of the router by using the show version command 6										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (6)										
XII. Configure a router by utilizing the CLI.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Utilize CLI command modes										
Configure a router name										
Configure router passwords										
Utilize the show commands										
Configure a serial interface and Ethernet interface										
Change configurations										
Configure interface descriptions										
Configure login banners and MOTD										
Configure host tables										
Back up the configuration file by using the copy command to back up the configuration file										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (12)										
XIII. Discover other devices on the network using the router.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Document neighboring routes and Cisco devices by using Cisco Discovery Protocol (CDP) commands										
Monitor CDP										
Disable CDP										
Troubleshoot CDP										
Gather information about remote devices by using Telnet										
Establish and verify a Telnet connection										
Disconnect and suspend Telnet sessions										

Use advanced Telnet operations										
Troubleshoot IP address issues										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (11)										
XIV. Manage the IOS software.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Identify where a Cisco device locates and loads IOS										
Utilize the boot system command										
Configure the register										
Troubleshoot IOS boot failure										
Manage the Cisco file system										
Identify IOS naming conventions										
Utilize TFTP to manage and copy										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (9)										
XV. Configure routing protocols.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Identify the workings of a static route										
Configure static routes										
Configure default route forwarding										
Verify static route configuration										
Troubleshoot static route configuration										
Identify the purpose of a routing protocol and autonomous system										
Identify the classes of routing protocols										
Identify distance vector routing protocol features and examples										
Describe link-state routing protocol features and examples										
Describe path determination										
Configure RIP and OSPF single area										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (13)										
XVI. Identify and utilize distance vector routing protocols.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
View distance vector routing updates, hold-down timers, and RIP processes										
Eliminate routing loops through split horizon, route poisoning and triggered updates										
Utilize RIP as the routing protocol										
Configure RIP										
Utilize the IP classless command										
Verify RIP configuration										

Troubleshoot RIP update issues										
Load balance using RIP										
Load balance across multiple paths										
Integrate static routes with RIP										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (12)										

XVII. Use TCP/IP suite error and control messages to troubleshoot a router.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Identify TCP/IP error message										
Utilize ICMP										
Utilize ICMP message delivery										
Discover unreachable networks										
Utilize ping to test destination reach ability										
Define echo messages										
Utilize the TCP/IP suite control messages										
Utilize ICMP redirect/change request										
Utilize requests and reply message formats										
Utilize congestion and flow control message										
Configure QoS and Nbar to control congestion										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (13)										

XVIII. Use basic show commands to troubleshoot the router.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Utilize the show IP route command to determine the gateway of last resort, route source and destination, L2 and L3 addresses, administrative distance, route metric, the route next hop, last route update and multiple paths to destination										
Identify OSI layers										
Troubleshoot Layer 1 using show interface										
Troubleshoot Layer 2 using show interface										
Troubleshoot using show CDP										
Troubleshoot using trace route										
Troubleshoot routing issues										
Troubleshoot using show controllers serial										
Utilize the debug command										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (11)										

XIX. Identify the intermediate TCP/IP operations and porting.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10

Identify synchronization process or three-way handshake										
Define a denial-of-service attack										
Identify how windowing, sequencing numbers and positive ACK work together to deliver data packets										
Compare UDP with TCP										
Observe transport layer ports										
Test multiple conversations between hosts										
Define ports for services, clients and numbering and well known port numbers										
Compare and contrast MAC addresses, IP addresses and port numbers										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (10)										
XX. Identify and utilize access control lists (ACLs) to add security to the network.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Create access control list fundamentals (ACL's)										
Demonstrate the function of a wildcard mask										
Utilize an ACL by Verify										
Compare standard, extended ACL's and named ACL's										
Place an ACL to create the requested security inside a firewall										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (7)										

XXI. Define and use variable length subnet masking (VLSM).										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Demonstrate VLSM and why and when it is used										
Calculate subnets with VLSM										
Recognize route aggregation with VLSM										
Configure VLSM on a multi-router network										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (6)										
XXII. Describe how RIP Version 2 is incorporated in a routed network										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Compare RIP v1 and v2										
Configure RIP v2										
Verify RIP v2										
Troubleshoot RIP v2										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (6)										

XXIII. Understand how to design and implement single-area OSPF.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Recognize link-state routing protocol										
Compare the advantages and disadvantages of link-state routing										
Compare and contrast distance vector and link-state routing										
Compare OSPF with distance vector routing protocols										
Identify single area OSPF configuration										
Configure the OSPF routing process										
Configure OSPF loopback address and router priority										
Modify OSPF cost metric										
Configure OSPF authentication and timers										
Verify the OSPF configuration										
Troubleshoot OSPF configuration										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (13)										
XXIV. Describe and implement EIGRP routing protocol.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Identify EIGRP concepts and terminology										
Configure EIGRP										

Configure EIGRP summarization										
Verify basic EIGRP										
Troubleshoot EIGRP configuration										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (7)										

XXV. Understand how switching operates switching concepts.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Recognize Ethernet/802.3 LAN technologies										
Recognize factors that impact network performance										
Recognize network segmentation using hardware devices										
Recognize basic operations of a switch										
Compare Layer 2 and Layer 3 switching										
Compare symmetric and asymmetric switching										
Recognize micro segmentation implementation										
Recognize the effects switches have on a collision domain										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (10)										

XXVI. Understand the use of the access, distribution and core layers in switching and routing.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Describe LAN design goals										
Utilize a 1, 2, 3 layered model in the switch design										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (4)										

XXVII. Understand how to do a complete switch configuration.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Verify port LEDs during switch POST										
View initial boot output from the switch										
Examine keyboard help in the switch CLI										
Recognize switch modes and configure the switch										
Verify the catalyst switch default configuration										
Configure the catalyst switch										
Manage the MAC address table										
Configure static MAC addresses										
Configure port security										
Execute a plan for adds, moves and changes										
Manage switch operating system										
Define password recovery										
Recognize firmware upgrade										
Safety and infection control are adhered to during all aspects of this task.										

