e-Quals Unit Syllabus

Level 3 ICT Systems and network management

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Unit 506 ICT Systems and network management

Rationale

This unit will enable the candidate to monitor and control the operation of IT systems (stand-alone, peer-to-peer, client server wireless LAN). Candidates will also gain knowledge of wide area, metropolitan and global networks.

Learning outcomes

There are **four** outcomes to this unit. The candidate will be able to:

- Monitor and control the operation and performance of IT systems
- Make recommendations on improving the use of IT systems
- Control the routine maintenance of IT systems and resources
- Administer IT system resources and user profiles

Guided learning hours

It is recommended that 90 hours should be allocated for this unit. This may be on a full time or part time basis.

Connections with other qualifications

This unit contributes towards the knowledge and understanding required for the following qualifications:

NVQ for IT Professionals (4324) Level 3

Outcome	Unit
1,2,3	314.1 How available options for system configuration affect functionality and capacity
1, 3	314.2 Make changes to system configuration
2	315.1 What operating procedures are applicable to the system
1, 3, 4	315.2 How to operate the system
1, 4	315.3 System functionality during normal operation
1, 4	315.4 Effects of operational activities on system functionality
2,3,4	315.5 How to recognise and resolve system faults
1,2,3	317.1 Appropriate uses of diagnostic methods
2,3	317.2 The purpose for which diagnostic information required
1,2,3	317.3 The diagnostic process to be followed
3	319.1 The testing process to be followed
4	319.2 The purpose of testing
3	319.3 What test preparation and conclusion activities are necessary for specific tests
1	321.1 The working process
3	321.2 What regulatory requirements affect work activities

Key Skills

Application of number	N/A
Communication	2.2, 2.3
ICT	2.1
Working with others	N/A
Problem solving	3.1
Improving own learning	2

Assessment and grading

Assessment will be by means of a **set assignment** covering both practical activities and underpinning knowledge.

Unit 506 ICT Systems and network management

Outcome 1 Monitor and control the operation and performance of IT systems

Practical activities

The candidate will be able to:

1 use suitable tools to monitor the operation and performance of IT systems (stand-alone and networked systems – peer-to-peer, client-server) eg

- a SNMP agent
- b managed nodes
- c management station
- d network viewing
- e performance and system monitor
- f protocol analyser

2 interpret the information provided by system monitoring tools, eg

- a demand overload
- b storage capacity overload
- c speed reduction
- d high percentage of resource users

3 identify failures of IT systems (stand-alone, peer-to-peer, client server to meet operational requirements, eg

- a system operates, but is unacceptably slow
- b unacceptable number of internet connection drop-outs
- c users have difficulty in accessing data
- d users have difficulty running software installed on their own workstations
- e users have difficulty running software installed on the server

4 initiate the actions required to remedy failures of IT systems to meet operational requirements, eg

- a re-configure operating system
- b upgrade operating system
- c upgrade system hardware
- d re-configure application software
- e upgrade application software
- f re-distribute load on system hubs

5 create and maintain operational records.

Underpinning knowledge

The candidate will be able to:

1 identify tools available to monitor the operation and performance of IT systems, eg

- a SNMP agent
- b managed nodes
- c management station
- d network viewing
- e performance and system monitor
- f protocol analyser

2 describe operational requirements (protocols, memory, processors, cabling, operating systems, hardware performance) for IT systems (stand-alone, peer-to-peer, client server LAN, MAN, WAN, GAN) performance, covering:

- a function
- b inputs
- c processes
- d outputs
- e capacity
- f access, eg number of simultaneous users, speed of response
- g processing
- h storage

3 describe potential effects of failures (slow system, difficulty logging on, slow data process, slow running applications, difficulty accessing data) of IT systems to meet operational requirements affecting:

- a the rest of the system
- b system users
- c the organisation
- d external customers/users

4 describe common causes of failures of IT systems (slow system, difficulty logging on, slow data process, slow running applications, difficulty accessing data) to meet operational requirements and the actions required to correct these, eg

- a insufficient memory
- b operating system cannot cope with user numbers
- c poorly distributed load
- d speed reduction
- e high percentage of users
- f excessive e-mail files on system
- g modem slow to dial out, causing missed Internet connection

Underpinning knowledge continued

5 describe the typical content and format of operational records, eg for each machine (server or workstation):

