OCR Computer Science A Level

1.1.3 Input, Output and Storage
Concise Notes

Specification:

1.1.3 a)

- How different input, output and storage devices can be applied to the solution of different problems.

1.1.3 b)

- The uses of magnetic, flash and optical storage devices.

1.1.3 c)

- RAM and ROM.

1.1.3 d)

- Virtual storage.

Input, Output and Storage Devices

- Input devices include:
  - Keyboards
  - Webcams
  - Magnetic stripe readers
  - Barcode readers
- Output devices include:
  - Speakers
  - Printers
  - Projectors
- A touch screen is both an input and an output device
- Performance factors for both input and output devices include:
  - Speed
  - Accuracy
  - Cost
  - Relevance to task

The Use of Storage

- Each method of storing information is suited to a particular type of information
- Optical devices
  - Read from and written to using lasers
  - Binary information represented by portions of the disc which either reflect or scatter the incident laser light:
    - A pit scatters light and represents a 0
    - A land reflects light and represents a 1
  - Pits and lands are written in spiral tracks on the disc's surface
  - **CD**
    - Stands for compact disc
    - Use optical technology to store small quantities of information
    - Most commonly used for audio files
    - Can also be used to store text and digital images
    - Small, thin and light so very portable
    - Easily damaged by scratches
    - Limited storage capacity
    - Relatively slow transfer speeds
  - **DVD**
    - Stands for digital versatile disc or digital video disc
    - Higher storage capacity than CDs
    - Suited to storing digital videos

- **Blu-Ray**
  - More than five times as much storage than traditional DVDs
  - Useful for storing high-resolution films
- Magnetic
  - Represent binary information using two magnetic states
    - Polarised
    - Unpolarised
  - Most common type is hard disk drives
  - Magnetic tape also stores information magnetically
  - **Hard Disk Drives**
    - Typically have high capacities of between 500GB and 5TB
    - Rotate magnetic platters at high speeds under a read/write head on an actuating arm
    - Most will have multiple platters stacked to maximise storage capacity
    - Have somewhat slow data transfer speeds
    - Many moving parts introduces tendency to be damaged by movement
  - **Magnetic Tape**
    - First used to record computer data in the 1950s
    - Popular storage medium through to the 1980s
    - Long stretches of tape wound onto reels passed through readers
    - A space consuming way to store data
  - **Floppy Disks**
    - A thin magnetic disk enclosed in plastic to protect the disk from dust and dirt
    - Thin size and low weight made them extremely portable
    - Typical storage capacity of 1MB
- Flash
  - Fast and compact
  - Silicon semiconductors form the logic gates NAND and NOR
  - Logic gates used to store electrical charge in one of two states: high or low
  - Information stored in blocks, combined to form pages
  - Preferred logic gate used for storing small quantities of data is NOR
  - NAND is the preferred technology for larger files
  - Can be erased and reprogrammed electronically
  - Is non-volatile
  - Flash memory is generally more expensive per gigabyte than other methods of data storage
  - **Solid State Drives**
    - Extremely light and portable
    - Have no moving parts
    - Much more resistant to damage from movement than hard disk drives
    - Renowned for high data transfer rates

■ Primary disadvantage is cost
■ Another disadvantage is limited lifespan
● When a page is written to, the voltage required increases
● Over time, this will become too high

RAM and ROM

● Two types of primary storage
● Store information like code instructions to execute and files which are required by running programs
● **RAM**
  ○ Random access memory
  ○ A type of fast, volatile main memory
  ○ Used to store data and programs that the computer is currently using
  ○ Speeds up the computer's execution
  ○ Higher access speeds than even flash memory
  ○ More expensive per gigabyte than secondary storage devices
  ○ Computers often have only 4 or 8 GB or RAM
● **ROM**
  ○ Read only memory
  ○ Non-volatile
  ○ Cannot be modified
  ○ Once programmed, the state of the memory cells inside does not changed
  ○ Useful for storing fixed sequences of instructions like a computer's startup (bootstrap) routine

Virtual Storage

● Name given to storing information remotely so that it can be accessed by any computer with access to the same system, for example over the Internet
● Examples include cloud storage services and networked storage used in offices and schools
● As internet speeds increase, virtual storage is becoming more popular
● Often an abstraction of multiple drives acting like one
● Disadvantages include limitations of a user's network speed and high costs