The student completed task within the time limited.										
Points earned										
Total possible points (15)										
XXVIII. Understand how spanning tree protocol has an effect on network design and setup.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Describe redundant topologies										
Describe a broadcast storm										
Recognize redundant topology and spanning tree										
Describe spanning tree operations										
Design the configuration to select a root bridge										
Select the stages of spanning tree port states										
Describe spanning tree recalculation and its effects on the network										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (9)										
XXIX. Describe how virtual LANs help to control broadcast domains and how this benefits the LAN network.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Recognize VLAN concepts										
Demonstrate the relationship between broadcast domains with VLANs and										

routers										
Describe VLAN types										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (5)										

XXX. Configure a VLAN-using network design concept.
Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Define geographic VLANs										
Configure static VLANs										
Verify VLAN configuration										
Save VLAN configuration										
Delete VLANs										
Troubleshoot VLANs										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (8)										

XXXI. Utilize virtual trunking protocol to set up multiple ports on a router and switch.
Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10

Describe Trunking concepts										
Describe Trunking operation										
Describe VTP concepts and how to configure and implement them in a physical and logical network design										
Divide physical interfaces into sub-interfaces										
Configure inter-VLAN routing										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (7)										
XXXII. Demonstrate how to use NAT and PAT to scale IP addresses over a multi-network configuration.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Name the private address spaces										
Identify the features of NAT and PAT										
Configure NAT and PAT										
Verify PAT configuration										
Troubleshoot NAT and PAT configurations										
Identify and utilize DHCP in a router configuration										
Verify DHCP operation										
Troubleshoot DHCP										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (10)										

XXXIII. Recognize the use of WAN technologies in the configuration of a router and the delivery of data.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Name the WAN devices										
Identify WAN standards and encapsulation types										
Compare packet and circuit switching										
Name the WAN link options and technology related to them										
Incorporate WAN design into the network scheme										
Demonstrate how to identify and select networking capabilities										
Use a three-layer design model										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (9)										

XXXIV. Understand and configure a secure PPP serial connection.

Tasks Instructions:

	1	2	3	4	5	6	7	8	9	10
Define a serial point-to-point links										
Define time-division multiplexing										
Use demarcation point as a reference for security										
Define DTE-DCE										
Compare HDLC encapsulation to PPP										

Configure PPP authentication										
Compare password authentication protocol (PAP) to challenge handshake authentication protocol										
Configure PPP										
Verify the serial PPP encapsulation configuration										
Troubleshoot the serial PPP encapsulation configuration										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (12)										
XXXV. Illustrate ISDN and DDR concepts.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Demonstrate ISDN standards and access methods										
Name the ISDN switch types										
Configure ISDN BRI/PRI ports										
Verify ISDN configuration										
Troubleshoot the ISDN configuration										
Configure legacy DDR										
Define static routes for DDR										
Configure DDR dialer information										
Set up a dialer profile										
Configure dialer profiles										
Verify DDR configuration										
Troubleshoot the DDR configuration										
Safety and infection control are adhered to during all aspects of this task.										

The student completed task within the time limited.										
Points earned										
Total possible points (14)										
XXXVI. Configure a point-to-point and multi-point Frame Relay circuit.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Demonstrate knowledge of frame relay concepts and terminology										
Configure a basic frame relay										
Configure a static frame relay map										
Configure frame relay sub-interfaces										
Verify the frame relay configuration										
Troubleshoot the frame relay configuration										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (8)										
XXXVII. Demonstrate best practices of network administration.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Define and compare workstations and servers										
Define NOS										
Use popular network operating systems Microsoft XP, 2000, NET, UNIX Sun,										

HP and LINUX versions as they relate to a network										
Describe SNMP and CMIP standards										
Configure SNMP and use sys-logs to monitor networks										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (7)										
XXXVIII. Provide customer support.										
Tasks Instructions:										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Converse effectively and correctly with a customer										
Speak clearly and to the point when conversing about products and solutions										
Repeat name, location and phone number back to the customer during technical support conversations										
Record all conversations with customers as either information, need to know or solution delivered										
Make good comparisons that the customer can relate to when troubleshooting a problem										
Take the needed actions to fix the customer's problem										
Close the conversation with a positive, reassuring attitude										
Safety and infection control are adhered to during all aspects of this task.										
The student completed task within the time limited.										
Points earned										
Total possible points (9)										
Total points earned for all sections (A)										
Total possible points for all sections (B) 350										

Student/candidate score (divide A/B)										