- a the type of machine
- b serial number
- c location of machine
- d what disk drives are available in the machine
- e adapter card modules fitted to the machine, make, version, configuration (IRQ, I/O address, speed, etc.)
- f operating system type and version installed in each machine
- g for servers: network operating system and version installed (including configuration)
- h other software permanently running in the machine (version, configuration)
- j what addresses the machine is using
- k if the IP is the address issued by a Dynamic Host Control Protocol (DHCP) server, the computer name of the machine details of workgroup/domain membership
- l details of the normal users of the machine
- m passwords and authorities in use
- n security arrangements (firewalls, anti-virus protection etc)
- p fault log
- q maintenance log
- r upgrade log

Underpinning knowledge continued

6 describe the technical details of IT systems (stand-alone, peer to peer, client server LAN, MAN, WAN, GAN) eg

- a OSI 7 layer model for networks
- b peer-to-peer networks
- c client server networks
- d Wireless networks
- e LAN topology:
  - i star topology
  - ii bus topology
  - iii mesh networks
  - iv ring topology
  - v cellular networks
- f bandwidth
- g transmission media (twisted pair, shielded twisted pair, co-ax, fibre optics)
- h transmission technologies (Ethernet, FDDI, synchronous and asynchronous transmission, token rings, wireless, ATM, etc.)
- j MAN and WAN topology, connectivity, transmission media/types
- k internetworking
  - i protocols – TCP, IP, FTP, DHCP, ICMP, ARP, SMTP, RIP
  - ii devices – hubs, switches, bridges, routers, gateways, modems
  - iii security – firewalls, network address translation (NAT), virtual private networks (VPN)

7 outline the content of regulations relevant to IT system operation, including:

- a legislation (eg Health and Safety)
- b manufacturer's documentation
- c organisational procedures
- d copyright
- e data protection.

Unit 506 ICT Systems and network management

Outcome 2 Make recommendations on improving the use of IT systems

Practical activities

The candidate will be able to:

1 review customers' use of IT systems to identify potential improvements

2 assess the feasibility of potential improvements

3 make recommendations, including justifications, on improving the use of IT systems (peer-to-peer, client server LAN).

Underpinning knowledge

The candidate will be able to:

1 describe areas of IT system use that may be inefficient, covering:

- a hardware (location, quantity, type, configuration)
- b software (ease of use, functionality, configuration)
- c use of materials (type, wastage)
- d services (coverage, level, availability)

2 describe methods of improving the efficiency of hardware and software including stand-alone,
peer-to-peer, LAN and WAN, eg

- a upgrade
- b re-configure system software/hardware
- c re-distribute load
- d re-design topology
- e provision of automated routines
- f provision of easy access software facilities (buttons, menus, etc.)

3 describe the factors contributing to the feasibility or otherwise of potential improvements

- a cost
- b impact on organisation
- c effectiveness

4 explain the importance of presenting recommendations in a manner suited to the needs of the audience.

Unit 506 ICT Systems and network management

Outcome 3 Control the routine maintenance of IT systems and resources

Practical activities

The candidate will be able to:

1. create routine maintenance schedules that meet regulations and minimise disruption to system users, covering:
   - a cleaning
   - b diagnostics, self-tests and visual checks
   - c regular servicing
2. control the physical storage of system media and documentation. System media are:
   - a original software
   - b data archives
   - c system backups
3. control the storage and issue of system materials. Materials are:
   - a removable media
   - b consumables
4. create and maintain records of system maintenance. Records covering:
   - a installed hardware
   - b installed software
   - c routine maintenance
   - d storage and update of system media and documentation
   - e storage and issue of consumable materials.

Underpinning knowledge

The candidate will be able to:

1 describe the factors that need to be taken into account when scheduling maintenance, eg access when network is on minimum load, not running mission-critical tasks

2 describe the purpose and typical contents of system records, eg

- a the type of machine
- b serial number
- c location of machine
- d what disk drives are available in the machine
- e adapter card modules fitted to the machine, make, version, configuration (IRQ, I/O address, speed, etc.)
- f operating system type and version installed in each machine
- g for servers: network operating system and version installed (including configuration)
- h other software permanently running in the machine (version, configuration)
- i what addresses the machine is using
- j if the IP is the address issued by a Dynamic Host Control Protocol (DHCP) server
- k the computer name of the machine details of workgroup/domain membership
- l network diagrams (to assist with troubleshooting)
- m details of the normal users of the machine
- n passwords and authorities in use
- o security arrangements (firewalls, anti-virus protection etc)
- p fault log (to assist with troubleshooting)
- q maintenance log (to assist with troubleshooting
- r upgrade log (to assist with troubleshooting)
- s backed-up data and essential system files (in case of system crashes, etc.)
- t software licenses and authorities (to ensure legal compliance)

