

National Occupational Skill Standard (NOSS)

Occupational Title : Computer Network Technician

Level : 3

Sector : Computer

Sub - Sector : Computer Network

NOSS ID/NSCO ID :

ISCO NO :



Council for Technical Education and Vocational Training

NATIONAL SKILL TESTING BOARD

Madhyapur Thimi-17, Sanothimi, Bhaktapur, Nepal

Revised: 06-04-2023 (23-12-2079)



2045

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Approved By: The Tripartite National Skill Testing Board- 2001 (2057/058)



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Page:2



2045

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Revision Number: 01

Revised Date:

Page:3



The National Occupational Skill Standard Revised by:

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Recommended by Computer Technical Sub Committee: 06 April 2023 (23 Chaitra 2079)



NOSS ID #

Developed Date: 2023-04-06

Revision Number: 01

Revised Date:

Page:4



2045

1	Occupational Title: Computer Network Technician Level: 3
2	Job Description: Computer Network Technician, L-3, installs, configures, and maintains computer network, setup virtualization environment in server, implements and maintains backup system, repairs and maintains computer network system.
3	UNITS OF COMPETENCY: <ol style="list-style-type: none"> 1. Install, configure and maintain computer network 2. Setup virtualization environment in server 3. Implement and maintain backup system 4. Repair and maintain computer network system 5. Perform communication 6. Develop professionalism <p><i>*Note: Unit 5 and 6 are not for testing purpose.</i></p>
4	Qualifying Notes/Prerequisites: <ul style="list-style-type: none"> • Physical Requirements: Sound health • Entry Requirements: As per NSTB rules Additional Information: <ul style="list-style-type: none"> • Assessment Types: Performance and written test • Assessment Duration: 12 to 14 Hours (Full Competency) 4 to 6 hours (Single Competency) • Recommended Group Size: 3 to 5 candidates



NOSS ID #

Developed Date: 2023-04-06

Revision Number: 01

Revised Date:

Page:5



5	Unit No:1		Unit code:	
	Unit Title: Install, configure and maintain computer network			
	Elements of competency		Performance standards	
	1.1 Perform network planning		1.1.1 Network requirement identified based on the information gathered from clients. 1.1.2 Network layout diagram prepared based on the needs of clients. 1.1.3 IP planned as per network requirement. 1.1.4 Hardware and software selected based on network diagram. 1.1.5 Cost of computer network estimated and documented as per industry norms. 1.1.6 Network design and cost shared with concerned personnel for feedback and approval.	
	1.2 Setup physical network		1.2.1 Personal protective equipment (PPE) used in accordance with task requirement. 1.2.2 Tools, equipment and materials collected as per task requirement. 1.2.3 Network cables laid, crimped and tested as per cabling standard . 1.2.4 Network devices installed and connected as per network diagram. 1.2.5 Network connectivity checked from each network device.	
1.3 Install and configure operating system		1.3.1 BIOS configured and client/server booted with bootable installation media . 1.3.2 Operating system installed as per installation guide. 1.3.3 Network settings configured for the client/server. 1.3.4 Necessary software installed as per installation guide.		
1.4 Configure network		1.4.1 Network settings configured on network devices to communicate on the network. 1.4.2 Routing protocol configured and tested for network communication. 1.4.3 Services configured and tested for proper functioning.		



	<p>1.4.4 NAT rule implemented as per the network requirement.</p> <p>1.4.5 Network settings and services are documented as per industry norms.</p> <p>1.4.6 Network connectivity, performance and security tested and optimized to improve its performance.</p>
1.5 Configure VLAN	<p>1.5.1 Number of VLAN required for network determined.</p> <p>1.5.2 VLAN IDs created as per the network requirement.</p> <p>1.5.3 VLAN tagging methods selected and configured on ports.</p>
1.6 Configure VPN	<p>1.6.1 Type of VPN determined as per network requirement.</p> <p>1.6.2 VPN protocol and VPN client software selected based on organization requirement.</p> <p>1.6.3 VPN equipment configured as per VPN protocol and topology.</p> <p>1.6.4 VPN connection tested as per configuration.</p>
1.7 Setup firewall device	<p>1.7.1 Network settings and services configured to communicate on the network.</p> <p>1.7.2 NAT rule implemented as per the network requirement.</p> <p>1.7.3 Firewall policy requirement identified from clients.</p> <p>1.7.4 Firewall rules configured and implemented as per firewall policy.</p> <p>1.7.5 Firewall rules tested as per firewall policy.</p>
1.8 Monitor network activities	<p>1.8.1 Devices, applications and services running on the network listed and documented as per industry norms.</p> <p>1.8.2 Network performance metrics, availability and security of the network monitored on an ongoing basis.</p>



