

# TM111 Study Guide

## *Introduction to Computing and Information Technology 1*

### Hardware & Computer Systems

#### **Q: What is the CPU?**

A: Central Processing Unit - the 'brain' of the computer that executes instructions and performs calculations

#### **Q: What does RAM stand for, and what is its purpose?**

A: Random Access Memory - temporary, volatile memory that stores data and programs currently in use. Data is lost when the power is off

#### **Q: What is ROM?**

A: Read-Only Memory - permanent non-volatile memory containing boot instructions. Cannot be easily modified

#### **Q: What is the difference between volatile and non-volatile memory?**

A: Volatile memory (RAM) loses data when power is off. Non-volatile memory (ROM, hard drives) retains data without power

#### **Q: What are the main components of the Von Neumann architecture?**

A: CPU (ALU + Control Unit), Memory, Input devices, Output devices, and buses connecting them

#### **Q: What is cache memory?**

A: High-speed memory located close to or in the CPU that stores frequently accessed data to speed up processing

#### **Q: What is the fetch-execute cycle?**

A: The process where the CPU fetches an instruction from memory, decodes it, executes it, and stores the result. This repeats continuously

#### **Q: What does the ALU do?**

A: Arithmetic Logic Unit - performs mathematical calculations and logical operations (AND, OR, NOT, etc.)

**Q: What is clock speed measured in?**

A: Hertz (Hz), typically GHz (gigahertz). It determines how many instructions per second the CPU can process

**Q: What is a bus in computer architecture?**

A: A communication pathway that transfers data between components (data bus, address bus, control bus)

## Software & Operating Systems

**Q: What is system software?**

A: Software that manages hardware and provides services for application software (e.g., operating systems, device drivers)

**Q: What is application software?**

A: Programs designed for end-users to perform specific tasks (e.g., word processors, browsers, games)

**Q: What are the main functions of an operating system?**

A: Process management, memory management, file system management, device management, user interface, security

**Q: What is a process?**

A: A program in execution - an instance of a running program with its own memory space and resources

**Q: What is multitasking?**

A: The ability of an OS to run multiple processes apparently simultaneously by rapidly switching between them

**Q: What is virtual memory?**

A: A memory management technique that uses hard disk space as extended RAM, allowing programs larger than physical RAM to run

**Q: What is a file system?**

A: The method an OS uses to organise and store files on storage devices (e.g., NTFS, FAT32, ext4)

**Q: What is the difference between CLI and GUI?**

A: CLI (Command Line Interface) uses text commands. GUI (Graphical User Interface) uses visual elements like windows and icons

**Q: What is a device driver?**

A: Software that allows the OS to communicate with and control hardware devices

**Q: What is open source software?**

A: Software with source code that is freely available to view, modify, and distribute

## Programming Fundamentals

**Q: What is an algorithm?**

A: A step-by-step procedure or set of rules for solving a problem or completing a task

**Q: What is a variable in programming?**

A: A named storage location that holds a value which can change during program execution

**Q: What are the three basic control structures in programming?**

A: Sequence (steps in order), Selection (if/then decisions), Iteration (loops/repetition)

**Q: What is a loop?**

A: A control structure that repeats a block of code multiple times until a condition is met

**Q: What is the difference between a while loop and a for loop?**

A: While loops continue until a condition is false. For loops repeat a set number of times with a counter

**Q: What is a Boolean value?**

A: A data type with only two possible values: True or False (1 or 0)

**Q: What is a function/procedure?**

A: A reusable block of code that performs a specific task and can be called from other parts of the program

**Q: What is pseudocode?**

A: A plain language description of programming logic that's independent of any specific programming language

**Q: What are the main primitive data types?**

A: Integer (whole numbers), Float/Real (decimal numbers), Character (single character), Boolean (true/false), String (text)

**Q: What is debugging?**

A: The process of finding and fixing errors (bugs) in program code

## Networks & Internet

**Q: What is a network?**

A: Two or more computers connected to share resources and communicate

**Q: What is a LAN?**

A: Local Area Network - a network covering a small geographical area like a home, office, or building

**Q: What is a WAN?**

A: Wide Area Network - a network covering a large geographical area, potentially worldwide (the Internet is the largest WAN)

