Information Technology

Pathway: Network Systems

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
ITPA01.01	Network Systems Pathway	#4: Introduction to Network Systems	Identify and analyze customer/organizational network system needs and requirements.	Gather data to identify customer/organizational requirements.	Gather data to identify customer requirement.
					Identify system and network requirements.
					Develop functional requirements/specifications for high-level systems.
					Identify security requirements.
					Identify time, technology, and resource constraints.
					Identify physical requirements for system implementation.
					Identify system requirements for various types of installations.
					Identify new application requirements within the system.
					Identify environment requirements, conditions and limitations.
					Determine required service level.
					Gather information using interviewing strategies.
					Identify input and output requirements.
					Identify system processing requirements.
					Clarify specifications using questioning techniques.
					Identify hardware, networking, and software system functional requirements.
					Demonstrate knowledge of nonfunctional requirements (e.g., security, integrity response time, reliability, support, and documentation).

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			(CONTINUED)	Conduct needs analysis.	Gather information on problems from users.
					Perform workflow analysis to determine user needs.
					Analyze existing procedures.
					Define business problem to be solved by the application.
					Access needed information using company and manufacturers' references (e.g., procedural manuals, documentation, standards, work flowcharts).
				Develop networking requirements specification.	Demonstrate knowledge of the use, structure, and contents of a requirements specification document.
					Define system and software requirements.
					Develop informal specifications.
					Develop formal specification.
					Evaluate installation requirements.
					Resolve conflicting requirements.
					Review and verify specification with customer.
				Analyze requirements/specifications using current approaches.	Analyze facilities' bandwidth requirements.
					Demonstrate knowledge of how to use software methodologies to analyze a real-world problem.
					Identify constraints.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
ITPA01.02	Network Systems Pathway	#4: Introduction to Network Systems	Perform project management.	Produce strategies and plan to solve the specific network problem.	Evaluate project requirements.
					Define scope of work to meet customer/organizational requirements.
					Conduct organizational planning for information system.
					Demonstrate knowledge of the key functions and subsystems of the network system.
					Demonstrate knowledge of the system life-cycle approach.
				Create project plan.	Demonstrate knowledge of project budgeting, scheduling, and control issues related to development and support of a network system.
					Prepare overall plan for integrating new processes, protocols, and equipment.
					Develop implementation plan.
					Identify tools and resources for the job.
					Identify and evaluate risks.
					Identify critical milestones.
					Identify interdependencies.
					Estimate time requirements.

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			(CONTINUED)	Manage information system project methodologies.	Define the project's contribution to business needs.
					Define the scope of the project.
					Identify stakeholders and decision makers.
					Identify escalation procedures.
					Develop task list (work breakdown structures).
					Evaluate project requirements and risks.
					Identify required resources and budget.
					Develop initial project management flowchart.
					Identify interdependencies.
					Identify and track critical milestones.
					Prepare contingency plan.
					Manage the change control process.
					Participate in project phase review.
					Report project status.
					Utilize project management software.
					Develop a method of evaluation.
ITPA01.03	Network Systems Pathway	#4: Introduction to Network Systems	Analyze network system interdependencies and constraints.	Analyze the computer site environment.	Identify power and power supplies.
					Define power conversion.
					Identify ergonomic issues.
					Identify structural capacities and electrical wiring codes.
					Analyze facilities' capacity planning (power cable/wire conduit).
					Evaluate emerging technologies as either potential effect on information system software/hardware.

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			(CONTINUED)	Analyze network security systems.	Identify security requirements and the need for data protection.
					Identify specific access levels that need to be accommodated.
					Match security system design to identified security requirements.
					Develop security plan.
				Evaluate the correctness and effectiveness of implementing the network system.	Evaluate user support outcomes to determine whether the problem was solved as intended.
					Evaluate whether the process was applied in an efficient and responsible manner.
					Assess the validity and usefulness of the outcomes.
					Determine needed follow-up actions.
ITPA01.04	Network Systems Pathway	#5: Network System Design	Demonstrate knowledge of designing a network system.	Demonstrate knowledge of the basics of network architecture.	Demonstrate knowledge of the characteristics and uses of network components (e.g., hub, switches, routers, firewall).
					Differentiate between a physical and logical topology.
					Demonstrate a basic knowledge of OSI modeling.
					Demonstrate knowledge of LAN transmission methods and standards.
					Demonstrate knowledge of LAN transmission protocols.
					Demonstrate knowledge of various frame types and formats.
					Differentiate processes, services, and protocols.