		<p>1.8.3 Data collected from network monitoring tools analysed to identify trends and patterns.</p> <p>1.8.4 Hardware and software updated and configured based on analysis of network activities.</p> <p>1.8.5 Devices added/removed on existing monitoring system.</p> <p>1.8.6 Basic issues addressed promptly and efficiently to make network available and responsive to users at all times.</p> <p>1.8.7 Any changes in the network and services documented as per industry norms.</p>
	1.9 Clean workplace	<p>1.9.1 Tools and equipment cleaned and stored in designated area.</p> <p>1.9.2 Workplace cleaned neatly and waste disposed as per 3R's principle in designated area.</p>
6	<p>Task Performance Requirements (Tools, Equipment and Materials):</p> <ul style="list-style-type: none"> Computer, bootable media, device driver, software package, power cord, extension cord, phase tester, screwdriver, pliers, internet connectivity, router, switch, wireless access point, firewall device, media converter, ADSL/DSL modem, ethernet card, RJ45, network cable, network modular, faceplate, patch panel, patch cord, console cable, network punch down tool, network cable tester, crimping tool, cable raceway/duct, printer, paper, pen, register and Personal Protective Equipment (PPE). 	
7	<p>Safety and Hygiene (Occupational Health and Safety):</p> <ul style="list-style-type: none"> Apply Personal Protective Equipment (PPE). Disconnect power supply. Prevent from electric shock. Maintain proper posture (Avoid awkward position). 	



8	Required Knowledge		
	Technical Knowledge	Applied Calculation	Graphical Information
	<ul style="list-style-type: none"> • Network tools, components and materials <ul style="list-style-type: none"> ○ Introduction ○ Types ○ Specification ○ Safe handling • Fundamental of computer network • Network architecture • Network topology • Network hardware • Network cabling • IP address • Network security • Network management • Remote access • Network protocol and network standard • Network planning and design • TCP/IP and OSI layer • Operating system 	<ul style="list-style-type: none"> • Perform IP classification 	<ul style="list-style-type: none"> • Read and interpret manufacturer's manual/specification • Read and interpret network diagram



	<ul style="list-style-type: none"> • Routing protocol • VLAN <ul style="list-style-type: none"> ○ Definition, purpose and benefits ○ VLAN Types ○ VLAN configuration • VPN <ul style="list-style-type: none"> ○ Introduction ○ Types ○ VPN encryption ○ Configuration • Firewall security <ul style="list-style-type: none"> ○ Introduction and types of firewalls ○ Firewall configuration ○ Firewall policy and rules ○ Firewall management ○ Best practices • Monitoring of network activities <ul style="list-style-type: none"> ○ Network monitoring tools ○ Network resources and performance ○ Network traffic, device health and application 		
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	<ul style="list-style-type: none">performance<ul style="list-style-type: none">○ Network security• Costing and estimation• Backup and recovery• Troubleshooting• Technical documentation		
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9	Assessment of Competency					
Unit: 1 Unit Title: Install, configure and maintain computer network						
Candidate Details			Assessors Detail			
Candidate's Name:			Assessors' Name		ID/License No:	
Registration Number:			1.			
Symbol No:			2.			
Test Centre:			3.			
Test Date:						
Element of competency	Performance Standards		Standard Met	Standard Not Met	Evidence Type	Comments
1.1 Perform network planning	1.1.1 Network requirement identified based on the information gathered from clients.					
	1.1.2 Network layout diagram prepared based on the needs of clients.					
	1.1.3 IP planned as per network requirement.					
	1.1.4 Hardware and software selected based on network diagram.					
	1.1.5 Cost of computer network estimated and documented as per industry norms.					
	1.1.6 Network design and cost shared with concerned personnel					