3 identify system media (eg tapes, disks)and documentation that should be stored, eg

- a system and data backup media (CDROM, DAT, etc.)
- b network diagrams
- c licenses for software
- d details of system components
- e warranties
- f maintenance contracts
- g maintenance and fault logs
- h security details (passwords, authorities, user names, etc.)

4 explain the circumstances under which system media (eg tapes, disks) and documentation should be updated eg

   a regular data backups

   b system backups when the operating system has been updated or re-configured

   c hardware logs and network diagrams whenever the network has been changed

   d security log whenever passwords, user names etc. have been added, removed or changed.

5 describe how to identify and quantify the consumable materials required to meet operational requirements

6 describe the environmental conditions that need to be taken into account when storing system media, documentation and consumable materials. Environmental factors covering:

   a temperature

   b humidity

   c light

   d cleanliness

   e electro-magnetic fields

7 describe the factors that need to be taken into account when controlling the issue of materials from storage, eg

   a stock level replenishment

   b authority for issue/use

   c health and safety (COSHH)

   d cost control.

Unit 506 ICT Systems and network management

Outcome 4 Administer IT system resources and user profiles

Practical activities

The candidate will be able to:

1 design an efficient file storage structure

2 monitor and maintain file storage structures

3 monitor and configure networks and data communications

4 specify and control system backups

5 administer user profiles eg

- a access rights
- b file permissions.

Underpinning knowledge

The candidate will be able to:

1 describe the facilities available for backing up the system file storage, eg

- a automatic scheduled backup to a reserve server, tape medium, etc
- b full, incremental, differential and copy backup
- c grandfather/father/son systems
- d web-based storage

2 describe the factors to be taken into account when determining the required levels of available file storage, eg

- a location (on/off site)
- b fire/bomb/intruder proof
- c number of tapes required
- d ease of access in the event of a disaster

3 explain the importance of protecting system data from accidental or deliberate corruption

4 describe commonly available facilities for protecting system file storage, eg

- a fire/bomb/intruder proof
- b on/off site

5 explain the importance of maintaining the required levels of available file storage

6 explain the importance of backing up system software and data

Underpinning knowledge continued

7 describe commonly available hardware for backing up system software and data
   - a magnetic tape streamers, cartridges, etc
   - b re-writable drives (CD/DVD)
   - c RAID arrays
   - d Mirror sites

8 describe the factors that need to be considered when specifying backup procedures, eg
   - a how critical is the data
   - b how often does it change and how much by
   - c how quickly would recovery need to be completed
   - d how much data will be backed up
   - e who will be responsible
   - f how many copies are required

9 explain the importance of maintaining backup records

10 describe the factors that need to be considered when restoring system software and data from backups, eg
   - a age of backups
   - b changes backup may introduce
   - c will any vital data be missing
   - d will the system need to be re-configured

11 explain the importance of controlling user access to system resources

12 describe commonly available methods for controlling user access to system resources, eg
   - a user names, passwords
   - b workgroups
   - c authorities

13 identify methods and reasons for the protection of unauthorised access to the network system, eg
   - a data loss
   - b data corruption
   - c confidentiality
   - d copyright
   - e data protection
   - f firewalls
   - g restricted access
   - h permissions
   - i passwords
   - j wireless encryption.

Unit record sheet

Use this form to track your progress through this unit.

Tick the boxes when you have covered each outcome. When they are all ticked, you are ready to be assessed.

Outcome	✓	Date
1 **Monitor and control the operation and performance of IT systems**	☐	
2 **Make recommendations on improving the use of IT systems**	☐	
3 **Control the routine maintenance of IT systems and resources**	☐	
4 **Administer IT system resources and user profiles**	☐	

Candidate Signature ..... **Date** .....

City & Guilds Registration Number .....

Quality nominee (if sampled) ..... **Date** .....

Assessor Signature ..... **Date** .....

External Verifier Signature (if sampled) ..... **Date** .....

Centre Name ..... **Centre Number** .....

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