**SCHOOL NAME**

**GRADE 12 - INFORMATION TECHNOLOGY**

**PAPER 2 (THEORY)**

**MEMORANDUM**

**September 2019**

**Time 3 Hours – Marks 150**

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| This question paper memo consists of 26 pages. |

**SECTION A: SHORT QUESTIONS**

**QUESTION 1.1: MULTIPLE CHOICE QUESTIONS**

**Various possible options are provided as answers to the following questions. Choose the most correct answer and write only the letter (A – D) CLEARLY next to the question number (1.1.1 – 1.1.5) on your ANSWER paper.**

**Example: 1.1.6 D**

*ANSWERS:* B C C B C

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| --- | --- | --- |
| 1.1.1 | Which of the following is volatile yet crucial for storing data and instructions for a short while in a computer?  A. USB 3.0  B. RAM  C. BIOS  D. CMOS | (1) |
| 1.1.2 | In SSL encryption, the public key is sent from the server to the client via a...  A. certificate authority.  B. private key.  C. digital certificate.  D. digital signature. | (1) |
| 1.1.3 | The positive effect of the intentional implementation of data redundancy.  A. Anomaly  B. Parity  C. Duplication  D. Rollback | (1) |
| 1.1.4 | The following Delphi statements appear in a program.  sLine := ‘Computers do not always produce intelligent answers’;  sAnswer := COPY(sLine, 14);  What will be the content of the *sAnswer* variable after the code has been executed?  A. ‘Computers do n’  B. ‘not always produce intelligent answers’  C. Nothing, as the syntax is incorrect  D. ‘Computers 14’ | (1) |

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| 1.1.5 | Working in a decentralised location, such as a home, while using modern communication technologies to connect with the physical office, is known as:  A. Virtual Office  B. Outsourcing  C. Telecommuting  D. Virtualisation | (1) |

**QUESTION 1.2: SHORT QUESTIONS**

**Give ONE word/term for each of the following descriptions. Write down only the word/term next to the question number (1.2.1 – 1.2.10) on your ANSWER paper.**

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| 1.2.1 | High speed, expensive memory found close to the CPU. | (1) |
|  | Cache (Perhaps SRAM can be considered too) |  |
| 1.2.2 | Computers that run most of their applications from their local hard drives and make little use of network services. | (1) |
|  | Fat clients |  |
| 1.2.3 | When a record in a relational database is in use, it is flagged to ensure thatno other usercan make changes to that specific record at the same time. | (1) |
|  | Record locking |  |
| 1.2.4 | The term that is used to describe **TWO** methods having the same name in the same class. | (1) |
|  | Overloading |  |
| 1.2.5 | The simulation of human decision-making processes by a computer system that is programmed to react on the basis of input, often gained from sensors. | (1) |
|  | Artificial Intelligence (AI) |  |
| 1.2.6 | A way of designing computers that makes it easy to repair and upgrade by replacing components. | (1) |
|  | Modular design or just modular |  |
| 1.2.7 | A permanent digital connection to the Internet using a telephone line. | (1) |
|  | ADSL / DSL / ISDN |  |
| 1.2.8 | Sifting through large datasets using algorithms to find informational patterns. | (1) |
|  | Data mining |  |
| 1.2.9 | A graphic depiction of the interactions among the elements (e.g. the users) of a computerised system. | (1) |
|  | USE CASE diagram |  |
| 1.2.10 | The unique hardware identifier that is given to every networking device when it is manufactured. | (1) |
|  | MAC Address |  |
| **TOTAL SECTION A: 15** | | |

**SECTION B – SYSTEM TECHNOLOGIES**

**QUESTION 2 – HARDWARE AND SOFTWARE**

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| 2.1 | As part of a practical project you are putting together (building) a computer. You have bought a computer case, a hard drive, a processor, RAM, a power supply and a graphics card but you seem to be missing a crucial component in order to allow all these components to communicate with each other. Identify the missing component and state **TWO** other functions of the component, over and above communication. | (3) |
|  | Motherboard. ✓  It provides slots for components to be plugged into it✓, distributes power to all components. ✓ |  |
| 2.2 | iOS is an example of an operating system. |  |
| 2.2.1 | Name the company that developed iOS. | (1) |
|  | Apple ✓ |  |
| 2.2.2 | What type of devices would typically have iOS installed on them? | (1) |
|  | Mobile devices ✓ |  |

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| 2.3 | Your laptop is a 2013 model with a 500 GB hard drive, 4 GB of RAM and an i3 processor. This laptop now takes a very long time to boot up. It originally had the 32-bit version of Windows 8 installed but has since been upgraded to the 32-bit version of Windows 10 Home so adding more RAM will not help.  What hardware upgrade would you suggest in order to sort out this problem? Argue the advantages and disadvantages of your suggested solution. |  |
| 2.3.1 | What hardware upgrade would you suggest in order to sort out this problem? | (1) |
|  | Replace the hard drive with an SSD.✓ |  |
| 2.3.2 | Argue the advantages of your suggested solution. | (2) |
|  | SSDs are much faster than HDDs.✓ This will dramatically improve the speed of the bootup process.✓ |  |
| 2.3.3 | Argue the advantages of your suggested solution. | (2) |
|  | SSDs are however expensive✓ and you might end up with a much smaller storage space than the HDD that you had.✓ |  |