	for feedback and approval.				
1.2 Setup physical network	<p>1.2.1 Personal protective equipment (PPE) used in accordance with task requirement.</p> <p>1.2.2 Tools, equipment and materials collected as per task requirement.</p> <p>1.2.3 Network cables laid, crimped and tested as per cabling standard.</p> <p>1.2.4 Network devices installed and connected as per network diagram.</p> <p>1.2.5 Network connectivity checked from each network device.</p>				
1.3 Install and configure operating system	<p>1.3.1 BIOS configured and client/server booted with bootable installation media.</p> <p>1.3.2 Operating system installed as per installation guide.</p> <p>1.3.3 Network settings configured for the client/server.</p> <p>1.3.4 Necessary software installed as per installation guide.</p>				
1.4 Configure network	<p>1.4.1 Network settings configured on network devices to communicate on the network.</p> <p>1.4.2 Routing protocol configured and tested for network communication.</p> <p>1.4.3 Services configured and tested for proper functioning.</p>				



	<p>1.4.4 NAT rule implemented as per the network requirement.</p> <p>1.4.5 Network settings and services are documented as per industry norms.</p> <p>1.4.6 Network connectivity, performance and security tested and optimized to improve its performance.</p>				
1.5 Configure VLAN	<p>1.5.1 Number of VLAN required for network determined.</p> <p>1.5.2 VLAN IDs created as per the network requirement.</p> <p>1.5.3 VLAN tagging methods selected and configured on ports.</p>				
1.6 Configure VPN	<p>1.6.1 Type of VPN determined as per network requirement.</p> <p>1.6.2 VPN protocol and VPN client software selected based on organization requirement.</p> <p>1.6.3 VPN equipment configured as per VPN protocol and topology.</p> <p>1.6.4 VPN connection tested as per configuration.</p>				
1.7 Setup firewall device	<p>1.7.1 Network settings and services configured to communicate on the network.</p> <p>1.7.2 NAT rule implemented as per the network requirement.</p> <p>1.7.3 Firewall policy requirement identified from clients.</p> <p>1.7.4 Firewall rules configured and implemented as per firewall policy.</p> <p>1.7.5 Firewall rules tested as per firewall policy.</p>				



<p>1.8 Monitor network activities</p>	<p>1.8.1 Devices, applications and services running on the network listed and documented as per industry norms.</p> <p>1.8.2 Network performance metrics, availability and security of the network monitored on an ongoing basis.</p> <p>1.8.3 Data collected from network monitoring tools analysed to identify trends and patterns.</p> <p>1.8.4 Hardware and software updated and configured based on analysis of network activities.</p> <p>1.8.5 Devices added/removed on existing monitoring system.</p> <p>1.8.6 Basic issues addressed promptly and efficiently to make network available and responsive to users at all times.</p> <p>1.8.7 Any changes in the network and services documented as per industry norms.</p>				
<p>1.9 Clean workplace</p>	<p>1.9.1 Tools and equipment cleaned and stored in designated area.</p> <p>1.9.2 Workplace cleaned neatly and waste disposed as per 3R's principle in designated area.</p>				

WT- Written Test

OQ- Oral Question

PT- Practical Test

DO – Direct Observation

SR- Supervisor’s report

SN-Simulation

RP- Role Play

PG –Photographs

VD- Video

CT – Certificates

TS – Testimonials (Reward)

PP – Product Produced

CS – Case Study



NOSS ID #	Developed Date: 2023-04-06	Revision Number: 01	Revised Date:	Page:15
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Range Statement

Variable	Range
Network requirement	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Network topology • Software requirement • Security measures
Hardware and software	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Router • Manageable/non manageable switch • Firewall • Server • Operating system and application software
Concerned personnel	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Clients • Network administrator • Supervisor • Manager
Personal protective equipment	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Goggles • Apron • Gloves



	<ul style="list-style-type: none"> • Antistatic suits • Shoes
Cabling standard	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • T568A, T568B • Straight cabling • Crossover cabling
Network device	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Router • Wireless access point/repeater • Network switch • Media converter
Installation media	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • USB disk • Optical disk • External hard disk drive • Network drive
Operating system	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Windows operating system • Linux operating system • Macintosh operating system
Network settings	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Host name



