Gr 12 Theory. Key Concepts Cheat Sheet Version One

NOTES:

- In the theory exam you may not claim 2 marks but giving the same point in two different ways (opposites) Example: Option A is cheaper. Option B is more expensive – this is the same point.
- You do not get marks for a decision eg "Yes" or "No". The marks are awarded for the justification of your decision.
- Make a close study of "Theory – 12 week reading program. 2019. Version 4."

Hardware

Volatile – **primary** memory that loses data when the power is turned off. RAM. Cache memory in the CPU.

Non-volatile – permanent **secondary** memory even without power. HDD. SSD. ROM. Flash drives

HDD – Hard disk drive. Secondary memory. Cheap and stores a lot of data. Slower.

SSD – Solid state hard drives. Secondary memory. Expensive but fast.

Virtual – something that exists in software only eg three virtual servers on one physical server

Upgrading an old computer using new components – Issues

1. **RAM** - DDR, DDR2, DDR3, DDR4 are not the same. You cannot upgrade from DDR to DDR4 due to technical differences.
2. **Socket** "775 LGA" is not the same as Socket "1151 LGA".
3. **Power supply**. A 400W power supply may not sufficient if you add more power consuming hardware to a PC.
4. **Secondary storage**. The interface for an old HDD may be different to a more modern drive.
5. **Monitors**. Old monitors are **VGA**. New PCs use **HDMI.**
6. **Motherboard.** In many cases a new motherboard is needed making the upgrade not financially viable.

Hybrid drive – Place the OS on the SSD and use the HDD to store your data, large files, movies, photos etc

An e-book reader. A device optimized for reading e-books – not backlit, longer battery life, spacing and fonts can be adjusted for people with **reading difficulties**. Has **search** and **look-up** functionality. Is not the same as a tablet which has colour and can run sophisticated applications as well. E-readers can connect to the Internet and download thousands of books – therefore **privacy** is an issue. You can read an e-book on a tablet however.

Tags – Your **own** bar codes, QR codes and RFID tags can all be customized with the information **you** want. Products do have standard bar codes or even QR codes that have default standardized information. E.g. country of origin.

Router – You need a router to connect to the Internet. Your cellular phone can also act as a router.

Computers: Advantages and disadvantages of laptops, desktops, tablets, smart phones and e-readers.

Buffering – When two sub-systems work at different speeds. Buffering stores data until the slower process catches up.

System Software

OS – Operating system. Eg Ms Windows, Linux, Anroid iOS.

Virtual memory – The OS facilitates the use of the hard drive as an extension of RAM when RAM is full.

Computer management – archiving v backups. Updates for better security. Defrag for better performance. Antivirus and anti-malware for better protection. Uninstall of unused software for better performance. Clear browser history and cookies for a fresh start, fresh content. File and folder management for better organization.

Networking

Peer to peer network. All computers have equal status. Two computers linked together to share resources. Lacks security and privacy (peer to peer file share is something different)

LAN – Local area network e.g. within an office, within a building, within a campus

WAN – Wide area network e.g. between buildings, between campuses, between cities and countries.

Backbone – usually fibre. Connects LANs together eg building to building, campus to campus

Bounded media – physical copper cabling. Used in a LAN

Unbounded media – No cables. Wireless. Used in a WAN

Bounded media – UTP cable cheap. STP expensive

Unbounded media – Infrared beams, microwaves, satellites, laser light signals. Used to connect to the internet where cabling is not possible or the distances are too far.

Unbounded media – Bluetooth. **Short range** exchange of data between electronic devices.

UTP cable – copper, max 100m, suffers from EMI and attenuation. Used in LANs.

EMI – Electromagnet interference from the environment

Attenuation – loss of signal strength over distance. Adding a **repeater** strengthens the signal again.

Fibre – uses light, does not suffer from EMI and attenuation. Expensive to install.

Microwave – is line of sight communication. Max 50km

Client Server model - Server shares resources e.g. a database. "Client" uses the shared resources.

NOS – Network Operating System. Handles logins, enforces permissions, facilitates connectivity between hardware and sharing, monitors traffic.

Topology – the physical design/layout of the network

Star topology – each computer is cabled to a port on a hub/switch. Easy to troubleshoot but a lot of cable. Inexpensive and easy to install.

Internet and Communication Technologies

Web 1.0 – Static information only. Professional content by companies etc. Reliable.

Web 2.0 – Interactive. Self-publishing and opinions. Social media. Chats. Fake news. Uses cookies.

Web 3.0 – Customization according to your profile, history, preferences. Uses machine learning.

