INFORMATION TECHNOLOGY: PAPER I

MARKING GUIDELINES

Time: 3 hours

180 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

QUESTION 1

1.1   K
1.2   E
1.3   J
1.4   H
1.5   I
1.6   L
1.7   B
1.8   A
1.9   G
1.10   M

[10]

QUESTION 2

2.1   **ISP** – a company that offers its customers access to the Internet. (2)
2.2   **Firmware** – ROM chips that contain permanently written data, instructions, or information, recorded on the chips when they were manufactured. (2)
2.3   **Pharming** – is a hacker's attack on a user's browser software aiming to redirect a website's traffic to another, bogus site. (2)
2.4   **E-commerce** – Conducting business electronically over the Internet. (2)
2.5   **Overclocking** – Increase the speed of the system bus/clock hence increasing the speed of all components. Overclock CPU/Runs higher than default. (2)
2.6   **Inheritance** – Inheritance allows a class to have the same behaviour as another class and extend or tailor that behaviour to provide special action for fields.
OR Where a subclass gains the properties and behaviour of the superclass and adds more properties and methods, or overwrites existing methods. (2)
2.7   **Worm virus** – Self propagating software found on a network. One example would be for a worm to send a copy of itself to everyone listed in your e-mail address book. (2)
2.8   **Topology** – The physical/logical layout of devices on a network (LAN), e.g. star topology. (2)
2.9   **Buffer** – An area in primary memory/RAM reserved for the storage of input and output data. (2)
2.10 **UML** – (Unified Modeling Language) A general-purpose notational language/Design tool/structure for specifying and visualising complex software, e.g. object-oriented projects. (2)

[20]

QUESTION 3

3.1   3.1.1   Northbridge has to manage the faster working parts of the motherboard and the Southbridge is the I/O controller (connect the slower parts). (2)

        3.1.2   (a)   CPU
                    (b)   RAM
                    (c)   AGP video/PCI Express Graphics Card
                    (d)   PCI or Standard I/O ports
                    (e)   Firewire
                            Alternatives to (d) & (e) – Ethernet card/TV card/external data bus/PCI Express/HD/NIC (5)

        3.1.3   (a)   Busses (1)
                    (b)   Transfers data between components across the motherboard.
                            OR It transfers data across the motherboard (1)

        3.1.4   RAM – Random Access Memory. Data needs to be loaded into RAM before it can be processed. RAM is electronic and volatile.
                ROM – Read Only Memory contains the critical data to boot-up the PC. It keeps its contents whilst the power is off. (2)

        3.1.5   Hot plugging – devices can be changed/inserted without turning off the computer based on plug and play. (2)

3.2   3.2.1   CPU – CU, ALU/FPU, register/Cache (3)

        3.2.2   Four step cycle: Fetch, Decode, Transfer, Execute/store (4)

        3.2.3   Transfer, sometimes no further processing is needed after transferring the data. Execute, sometimes the data are just stored. (4)

        3.2.4   A 64-bit register vs 32-bit
                    (a)   Register size – Number of bits that can be processed simultaneously increases. (2)
                    (b)   The size of the data bus – It must be 64-bits to constantly feed data to the registers on the CPU. (2)
                    (c)   Yes, correct motivation.
                            Most programs designed for the 32-bit version of Windows will work on the 64-bit version of Windows, exceptions are many antivirus programs. Device drivers designed for 32-bit versions of Windows won't work on computers running a 64-bit version of Windows.
                            Example: If you're trying to install a printer or other device that only has 32-bit drivers available, it won't work correctly on a 64-bit version of Windows. (2)

3.3   CBT (Computer Based Training)
        3.3.1   Self-paced/self-directed (1)
        3.3.2   Need good computer/time consuming/no individual assistance/need to be self-motivated. Cost of software, computers, headphones. (1)

3.4   Webcam (1)

3.5   Secure Network
        3.5.1   Install a firewall.
                Use passwords for user accounts.
                Assign access rights to users./Encryption/Disable USB ports.
                Install malware detection and removal tools for spyware. **(ANY THREE)** (3)

        3.5.2   **RAID** – Data recovery/data storage schemes that divide and/or replicate data among multiple hard drives/increase drive performance and/or reliability.
                Backup – RAID still needs backup/If a file is deleted or overwritten or corrupted the RAID array cannot be used to retrieve it, it is deleted from all the drives and backup is needed to restore the data. (2)