	<ul style="list-style-type: none"> • IP • Subnet mask • Gateway • DNS • RDP/SSH
Software	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Drivers • Software update • Software patches • Application software
Routing protocol	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Default route • OSPF (Open Shortest Path First) • BGP (Border Gateway Protocol) • Static route
Services	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • DNS (Domain Name Server) • DHCP (Dynamic Host Control Protocol) • NTP (Network Time Protocol)
NAT (Network address translation) rule	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • PAT (Port Address Translation) • Port forwarding



VLAN tagging method	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Access • Trunk • Dot1q
Types of VPN	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Remote access (SSL) • Site to site
Firewall policy	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • IP • Hosts • Network • Port • Services • Communication between different network
Network performance metrics	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Latency • Packet loss • Throughput • Bandwidth usages • CPU usages • RAM usages • Network traffic • Thread



	<ul style="list-style-type: none"> • Security threats
3R's principle	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Reduce • Reuse • Recycle



5	Unit No: 2		Unit code:		
	Unit Title: Setup virtualization environment in server				
	Elements of competency		Performance standards		
	2.1 Plan for virtualization environment		2.1.1	Number of virtual machines (VMs) that will be created on the server determined based on organization requirement .	
			2.1.2	Hardware resources planned and assigned to support virtualization workloads.	
			2.1.3	Suitable virtualization platform selected based on organization need or resource plan.	
2.1.4			Backup and security measures for the virtualization environment planned.		
2.2 Install virtualization platform on server		2.2.1	Hardware requirements for the virtualization verified as per virtualization platform.		
		2.2.2	Virtualization software prepared.		
		2.2.3	BIOS configured and server booted with installation media		
		2.2.4	Virtualization software installed as per installation guide.		
2.3 Create virtual machine		2.3.1	New virtual machine created on virtualization platform.		
		2.3.2	Resources allocated to virtual machine.		
		2.3.3	Virtual machine settings configured/customized.		
2.4 Install operating system		2.4.1	Virtual machine booted with installation media.		
		2.4.2	Operating system installed as per installation guide.		
		2.4.3	Network settings configured for the server.		
		2.4.4	Necessary software installed as per installation guide.		
		2.4.5	Roles and services configured as per client's requirement.		
2.5 Setup end point security		2.5.1	All endpoints on the network identified and classified based on their function and level of access.		
		2.5.2	Security features configured and enabled on all endpoints.		
		2.5.3	Network access control implemented based on endpoint's security.		
		2.5.4	Security policies and rules enforced on endpoints.		



	<p>2.6 Perform operating system hardening</p>	<p>2.6.1 Operating system updated with latest security patches and software updates.</p> <p>2.6.2 User account configured and permission assigned to users based on their job responsibilities.</p> <p>2.6.3 Unnecessary services, protocols and applications disabled/removed from the server.</p> <p>2.6.4 OS Firewall settings configured as per requirement.</p> <p>2.6.5 File and directory permissions configured so that only authorized users have access to them.</p> <p>2.6.6 Encryption system implemented while transmitting data over the network.</p> <p>2.6.7 Ports configured as per security requirement.</p>
<p>6</p>	<p>Task Performance Requirements (Tools, Equipment and Materials):</p> <ul style="list-style-type: none"> • Computer, server, virtualization platform, bootable OS media/ISO file, , device driver, software package, internet connectivity, router, switch, wireless access point, media converter, ethernet card, network cable, patch cord, printer, paper, pen, register and Personal Protective Equipment (PPE). 	
<p>7</p>	<p>Safety and Hygiene (Occupational Health and Safety):</p> <ul style="list-style-type: none"> • Apply Personal Protective Equipment (PPE). • Prevent from electric shock. • Avoid awkward position. • Adjust posture to reduce strain. 	