Web 1.0 – Websites that you navigate to by choice.

Web 2.0 – Personal blogs, Wikis, e-commerce sites that you navigate to by choice.

Web 3.0 – Suggestions and dynamic content you did not directly ask for.

Location based services – content and services customization based on your geographical location. Web 3.0

Cloud computing is NOT just storing your files on the Internet.

- **SaaS.** Software as a service. E.g. Google docs. You use the software applications online and save to your PC.
- **IaaS**. Infrastructure as a service. E.g. Having an **empty** virtual server on Amazon Web Services where you can load your own operating system and your own applications.

- **PaaS.** Platform as a service. Having a virtual computer online i.e. a computer with the Windows OS loaded where you can load your own applications. A Linux computer that you can test your software on etc. With PaaS you do not get access to the OS. Dropbox is also an example (online storage platform**)**

POP3 and IMAP – protocols for receiving email. **SMTP** is for sending email.

VPN – When you extend your private LAN over the public network. Your work in kept private via encryption.

DNS (Domain Name System) DNS translates domain names to IP addresses so browsers can load Internet resources.

WiFi hotspot – A physical location where users can connect wirelessly to a LAN OR the Internet OR both.

Charging for WiFi use – Charge for "time" versus charge for "data". Charge for time if you contract is uncapped. Charge for data if capped.

Internet protocols – HTTP, HTTPS, FTP and WebDAV

> **WebDAV** (Web Distributed Authoring and Versioning) is an extension to HTTP that lets clients remotely edit files. In essence, it enables a web server to act as a file server, allowing authors to **collaborate on web content**.

RIA (Rich Internet Applications) – Software that used to run locally off your HDD is now available for use through your browser. Example: Office365 is RIA because you run it through your browser.

Internet content – websites, blogs, wikis, e-Commerce, forums, webinars, podcasts. Know the difference

RFID – Radio Frequency identification (tag). Placed on a device, allows identified and tracking via a radio signal. Is hidden in the device where it cannot be easily removed.

Peer to peer file sharing eg BitTorrent. The file is split up. Your download comes from multiple places/computers/ servers that have been made available to facilitate file sharing. Only legal IF the file being shared is not copyright (a movie is copyright)

Cookies - Messages that web servers pass to your web browser when you visit Internet sites. Your browser stores each message in a small file, called cookie.txt. When you request another page from the server, your browser sends the cookie back to the server. These files typically contain information about your visit to the web page, as well as any information you've volunteered, such as your name and interests. Part of Web 2.0

Compression – Images must be resized and compressed for the Net (e.g. jpg). Audio too (e.g. mp3). Lossless is no compression. Lossy is compressed – the amount of compression can be controlled.

Streaming v downloading – Streaming is downloading as you need it e.g. a 2 hour movie can stream over 2 hours. Downloading is as quickly as the connection allows.

Web caching – when webpages are stored in the browser history in case they are needed again. Improves performance and saves bandwidth

Java and OOP

Objects – Have fields and methods.

Overloading. Method overloading is a feature that allows a class to have more than one method having the same name, if their argument lists are different. It is similar to **constructor overloading** in Java that allows a class to have more than one constructor having different argument lists. **Operator overloading** is when an operator does more than one thing depending on the context eg "+" Can add numbers or it can join strings together.

Benefits of Java

Object Orientated – We can created fields and methods around a particular concept e.g. a customer

Encapsulation – Protects data from illegal access and modification by making variables "private". Java has access modifiers – public, private and protected to achieve this.

Platform independent. Java is **interpreted**. Gets compiled into bytecode which is then run within a Java Virtual Machine (JVM) designed for that particular platform.

Secure – Because Java runs within a JVM it cannot do evil things to the computer it is running on.

Social Implications

Know all forms of **Malware** and **Cyber attack**

Digital Divide – Unequal access to information and communication technology as a result of geographical location, lack of infrastructure or financial resources.

Copyright is a big deal. Know various **software licenses** and when you may not share or copy files, data etc

Data and Information Management

Normalization. All aspects including anomalies and dependencies

Know how to create and read a **class diagram**

Know how to create, read and edit a **method header**

- Access modifier, return type, method name, parameters
    - public String fullName(firstName, lastName) { . . . . . **return** fullNameString }
    - public int returnDate ( ) { . . . . **return** theDate }
    - public void greetClient(clientName) . . . no return needed here
    - public void openingBanner( ) . . . no return needed here.

Write an algorithm in **pseudocode.**

Read code and fill out a **trace table**