**Q: What is a protocol?**

A: A set of rules governing how data is transmitted over a network

**Q: What is TCP/IP?**

A: Transmission Control Protocol/Internet Protocol - the fundamental communication protocols of the Internet

**Q: What is an IP address?**

A: A unique numerical address (e.g., 192.168.1.1) assigned to each device on a network

**Q: What is DNS?**

A: Domain Name System - translates human-readable domain names (google.com) into IP addresses

**Q: What is HTTP/HTTPS?**

A: Hypertext Transfer Protocol - the protocol for transferring web pages. HTTPS is the secure, encrypted version

**Q: What is a router?**

A: A network device that forwards data packets between networks and connects local networks to the Internet

**Q: What is bandwidth?**

A: The maximum amount of data that can be transmitted over a network connection in a given time (measured in bps)

**Q: What is a client-server model?**

A: An architecture where clients request services/resources from centralised servers

**Q: What is a packet?**

A: A small unit of data transmitted over a network, containing both payload data and routing information

## Data & Information

**Q: What is the difference between data and information?**

A: Data is raw facts and figures. Information is processed data that has meaning and context

**Q: What is a bit?**

A: Binary digit - the smallest unit of data in computing, representing either 0 or 1

**Q: What is a byte?**

A: A group of 8 bits, the standard unit for measuring storage and memory

**Q: What is binary?**

A: Base-2 number system using only 0s and 1s - the fundamental language of computers

**Q: What is hexadecimal?**

A: Base-16 number system (0-9, A-F) is often used as a shorthand for binary in computing

**Q: What is ASCII?**

A: American Standard Code for Information Interchange - a character encoding standard assigning numbers to letters and symbols

**Q: What is Unicode?**

A: A universal character encoding standard that can represent characters from all writing systems worldwide

**Q: What is compression?**

A: Reducing file size by encoding data more efficiently. Can be lossy (some data lost) or lossless (fully reversible)

**Q: What is encryption?**

A: Converting data into a coded form to prevent unauthorised access

**Q: What is a database?**

A: An organised collection of structured data stored electronically for easy access and management

## Security & Ethics

**Q: What is malware?**

A: Malicious software designed to damage, disrupt, or gain unauthorised access to computer systems

**Q: What are the main types of malware?**

A: Viruses, worms, trojans, ransomware, spyware, adware

**Q: What is a firewall?**

A: A Security system that monitors and controls incoming and outgoing network traffic based on security rules

**Q: What is authentication?**

A: The process of verifying the identity of a user or system (e.g., passwords, biometrics)

**Q: What is social engineering?**

A: Manipulating people into divulging confidential information or performing actions that compromise security

**Q: What is phishing?**

A: Fraudulent attempts to obtain sensitive information by disguising oneself as a trustworthy entity (typically via email)

**Q: What is the Data Protection Act/GDPR?**

A: Legislation protecting personal data and privacy, giving individuals rights over their information

**Q: What is intellectual property?**

A: Legal rights protecting creations of the mind (copyright, patents, trademarks)

**Q: What is backup?**

A: Creating copies of data to restore in case of loss, corruption, or disaster

**Q: What is two-factor authentication?**

A: Security method requiring two different forms of identification (e.g., password + phone code)

## Web Technologies

**Q: What is HTML?**

A: Hypertext Markup Language - the standard language for creating web page structure and content

**Q: What is CSS?**

A: Cascading Style Sheets - language for describing the presentation and styling of web pages

**Q: What is JavaScript?**

A: A Programming language that adds interactivity and dynamic behaviour to web pages

**Q: What is a web browser?**

A: Software application for accessing and viewing websites (e.g., Chrome, Firefox, Safari)

**Q: What is a URL?**

A: Uniform Resource Locator - the address of a resource on the web (e.g.,  
<https://www.example.com>)

**Q: What is a cookie?**

A: A Small text file stored by websites on a user's computer to remember information about their visit

**Q: What is a search engine?**

A: A web service that searches the Internet and returns relevant results (e.g., Google, Bing)

**Q: What is cloud computing?**

A: Delivery of computing services (storage, processing, software) over the Internet rather than locally