8	Required Knowledge		
	Technical Knowledge	Applied Calculation	Graphical Information
	<ul style="list-style-type: none"> • Network tools, components and materials <ul style="list-style-type: none"> ○ Introduction ○ Types ○ Specification ○ Safe handling • Fundamental of computer network • Network architecture • Network topology • IP address, subnetting and supernetting • Network management • Remote access • Virtualization <ul style="list-style-type: none"> ○ Introduction ○ Virtualization technologies ○ Virtualization platform ○ Hardware requirement ○ Installation of virtualization platform 	<ul style="list-style-type: none"> • Perform IP classification 	<ul style="list-style-type: none"> • Read and interpret manufacturer's manual/specification • Read and interpret network diagram



	<ul style="list-style-type: none">○ Configuration of virtual machine○ Virtual networking○ Configuring network and services○ Storage management○ Performance optimization○ Security configuration○ Operating System (OS) hardening○ Backup and recovery		
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9	Assessment of Competency						
Unit: 2 Unit Title: Setup virtualization environment in server							
Candidate Details				Assessors Detail			
Candidate's Name:				Assessors' Name		ID/License No:	
Registration Number:				1.			
Symbol No:				2.			
Test Centre:				3.			
Test Date:							
Element of competency	Performance Standards			Standard Met	Standard Not Met	Evidence Type	Comments
2.1 Plan for virtualization environment	2.1.1 Number of virtual machines (VMs) that will be created on the server determined based on organization requirement .						
	2.1.2 Hardware resources planned and assigned to support virtualization workloads.						
	2.1.3 Suitable virtualization platform selected based on organization need or resource plan.						
	2.1.4 Backup and security measures for the virtualization environment planned.						
2.2 Install virtualization platform on server	2.2.1 Hardware requirements for the virtualization verified as per virtualization platform.						
	2.2.2 Virtualization software prepared.						
	2.2.3 BIOS configured and server booted with installation media						
NOSS ID #		Developed Date: 2023-04-06		Revision Number: 01		Revised Date:	
						Page:25	



	2.2.4 Virtualization software installed as per installation guide.				
2.3 Create virtual machine	2.3.1 New virtual machine created on virtualization platform. 2.3.2 Resources allocated to virtual machine. 2.3.3 Virtual machine settings configured/customized.				
2.4 Install operating system	2.4.1 Virtual machine booted with installation media. 2.4.2 Operating system installed as per installation guide. 2.4.3 Network settings configured for the server. 2.4.4 Necessary software installed as per installation guide. 2.4.5 Roles and services configured as per client's requirement.				
2.5 Setup end point security	2.5.1 All endpoints on the network identified and classified based on their function and level of access. 2.5.2 Security features configured and enabled on all endpoints. 2.5.3 Network access control implemented based on endpoint's security. 2.5.4 Security policies and rules enforced on endpoints.				
2.6 Perform operating system hardening	2.6.1 Operating system updated with latest security patches and software updates. 2.6.2 User account configured and permission assigned to users based on their job responsibilities. 2.6.3 Unnecessary services, protocols and applications disabled/removed from the server. 2.6.4 OS Firewall settings configured as per requirement. 2.6.5 File and directory permissions configured so that only authorized users have access to them.				



	2.6.6 Encryption system implemented while transmitting data over the network.				
	2.6.7 Ports configured as per security requirement.				

WT- Written Test

OQ- Oral Question

PT- Practical Test

DO – Direct Observation

SR- Supervisor’s report

SN-Simulation

RP- Role Play

PG –Photographs

VD- Video

CT – Certificates

TS – Testimonials (Reward)

PP – Product Produced

CS – Case Study



NOSS ID #	Developed Date: 2023-04-06	Revision Number: 01	Revised Date:	Page:27
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Range Statement

Variable	Range
Organization requirement	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Workload requirement: Web server, database server, mail server • Resources utilization • Availability requirement • Security requirement • Cost consideration
Hardware resources	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • CPU • Memory • Storage • Network adapter
Virtualization platform	<p><i>May include but are not limited to:</i></p> <ul style="list-style-type: none"> • VMware • Hyper-V • KVM • XCP-NG
Security measures	<p><i>May include but are not limited to:</i></p> <ul style="list-style-type: none"> • User authentication • Network segmentation • Firewall policy and rules