3.6   Embedded operating systems
        3.6.1   Symbian, Windows Mobile, IOS, Blackberry OS, Palm OS, Android
                (ANY TWO)   (2)
        3.6.2   Functions of an OS:
                • Manage processors efficiently
                • Manage input and output
                • Manage memory
                • Provide GUI/Interface/Load, run, save programs
                • Manage secondary storage **(ANY THREE)**   (3)
3.7   Pipelining
        • Process of instructions is **divided into steps or stages** (machine cycle)
        • At each stage an instruction is **partly processed** and an instruction is only
          completely processed once it has been through all the phases
        • The processor **reads a new instruction** from memory before the instruction
          that is currently being processed is completed
        • Once the **pipeline is full**, there will be instructions in the pipeline in
          different phases of completion at any moment in time.
        Diagram accepted, only if labelled correctly.   (4)
3.8   The CPU has 2 physical processors, but each processor is hyperthreaded/virtual
        processor, producing 4 logical processors.   (3)
                                                                                         [50]

QUESTION 4

4.1   Laptop advert
        4.1.1   The CPU and RAM are both different factors of the system clock. Clock
                multiplication.   (2)
        4.1.2   Chipsets vs CPU
                The chipset is a specific pair of chips on the motherboard: the northbridge
                and the southbridge. The northbridge links the CPU to very high-speed
                devices, especially main memory and graphics controllers.
                OR The chipset is designed for the CPU, which processes instructions.   (2)
        4.1.3   Yes/No + correct motivation.
                Not always, however chipsets are designed for specific processes,
                e.g. NVIDIA VIA Technologies.   (2)
4.2   Solid state drive (SSD):
        • Do not have any moving parts.
        • Use micropchips that retain data in non-volatile memory chips.
        • Faster access time. Uses flash memory. No need to be defragged.
        • Completely electrical/uses electric pulses.
        • Smaller, but more expensive/Cost more per GB of data.
        (ANY THREE)   (3)
4.3   SDRAM (Synchronous DRAM) – Synchronised to the system clock; Much faster
        than DRAM **OR** transfer data on rise and fall of clock phase.   (2)
4.4   The graphics card has its own RAM to store images to be rendered by GPU. Size of
        images too large to store on RAM as RAM stores programs and data currently being
        processed by the CPU. Use up too much RAM for other programs.   (3)
4.5   Yes. Image editing needs good graphics and uses a lot of RAM. If the images are
        large, then the HDD needs to be fast to reduce delays with virtual memory. She will
        need a good display and fast RAM.
        2 marks for each correct reason.   (4)
                                                                                         [18]

QUESTION 5

5.1
- Boost signal. Connect different network architectures. WiFi access.
- Manage the paths along which information is forwarded within a network.
- They are necessary to facilitate communication between computers and the Internet.
- Router is designed to direct packets to the correct destination along the best possible route.
- Restrict network broadcasts to the LAN.
- Move data between networks.

(ANY THREE) (3)

5.2
- Share expensive hardware
- Share Internet connection
- Sharing of data and software/resources
- Centralisation of data (server)
- Transfer of data much easier
- Improved communication
- Entertainment

(ANY FOUR) (4)

5.3 Access/security rights

5.3.1 Network Administrator (1)

5.3.2 Salary data
Confidential documents
Printer/HW, e.g. HD
Firewall **(ANY TWO)** (2)

5.3.3 Yes/No + correct motivation.
Certain employees have more rights than others, e.g. the CA of the company may access the financial statements of the company.
The computer manager/administrator has access to nearly everything on the network since he/she needs to manage and control the system.
(OR any other valid example) (2)

5.4 Unbounded or wireless media

5.4.1 GPS (Satellite) – Consists of earth stations that communicate with satellites in orbit
WiFi (Radio waves) – transfer data over short distance
Bluetooth (Radio waves) – communicate without cables; wireless communication between devices
WAP – transferring data to cellphones **(ANY THREE + description)** (6)

5.4.2 Employees can remotely log onto the company's network via VPN
Can use 'dropbox' or cloud computing/Google drive (2)

5.4.3 (Choose Wireless or Cables and justify ANY THREE reasons)
Speed
- Cables dedicated bandwidth
- Wireless shared bandwidth
Cost
- Cables more expensive
- Wireless cheaper
Reliability
- Cables very reliable
- Wireless affected by building/construction/weather
Network card
- Most PCs do not have wireless cards **(ANY THREE reasons)** (3)

Wireless:
- Cheaper
- Flexibility/Mobibility
- No cables
- No NIC

5.4.4 Difference between an IP and a MAC address?
Mac – unique hardware, number of card/physical address
IP – software assigned by TCP/IP protocol (2)

[25]

QUESTION 6

6.1   Forum – it is a tool on a website (on-line) where people go to discuss issues/same topic, which they might need help on, by reading structured sequences of questions and answers on specific topics.   (2)

