City & Guilds 7540

Certificate in ICT Systems and Principles
Option 1: Copper

Description	The qualification will provide underpinning knowledge and recognised skills in telecommunications and data installations, design and planning in the workplace.
Venue	Melksham, Wiltshire
Duration	15 Days

Course Overview

Unit 042: Telecommunications Principles (Mandatory Unit)

- **Alternating current (AC) circuits**
- **Effects of line impairments**
- **Characteristics of transmission lines**
- **Transmission of digital signals**
- **Modulating carrier waves**
- **Multiplexing**

Unit 357: Design and plan for an internal network cabling infrastructure

- **Surveying the site for the purpose of internal network cabling**
- **Identify a range of options**
- **Schematic designs and detailed plans**
- **Co-ordinating the project**

Unit 227: Copper cabling in an internal environment

- **Working safely with copper cabling**
- **Understanding basic electrical theory and safety with reference to data communications cabling.**

Assessment: **You will be assessed via a combination of online multiple-choice exams, project work and practical competency.**

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Certificate in ICT Systems and Principles
Unit 042: Telecommunications Principles

Description	Cover principles of telecommunications including AC circuits, line impairments and transmissions.
Venue	Melksham, Wiltshire
Duration	5 Days

Course Content

Alternating current (AC) circuits

- **Reactance in circuits**
- **Impedance in terms of resistive and reactive components**
- **Describing series and parallel resonant circuits**
- **Calculating frequency on resonant circuits**

Effects of line impairments

- **dB & dBm's**
- **Signal to noise ratio**
- **Loss & power budgets**

Characteristics of transmission lines

- **Primary line constraints R, G, L and C**
- **Finite and infinite lines**
- **Coaxial**
- **Parallel wires**
- **Calculating bandwidth**

Transmission of digital signals

- **Return, and Non-return to zero digital encoding**
- **Bi-phase digital encoding**
- **Bit rate and bit error rate (BER)**
- **Delay, jitter and binary errors**

Modulating carrier waves

- **Amplitude, frequency and phase shift keying**
- **Shannon/Hartley formula**
- **Baud rate**

Multiplexing

- **Frequency division**
- **Wave division**
- **Synchronous/asynchronous time division**
- **Code division**
- **Digital time division**

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Certificate in ICT Systems and Principles
Unit 227: Copper Cabling in an Internal Environment

Description	Covers the safe installation, procedures and testing of copper communication cables
Venue	Melksham, Wiltshire
Duration	5 Days

Course Content

Working safely with copper cabling in an internal environment

- Risk assessments
- Terminating copper cables
- Relevant legislation
- Testing systems as per standards
- Practical install and testing

Basic electrical theory and safety with reference to data communications cabling

- Conductors and insulators
- Capacitance and inductance
- Electrical component symbols
- Heat/Chemical/Magnetic reactions
- Ohms law
- MHz and Mbits

Testing copper systems

- Return Loss
- Near end/Far end cross talk (NEXT/FEXT)
- Propagation delay
- Delay skew
- Wire maps
- Attenuation
- Bandwidth
- Length
- Nominal velocity of propagation (NVP)

Installation techniques

- Separation distances
- Bend radius
- Maintaining the twists
- Termination
- Safe use of hand tools
- Pulling tension
- Cable management

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Certificate in ICT Systems and Principles
Unit 357: Design and Plan for an Internal Network Cabling Infrastructure

Description	Basic principles needed to plan an underground internal cable route. Ability to develop and understand how infrastructure is specified, planned and provided.
Venue	Melksham, Wiltshire
Duration	5 Days

Course Content

Survey the site for the provision of an internal network cabling infrastructure.

- Data, equipment and tools required
- Hazard identification
- Working safely on site
- Managing variations in plan
- Recording survey findings
- Resource management
- IT software
- Relevant legislation
- 3rd party implications

Schematic designs and detailed plans

- Existing and new infrastructure
- Relevant documentation
- Cost calculations
- Interpreting customer order
- Growth/Strategic planning policies

Identifying a range of options

- Viable options and their importance
- Forecasts
- Existing utilities
- Maintenance and upgrading
- Cost options and implications
- Resource management

Co-ordinate the project

- Work activity delegation
- Programming
- Scheduling work packages
- Resource management
- Critical path analysis
- Scope of works