<p>BIOS configured</p>	<p><i>May include but are not limited to:</i></p> <ul style="list-style-type: none"> • Boot priority • Virtualization technology enabled • RAID configuration • Remote access controller • Network setup (IPMI)
<p>Operating system</p>	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Windows operating system • Linux operating system • Macintosh operating system
<p>Network settings</p>	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Host name • IP • Subnet mask • Gateway • DNS • RDP/SSH
<p>Software</p>	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Drivers • Software update • Software patches • Application software • Utility software



<p>Roles and services</p>	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • AD (Active Directory) • DC (Domain Controller) • DNS (Domain Name Server) • DHCP (Dynamic Host Control Protocol) • Group policy • NFS (Network File System) • SAMBA • IIS (Internet Information Services) • Apache • Nginx
<p>Endpoints</p>	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Server • Workstation • Mobile device
<p>Permission</p>	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Read • Write • Execute • Inheritance
<p>Encryption system</p>	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • SSL (Secure Sockets Layer) • TLS (Transport Layer Security)



5	Unit No: 3		Unit code:
	Unit Title: Implement and maintain backup system		
	Elements of competency	Performance standards	
	3.1 Prepare backup plan	3.1.1 Backup requirement determined from the clients. 3.1.2 Backup schedule determined and prepared based on size of data, frequency of changes and recovery needs. 3.1.3 Backup method selected base on backup requirement. 3.1.4 Appropriate backup system selected based on size of network, amount of data and cost of backup.	
3.2 Configure backup system	3.2.1 Backup system installed as per manufacturer's instruction. 3.2.2 Backup type, backup location and backup schedule configured as per backup plan. 3.2.3 Encryption and authentication method ensured during backup. 3.2.4 Data backup started as per backup schedule and backup method.		
3.3 Perform backup	3.3.1 Data to be backed up selected and backup started 3.3.2 Regular data backup scheduled as per backup plan. 3.3.3 Backup data secured from unauthorized access. 3.3.4 Backup system tested by restoring data to ensure it is functioning correctly. 3.3.5 Backup logs checked regularly for errors and failures. 3.3.6 Concerned personnel informed on any issues related to backup. 3.3.7 Backup restored to previous state.		



6	<p>Task Performance Requirements (Tools, Equipment and Materials):</p> <ul style="list-style-type: none"> • Computer with network connectivity, device driver, application software, utility software, backup system, storage devices and Personal Protective Equipment (PPE).
7	<p>Safety and Hygiene (Occupational Health and Safety):</p> <ul style="list-style-type: none"> • Apply Personal Protective Equipment (PPE). • Prevent from electric shock. • Avoid awkward position. • Adjust posture to reduce strain.



8	Required Knowledge		
	Technical Knowledge	Applied Calculation	Graphical Information
	<ul style="list-style-type: none"> • Introduction to backup systems • Backup planning and strategies • Backup system • Hardware and software for backup system • Backup implementation • Backup monitoring and maintenance • Disaster recovery planning • Backup tools • Backup security • Data security policy 	<ul style="list-style-type: none"> • Calculate storage requirement 	<ul style="list-style-type: none"> • Read and interpret instruction manual • Read and interpret network diagram



9	Assessment of Competency					
Unit: 3 Unit Title: Implement and maintain backup system						
Candidate Details			Assessors Detail			
Candidate's Name:			Assessors' Name		ID/License No:	
Registration Number:			1.			
Symbol No:			2.			
Test Centre:			3.			
Test Date:						
Element of competency	Performance Standards		Standard Met	Standard Not Met	Evidence Type	Comments
3.1 Prepare backup plan	3.1.1 Backup requirement determined from the clients.					
	3.1.2 Backup schedule determined and prepared based on size of data, frequency of changes and recovery needs.					
	3.1.3 Backup method selected base on backup requirement.					
	3.1.4 Appropriate backup system selected based on size of network, amount of data and cost of backup.					
3.2 Configure backup system	3.2.1 Backup system installed as per manufacturer's instruction.					
	3.2.2 Backup type, backup location and backup schedule configured as per backup plan.					
	3.2.3 Encryption and authentication method ensured during					