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| 2.4 | You have a choice of the following 3 devices:   |  |  |  | | --- | --- | --- | | **Tablet** | **Desktop** | **Laptop** | | Samsung Galaxy Tab 4 | Lenovo V530S | Macbook Pro | | 2.35 GHz Octa-core processor | 7th Gen i7 processor | i9 processor | | 4 GB memory | 32 GB memory | 16 GB memory | | 7300 mAh battery | - | 7000 mAh battery | | Up to 400 GB on SD card | 2 TB storage on hard disk drive | 512 GB SSD | |  |
| 2.4.1 | Which of the devices above is best suited to render/create large numbers of lengthy HD videos that require a lot of power? Give a reason for your answer. | (2) |
|  | Lenovo Desktop✓  It is not battery operated and therefore power consumption does not matter.✓ OR it has more memory (or storage) than the Macbook Pro. |  |
| 2.4.2 | Which of these devices would be best suited to a travelling writer? Give **TWO** reasons for your answer. | (3) |
|  | Macbook Pro✓  It has a full keyboard✓ and is portable✓.  (Even without this being stated explicitly, the Macbook is indicated as a laptop so this rules out the Tablet.) |  |
| 2.4.3 | The Samsung tablet has a powerful octa core processor. Explain, giving **TWO** reasons why installing a processor that is too powerful could have a detrimental effect on the tablet. | (2) |
|  | The CPU can overheat ✓  Draining on battery life ✓ |  |

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| 2.4.4 | List **THREE** advantages that a tablet has over a desktop computer. | (3) |
|  | **ANY THREE✓✓✓**  “Always On”  Always connected  Convergence device  Small Size - very portable  Built in sensors  Touch screen  Easier to use user interface  Not dependent on power |  |
| 2.4.5 | The Samsung tablet in the table has the smallest storage capacity. How would a tablet user overcome this limitation without upgrading the SD card? Explain your answer with an example. | (2) |
|  | Best way is through online storage to free up local space ✓such as Google Drive.✓ The tablet is designed to be always connected. |  |
| 2.4.6 | Which of the individual components listed in the table is most likely the slowest? Give a reason for your answer. | (2) |
|  | The Hard disk drive or SD card ✓. The other components are an SSD which is the fastest storage and RAM (which is fast) and cpu’s which are very fast. ✓ |  |
| 2.5 | What is a firewall? | (2) |
|  | Hardware or software that monitors and controls your internet (communication) connection✓ to protect you from malicious activity/unauthorized access.✓ |  |
| **TOTAL SECTION B: 26** | | |

**SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES**

**QUESTION 3**

**Scenario:**

The local municipality has allocated funds for a new venture in town that will provide a venue with internet and other network services to the youth who don’t have general access to these facilities. They have set up a task team that will drive this project and have asked for your assistance.

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| 3.1 | Would the network be an example of a PAN? Briefly motivate your answer. | (3) |
|  | No✓, a PAN refers to a Personal Area Network. This network would be an example of a LAN✓ (local area network) as it covers a larger area, but it is still limited to one physical location. ✓ |  |
| 3.2 | A choice has to be made between connecting the network using UTP cables or connecting it wirelessly. |  |
| 3.2.1 | Give **TWO** advantages of connecting the network wirelessly. | (2) |
|  | Any two of: ✓✓   * Saves cabling costs, requires less effort and presents no cabling difficulties. * It is easier to add additional equipment to the network. * It allows for mobility – you can connect wherever you can access the signal. * There is no clutter that is associated with using cables, etc. * The youth can link their smartphones to the internet using the hotspot provided by the facility   (Any two logical advantages, including answers written for the scenario) |  |
| 3.2.2 | Give **TWO** possible disadvantages of connecting the network wirelessly. | (2) |
|  | Any two of: ✓✓   * They will need to purchase extra hardware, like wireless access points and possibly wireless network cards, for the computers. * There might be interference with the wireless signal, which would cause the devices to lose their connection to the network. * Requires a greater level of expertise to set up. * They would need to guard against people illegally accessing the network by ‘intercepting’ the wireless signal, etc. |  |
| 3.3 | Briefly describe the function of a router. | (2) |
|  | A router is a hardware device that connects different networks ✓ and directs data to its correct destination. ✓ |  |
| 3.4 | Support for the network will be done remotely.  Distinguish between controlling a computer remotely with software such as Remote Desktop Connection and using a VPN. | (4) |
|  | Remote desktop connection ✓✓   * View the screen of the remote pc on local pc * Local keyboard and mouse used to control remote pc * Software is configured on host and target computer. * Changes are made to files on the remote computer.   VPN ✓✓   * Users logon onto the network via a remote location with the same security and privacy as logging onto a LAN. * Files are opened and modified in the remote location and can be saved locally or at the remote location. |  |
| 3.5 | The task team will have to share a large number of documents among themselves. The members are not always in the same location but need to update the documents individually. They also have a very limited budget.  Review the cloud storage comparison from www.pcmag.com below and answer the questions that follow.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Product** | **Microsoft OneDrive** | **Google Drive** | **Apple iCloud Drive** | **DropBox** | | **Emphasis** | Office Apps | Collaboration | Apple Device Users | Compatibility | | **File size limit** | 15GB | 5TB | 15GB | Unlimited | | **Free storage** | 5GB | 15GB | 5GB | 2GB | | **Online App** | ✓ | ✓ | - | - | |  |
| 3.5.1 | Suggest the best product for their needs. | (1) |
|  | Google Drive✓ |  |
| 3.5.2 | Provide **TWO** reasons for your answer in 3.5.1. | (2) |
|  | Emphasis on collaboration / online editing enabled as members need to work on the same documents ✓  Provides largest (free) storage capacity - limited budget ✓ |  |

