



Continue your lifelong love of learning and personal development

Paper 1: Computer Systems

Paper 2: Computational Thinking, Algorithms and Programming

Both Papers 50% each and 1hr 30mins long

Computer Science Careers

- Software Developer
- Games Designer
- Cyber Security Analyst
- Computer Forensics
- Web Developer
- Professional Hacker
- Programmer



Exam Time!

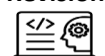


Mock Exams

Revision



Revision



Practical Programming Skills



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1.3.2 Wired and Wireless Networks, Protocols and Layers

- Modes of connection: *Wired & Wireless*
 - Encryption
- IP Addressing and MAC addressing
- Common protocols: *TCP/IP, HTTP, HTTPS, FTP, POP, IMAP, SMTP*
- The concept of layers



1.4.1 Threats to Computer Systems and Networks

- Forms of Attack: *Malware, Social Engineering, Brute-Force attacks, Denial of Service attacks, Data interception and theft, the concept of SQL injection*
- 1.4.2 Identifying and preventing vulnerabilities
 - Common prevention methods: *Penetration testing, Anti-Malware software, Firewalls, User access levels, Passwords, Encryption, Physical Security*

1.5.1 Operating Systems

- The purpose and functionality of operating systems: *User Interface, memory management and multitasking, peripheral management and drivers, user management, file management*

1.5.2 Utility Software

- The purpose and functionality of utility software.
- Utility system software: *Encryption software, Defragmentation, data compression*

1.3.1 Networks and Topologies

- Types of network: *LAN (Local Area Network) & WAN (Wide Area Network)*
 - Factors that affect the performance of networks
- The different roles of computers in a client-server and peer-to-peer network
- The hardware needed to connect stand-alone computers into a Local Area Network: *Wireless Access Points, Routers, Switches, NIC, Transmission Media*
- The Internet as a worldwide collection of computer networks: *DNS (Domain Name Server), Hosting, The Cloud, Web Servers and Clients*
 - Star and Mesh network topologies

1.2.2 Secondary Storage

- The need for secondary storage
- Common types of storage: *Optical, Magnetic and Solid State*
- Suitable storage devices and storage media for a given application
- The advantages and disadvantages of different storage devices and storage media relation to these characteristics: *capacity, speed, portability, durability, reliability, cost*

1.2.1 Primary Storage (Memory)

- The need for Primary Storage
- The difference between RAM and ROM
- The purpose of RAM and ROM in a computer system
 - Virtual Memory

1.2.4 Images

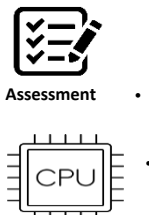
- How an image is represented as a series of pixels, represented in binary
- Metadata
- The effect of colour depth and resolution on the quality of image & the size of an image

1.2.4 Sound

- How sound can be sampled and stored in digital form
- The effect of sample rate, duration and bit depth on the playback quality and the size of a sound file

1.2.5 Compression

- The need for compression
- Types of compression: *Lossy and Lossless*



1.1.1 Architecture of the CPU

- The purpose of the CPU and fetch-execute cycle
- Common CPU components and their function: *ALU (Arithmetic Logic Unit), CU (Control Unit), Cache, Registers*
- Von Neumann Architecture: *MAR (Memory Address Register), MDR (Memory Data Register), Program Counter, Accumulator*

1.1.2 CPU Performance

- How common characteristics of CPUs affect their performance: *Clock Speed, Cache Size, Number of Cores*

1.1.3 Embedded Systems

- The purpose and characteristics of embedded systems
- Examples of embedded systems

2.2.2 Data Types

The use of data types: *Integer, Real, Boolean, Char & String, Casting*

1.2.4 Characters

- The use of Binary codes to represent characters
- The term 'character set'
- The relationship between the number of bits per character and the number of characters which can be represented. e.g. *ASCII, Unicode*



Assessment



Practical Programming Skills

2.2.3 Additional Programming Techniques

- The use of basic string manipulation
- The use of basic file handling operations: *Open, Read, Write, Close*
- The use of records to store data & SQL to search
 - The use of arrays when solving problems
- How to use sub programs to produce structured code
 - Random number generation



Assessment

2.2.1 Programming Fundamentals

- The use of variables, constants, operators, inputs, outputs and assignments
- The use of the three basic programming constructs used to control the flow of a program: *Sequence, Selection, Iteration*
 - The common arithmetic operators
- The common Boolean operators AND, OR and NOT

10

0123456789
 ABCDEFGHIJKL
 NOPQRSTUVWXYZ
 abcdefghijklmno
 pqrstuvwxyz

How can 10 = 2?



2.4.1 Boolean Logic

- Simple Logic Diagrams using the operators AND, OR and NOT
 - Truth Tables
- Combining Boolean Operators using AND, OR and NOT
- Applying Logical Operators in Truth Tables to solve problems

1.2.3 Units

- The units of data storage: *Bit, Nibble, Byte, Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte*
 - How data needs to be converted into a Binary format to be processed by a computer
- Data capacity and calculation of data capacity requirements

1.2.4 Data Storage - Numbers

- How to convert positive Denary whole numbers to Binary numbers and vice versa
- How to add two Binary Integers together and explain overflow errors which may occur
- How to convert positive Denary whole numbers into 2-digit Hexadecimal numbers and vice versa
 - How to convert Binary Integers to their hexadecimal equivalents and vice versa
 - Binary shifts

2.1.2 Designing, creating and refining Algorithms

- Identify the inputs, processes and outputs for a problem
 - Structure diagrams
- Create, interpret, correct, complete and refine algorithms using: *Pseudocode, Flowcharts and high-level programming language*
- Identify common errors
 - Trace tables