	<p>backup.</p> <p>3.2.4 Data backup started as per backup schedule and backup method.</p>				
3.3 Perform backup	<p>3.3.1 Data to be backed up selected and backup started</p> <p>3.3.2 Regular data backup scheduled as per backup plan.</p> <p>3.3.3 Backup data secured from unauthorized access.</p> <p>3.3.4 Backup system tested by restoring data to ensure it is functioning correctly.</p> <p>3.3.5 Backup logs checked regularly for errors and failures.</p> <p>3.3.6 Concerned personnel informed on any issues related to backup.</p> <p>3.3.7 Backup restored to previous state.</p>				

WT- Written Test

OQ- Oral Question

PT- Practical Test

DO – Direct Observation

SR- Supervisor’s report

SN–Simulation

RP- Role Play

PG –Photographs

VD- Video

CT – Certificates

TS – Testimonials (Reward)

PP – Product Produced

CS – Case Study



NOSS ID #

Developed Date: 2023-04-06

Revision Number: 01

Revised Date:

Page:35



Range Statement

Variable	Range
Backup requirement	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • What need to backup • Frequency of backup • How many copies required • How long to retain • Backup location
Backup method	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Full backup • Incremental backup • Differential backup
Backup system	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Cloud backup • Disk backup • NAS backup
Data	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Files/folders • Database • System configuration • Image level backup



Concerned personnel	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none">• Supervisor• Manager• Network administrators• Backup administrators
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NOSS ID #

Developed Date: 2023-04-06

Revision Number: 01

Revised Date:

Page:37



5	Unit No: 4		Unit code:		
	Unit Title: Repair and maintain computer network system				
	Elements of competency		Performance standards		
	4.1 Perform preventive maintenance		4.1.1 Preventative schedule and checklist prepared for stable and reliable network performance. 4.1.2 Network performance monitored on regular basis. 4.1.3 Network devices updated with latest firmware and security patches. 4.1.4 Security measures regularly reviewed and security protocol updated as needed. 4.1.5 Network system reviewed and implemented as per the recommendation of network audit. 4.1.6 Any changes in the network documented as per industry norms.		
4.2 Analyze computer network system		4.2.1 Information related to problem and issues collected from client. 4.2.2 Computer system visually observed for problems and issues. 4.2.3 Network connectivity checked and tested on all device. 4.2.4 System and network logs reviewed to identify errors and warnings. 4.2.5 Diagnostic tests run to identify network and software issues. 4.2.6 Network hardware and software checked for malfunction or misconfiguration. 4.2.7 Computer network problem identified based on the test result.			
4.3 Estimate cost		4.3.1 Materials listed with technical specification as per the fault. 4.3.2 Cost of repair calculated including material cost and service charge. 4.3.3 Customer informed about estimated cost for repair and risk factor.			



		4.3.4 Customer approval obtained prior to repair work.
4.4	Repair computer network system	<p>4.4.1 Troubleshooting plan developed based on the identified problem.</p> <p>4.4.2 Data backed up and stored in specific location.</p> <p>4.4.3 Software problems fixed using software issues resolving technique.</p> <p>4.4.4 Hardware faults repaired/replaced as per manufacturer's instruction.</p> <p>4.4.5 Computer system tested for normal operation.</p> <p>4.4.6 Data restored to previous location.</p> <p>4.4.7 Fault and maintenance details documented along with the solution.</p>
4.5	Clean workplace	<p>4.5.1 Tools and equipment cleaned and stored in designated area.</p> <p>4.5.2 Workplace cleaned neatly and waste disposed as per 3R's principle in designated area.</p>
6	<p>Task Performance Requirements (Tools, Equipment and Materials):</p> <ul style="list-style-type: none"> • Computer, bootable media, device driver, software package, power cord, extension cord, phase tester, multimeter, screwdriver, pliers, internet connectivity, network devices, RJ45, network cable, patch panel, patch cord, console cable, network punch down tool, network cable tester, crimping tool, printer, paper, pen, register and Personal Protective Equipment (PPE). 	
7	<p>Safety and Hygiene (Occupational Health and Safety):</p> <ul style="list-style-type: none"> • Apply Personal Protective Equipment (PPE). • Prevent from electric shock. • Avoid awkward position. • Adjust posture to reduce strain. 	