6.2   RSS (Really Simple Syndication) is a format for delivering regularly changing/ updating web content. Many news-related sites, weblogs and other online publishers syndicate their content as an RSS Feed to whoever wants it. You save time by not needing to visit each site individually.   (3)

6.3   6.3.1   Chat services
        (a)   Live chat between two or more people.
            Send text, video images, audio for free or low cost.
            The conversations are more visual and textual. This is helpful mainly for hearing impaired people.
            The recipient receives the message within a few seconds of the sender sending it. The recipient can read the message anytime, anywhere according to his convenience. **(ANY TWO)**   (2)
        (b)   Impersonal
            If you do not have BBM or WhatsAPP **(ANY ONE)**   (1)

    6.3.2   Fast, can be used with ease and comfort.
        Used for the transfer of data, images, signals, signs, etc.
        People across the world can share televised pictures, conversations, graphics, circuits and interactive software. **(ANY TWO)**   (2)

    6.3.3   Explain TWO ways – Identify theft.
- People post information about themselves such as photo's, birthdates, etc., which is enough for a person to copy your identity.
- People allow everyone to access their details and do not follow privacy restrictions.   (4)

    6.3.4   Social networking sites
        Facebook
        Twitter
        MySpace/Google +/Linkin/Skillspages **(ANY TWO)**   (2)

6.4   Green Computing
Possible discussions:
- Use an Intranet to transfer data
- Do not print everything/keep soft copies
- Display agenda of meeting on projector (do not print copies for all members) or smartboard
- Use devices such as iPads to communicate and take notes
    Other possibilities
    – Electronic archiving
    – Documents store/safe in pdf-format
    – Email/sms/electronic texting-communication

(ANY FOUR facts)   (4)

[20]

QUESTION 7

7.1   Normalisation

    7.1.1   Data redundancy occurs in database systems which have fields that are repeated unnecessarily. One-to-many relationship. (2)

    7.1.2   Example of repeating groups – For instance, in this case when vendor data is duplicated. When one vendor sells many items, but the data is combined in one table. (2)

    7.1.3   A primary key is an attribute (or combination of attributes) that uniquely identifies each row in a relation. A foreign key is an attribute in a relation of database that serves as the primary key of another relation in the same database. (2)

    7.1.4   No repeating groups
                Table must have a unique primary key (2)

7.2   OOP & SQL

    7.2.1   SELECT * FROM tblOrder ORDER BY [Product Name] (3)
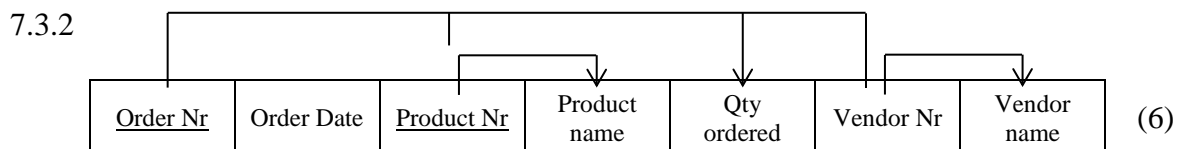
    7.2.2   Class design (7)

Class tOrder
Fields: (at least FOUR fields – 1 mark) (Private – 1 mark)
-        fOrder   :integer; -   fProduct   :string; -   fVendor   :string; -   fQuantity   :integer;
Methods: (Constructor method/set method/get method – 3 marks) **(Constructor and set methods must have parameters – 1 mark)** **(Public – 1 mark)**
+   Constructor create (order, qty :integer; product, vendor :string); +   setOrder (newOrder :string); +   getOrder :string;

    7.2.3   SQL statement is shorter, easier, small chance for errors (3)

    7.2.4   Information hiding: keeping the fields/methods of an object private
                Encapsulation: placing both the data and processing within a self-contained module (object) (2)

7.3   7.3.1   Anomalies + example of each **(ANY 2 + examples)**
                Update – if the description of an item changes, it must be updated in multiple places.
                Delete – if the external HD is deleted, the vendors will be lost.
                Insert – Cannot insert a product without an order number. (4)

    7.3.2

Order Nr	Order Date	Product Nr	Product name	Qty ordered	Vendor Nr	Vendor name

                (6)

2 marks for each dependency

    7.3.3   Third Normal Form (3NF)
                (1 mark for each table; 1 mark for indicating the primary keys)
                tblLineItem(Order Nr, Product Nr, Quantity Ordered, date Vendor Nr)
                tblProduct(Product Nr, Product Name)
                tblVendor(Vendor Nr, Vendor Name) (4)

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Total: 180 marks