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			(CONTINUED)	Demonstrate knowledge of basic network classifications and topologies.	Differentiate between LANs, MANs, and WANs.
					Demonstrate knowledge of how to turn LANs into MANs and WANs.
					Identify the basic point-to-point network topologies (e.g., star, ring, tree, network, irregular).
					Demonstrate knowledge of packet-switching techniques.
					Identify basic broadcast topologies (e.g., star, ring, bus).
					Demonstrate knowledge of characteristics of connection-oriented and connectionless networks.
					Identify standard high-speed network (e.g., broadband, ISDN, SMDS, ATMN, FDDI).
					Identify emerging networks (e.g., ATM, ISDN, satellite nets, optic nets, integrated voice, data, and video).
					Investigate emerging technologies.
					Demonstrate knowledge of electronic communications (e.g., LAN, Internet, remote database access, EDI).
					Demonstrate knowledge of basic telephony (analog vs. digital signals).

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			(CONTINUED)	Demonstrate knowledge of common network computing platforms.	Identify how the four components of a network operating system (i.e., server platform, network services software, network redirection software, communications software) support network operations.
					Select a LAN/WAN technology that meets defined set of requirements.
				Demonstrate knowledge of LAN physical media.	Demonstrate knowledge of the reasons for installing a network.
					Demonstrate knowledge of local-area network (LAN) trends and issues.
					Trace the evolution of networks.
					Analyze current trends and development in LANs.
				Demonstrate knowledge of network connectivity basis and transmission line applications.	Demonstrate knowledge of the principles and operation of wire (coaxial, fiber optics, etc.) and wireless systems.
					Demonstrate knowledge of the principles and operation of fiber optics, analog and digital circuits.
				Demonstrate knowledge of communication standards for networks.	Demonstrate knowledge of the open system interconnection (OSI) standard (ISO Standard 7498).
					Identify standard high-speed networks (e.g., broadband, ISDN, SMDS, ATM, FDDI).
					Demonstrate knowledge of the TCP/IP protocol.

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			(CONTINUED)	Demonstrate knowledge of WAN systems.	Demonstrate knowledge of the conversion of analog speech to digital.
					Relate voice, data concepts, and video to video area networks.
					Select primary and backup data circuits.
					Evaluate analog and digital transmission for cost performance and reliability.
					Demonstrate knowledge of firewall between trusted network and WAN.
					Establish a Virtual Private Network (VPN) to form the infrastructure of the WAN.
					Determine routers needed to connect with LAN.
					Demonstrate knowledge of interconnecting LANs using WAN services.
					Incorporate cost-saving approaches, including frame-relay ATM and voice/video/data compression.
				Demonstrate knowledge of network security systems.	Demonstrate knowledge security requirements and the need for data protection.
					Demonstrate the knowledge of access levels that need to be accommodated.
					Develop security plan.
				Demonstrate knowledge of Network Operating Systems.	Demonstrate knowledge of the general characteristics of network operating systems.
					Demonstrate knowledge of network operating systems (i.e., window NT, LINUX, UNIX, etc.).

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ITPA01.05	Network Systems Pathway	#6: Network System Installation	Perform network system installation and configuration.	Install system.	Evaluate installation requirements.
					Install information system application programs in accordance with requirements.
					Install appropriate operating system and telecommunications hardware and software.
					Access needed technical information using software help facilities.
					Operate server applications.
					Ensure that all multi-user aspects of the application function are operational.
					Operate coupled application systems.
				Perform software loading and configuration.	Load software with minimum disruption of process flow.
					Resolve compatibility issues.
					Convert data.
					Configure software appropriately for system and user application.
					Add capability to a software system by recording macros and storing them in the system's library.
					Customize a general-purpose software package (e.g., DBMS) to provide specific functionality beyond the default setting.
					Assemble necessary components to complement information system design.
					Install LAN Management software.