8	Required Knowledge		
	Technical Knowledge	Applied Calculation	Graphical Information
	<ul style="list-style-type: none"> • Tools, components and materials <ul style="list-style-type: none"> ○ Introduction ○ Types ○ Safe handling • Basic electronics • Network topology • Network protocol • Network hardware and software • Network troubleshooting process • Preventative maintenance • Network monitoring • Network security • Problem resolving technique • Data backup and restore • Technical documentation 		<ul style="list-style-type: none"> • Read and interpret instruction manual • Read and interpret network diagram



9	Assessment of Competency				
Unit: 4 Unit Title: Repair and maintain computer network system					
Candidate Details			Assessors Detail		
Candidate's Name:			Assessors' Name		ID/License No:
Registration Number:			1.		
Symbol No:			2.		
Test Centre:			3.		
Test Date:					
Element of competency	Performance Standards	Standard Met	Standard Not Met	Evidence Type	Comments
4.1 Perform preventive maintenance	4.1.1 Preventative schedule and checklist prepared for stable and reliable network performance.				
	4.1.2 Network performance monitored on regular basis.				
	4.1.3 Network devices updated with latest firmware and security patches.				
	4.1.4 Security measures regularly reviewed and security protocol updated as needed.				
	4.1.5 Network system reviewed and implemented as per the recommendation of network audit.				
	4.1.6 Any changes in the network documented as per industry				



NOSS ID #

Developed Date: 2023-04-06

Revision Number: 01

Revised Date:

Page:41



2045

	norms.				
4.2 Analyze computer network system	<p>4.2.1 Information related to problem and issues collected from client.</p> <p>4.2.2 Computer system visually observed for problems and issues.</p> <p>4.2.3 Network connectivity checked and tested on all device.</p> <p>4.2.4 System and network logs reviewed to identify errors and warnings.</p> <p>4.2.5 Diagnostic tests run to identify network and software issues.</p> <p>4.2.6 Network hardware and software checked for malfunction or misconfiguration.</p> <p>4.2.7 Computer network problem identified based on the test result.</p>				
4.3 Estimate cost	<p>4.3.1 Materials listed with technical specification as per the fault.</p> <p>4.3.2 Cost of repair calculated including material cost and service charge.</p> <p>4.3.3 Customer informed about estimated cost for repair and risk factor.</p> <p>4.3.4 Customer approval obtained prior to repair work.</p>				



<p>4.4 Repair computer network system</p>	<p>4.4.1 Troubleshooting plan developed based on the identified problem.</p> <p>4.4.2 Data backed up and stored in specific location.</p> <p>4.4.3 Software problems fixed using software issues resolving technique.</p> <p>4.4.4 Hardware faults repaired/replaced as per manufacturer's instruction.</p> <p>4.4.5 Computer system tested for normal operation.</p> <p>4.4.6 Data restored to previous location.</p> <p>4.4.7 Fault and maintenance details documented along with the solution.</p>				
<p>4.5 Clean workplace</p>	<p>4.5.1 Tools and equipment cleaned and stored in designated area.</p> <p>4.5.2 Workplace cleaned neatly and waste disposed as per 3R's principle in designated area.</p>				

WT- Written Test

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DO – Direct Observation

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NOSS ID #	Developed Date: 2023-04-06	Revision Number: 01	Revised Date:	Page:43
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Range Statement

Variable	Range
Computer network problem	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Network device problem • Cable problem • Connectivity problem • Configuration issue • Software issue • Network IP issue
Troubleshooting plan	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Hardware replacement • Hardware repair • Software reinstallation • Software updates • Software repair • Reconfiguration
Specific location	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Local drive • External hard drive • USB disk • Optical disk • Network drive



	<ul style="list-style-type: none"> • Cloud
Software issues resolving technique	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Uninstalling and installing software • Updating firmware and software • Configuring software and device driver • Updating configurations or settings • Roll back recent changes • Reverting system to previous backup • Troubleshoot by using command prompt/terminal
3R's principle	<p><i>May include but not limited to:</i></p> <ul style="list-style-type: none"> • Reduce • Reuse • Recycle