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ITPA01.06	Network Systems Pathway	#7: Network Administration	Perform network administration and monitoring.	Monitor the information/network system.	Support network operating center (NOC).
					Monitor system status and performance.
					Conduct post-implementation evaluation.
					Identify abnormal system performance.
					Identify required service level.
					Recognize system alerts.
					Recognize security problems.
					Recognize environmental problems.
					Perform remote monitoring.
				Demonstrate knowledge of disaster recovery and business continuance.	Differentiate between disaster recovery and business resumption.
					Identify the steps in a disaster recovery plan and a business resumption plan.
					Identify methods for avoiding common computer system disasters.
					Identify common backup devices.
					Identify the criteria for selecting a backup system.
					Compare/contrast streaming and file-by-file backup systems.
					Establish process for archiving files.
					Develop a disaster recovery plan.
					Develop a business resumption plan.
					Backup system.
					Restore system.

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			(CONTINUED)	Perform network system administration tasks.	Identify principles governing software acquisition and upgrades.
					Manage inventory and assets.
					Retrieve/analyze historical data for trends analysis.
					Perform administration functions using LAN manager software.
					Respond to system messages.
ITPA01.07	Network Systems Pathway	#8: Network Systems Maintenance and Support	Perform network maintenance and user support services.	Identify technical support needed.	Identify support requirements.
					Apply information and data analysis techniques.
					Identify skill level needs.
					Define scope of work to meet customer needs.
					Identify resources and risks.
					Evaluate present data and system configuration.
					Formulate a support plan.
				Perform technical support needed.	Respond to user questions.
					Communicate and document technical support provided.
					Perform technical functions required by customer/user.
					Employ technical and computer tools to perform task in the most cost-effective manner.
					Manage working relationships with customer within support boundaries.
					Balance resource against customer/user needs.
					Manage multiple customer requirements.
					Participate in application and system development reviews.

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			(CONTINUED)	Perform software upgrades and fixes.	Analyze operational problems.
					Install and configure Internet software packages.
					Upgrade network system software.
				Perform standard computer backup procedures.	Recognize the need for regular backup procedures.
					Develop backup process.
					Load backup software.
					Perform restore operation using backup software.
					Identify battery backup equipment.
					Maintain battery backup system.
					Install surge suppression protection.

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Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Perform network system maintenance.	Demonstrate knowledge of the basic elements of network maintenance.
					Identify available diagnostic tools used for system maintenance.
					Identify maintenance procedures and processes.
					Identify problems using diagnostic tools.
					Run diagnostics.
					Respond to system messages.
					Document network system malfunction(s).
					Fix recoverable problems.
					Perform preventive maintenance procedures on computer and peripheral devices.
					Restore system.
					Identify new or replacement networking components needed.
					Establish a preventive maintenance plan.
					Create maintenance plan for regular integrity checks.
					Identify maintenance procedures and processes.
					Evaluate maintenance processes and outcomes.
					Select most appropriate solution.
					Implement selected solution.
					Minimize impact of problems on productivity (e.g., minimize downtime).

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			(CONTINUED)	Troubleshoot problems.	Demonstrate knowledge of basic troubleshooting steps.
					Identify available diagnostic tools used for system maintenance.
					Perform appropriate analysis to identify problem cause.
					Develop resolution plan.
					Identify possible solutions.
					Test identified solutions.
					Detect problems.
					Identify criticality of problem.
					Identify problems using diagnostic tools.
					Document results and solution.
				Troubleshoot data communications.	Isolate system faults in various types of networks, cables, data modems, and carrier systems.
					Determine hardware communication faults utilizing diagnostic tools.
					Identify network problems utilizing network management tools (e.g., hardware, software carriers).

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