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| 3.5.3 | How can you get access to files stored in the cloud? | (1) |
|  | Any ONE: ✓   * Downloading the app * By logging on to your account via the internet. |  |
| 3.5.4 | Cloud computing allows users to share files that are too big to send via email. Explain how you can give another user access to these files. | (1) |
|  | Any ONE: ✓   * You can share the folder with them * You can send them a link to the shared folder |  |
| 3.6 | Software as a service (SaaS) is used to distribute services over a network or the Internet. |  |
| 3.6.1 | How does using SaaS differ from the traditional software model? | (2) |
|  | You pay a subscription fee to use software ✓ instead of buying the permanent right to use a specific version for a fixed once-off fee. ✓ **OR**  SaaS used in a browser/web based/online ✓ where traditional software is installed/run locally✓ |  |
| 3.6.2 | Name **ONE** benefit of using SaaS. | (1) |
|  | Any **ONE** logical reason ✓  Always access to the latest version of the software  Able to use anywhere where internet is available  Not limited to a device, can use on another pc/tablet/laptop |  |
| 3.6.3 | Give an example of a SaaS application that can be downloaded and installed locally on your computer. | (1) |
|  | Any ONE example ✓  Adobe Creative Cloud, Office 365, DropBox, MailChimp, Amazon Web Services, Shopify, Eventbrite, BlackBoard, SurveyMonkey, etc |  |
| 3.7 | Search engines such as Google are able to filter search results automatically based on your personal search history. This means that different people may receive different results after searching the exact same word or phrase, because their search histories differ.  An example is when a member of the task team searches for a router, various sites selling network routers appear in the results page. However a carpenter searching for a router may receive sites selling power tools.  Did Google use *Context-aware* searches or *Mediated* searches in this example? Give a reason for your answer. | (2) |
|  | Context-aware ✓ Internet search history is extra/contextual data used as criteria to filter results.✓ OR No third parties were required to use the search history on Google which is what Mediated searches are based on. |  |
| **TOTAL SECTION C: 24** | | |

**SECTION D: DATA AND INFORMATION MANAGEMENT**

**QUESTION 4**

**Scenario:**

Jack’s Corner Second Hand Shop makes use of a database to manage and store his sales and stock. Currently the database consists of two tables as described below:

|  |  |  |
| --- | --- | --- |
| **tblCustomer** |  |  |
| **Field Name** | **Example of Data** | **Description** |
| **CustID (Primary key)** | SL00231 | *Unique customer identifier* |
| **Customer name** | Joe Soap | *Name of the customer* |
| **Date** | 21-Jul-19 | *Sales date* |
| **Address** | 112 Overand Drive George | *Customer address* |
| **item1** | DR0012 | *StockID of item sold* |
| **Qty1** | 1 | *Quantity sold* |
| **Price1** | 1200.00 | *Selling price of the item* |
| **item2** | BF0009 | *StockID of item sold* |
| **Qty2** | 1 | *Quantity sold* |
| **Price2** | 234.00 | *Selling price of the item* |
| **item3** | KK0012 | *StockID of item sold* |
| **Qty3** | 2 | *Quantity sold* |
| **Price3** | 65.00 | *Selling price of the item* |
| **item4** | SS0909 | *StockID of item sold* |
| **Qty4** | 1 | *Quantity sold* |
| **Price4** | 45.00 | *Selling price of the item* |
| **Telephone** | 077-909-8976 | *Telephone number of the customer* |
|  |  |  |
| **tblStock** |  |  |
| **Field Name** | **Example of Data** | **Description** |
| **StockID (Primary key)** | Dr0012 | *Unique identifier allocated to each stock item* |
| **Description** | Drill Metabo | *Description of stock item* |
| **Price** | 1200.00 | *Selling price of item* |
| **Condition** | Good | *Condition of the stock item* |
| **Cost** | 900.00 | *Cost price of stock item* |
| **Quantity** | 2 | *The number of items in stock* |

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| 4.1 | Provide the correct data type for each of the following fields in this database and explain your choice: |  |
| 4.1.1 | Price | (2) |
|  | Real/number ✓, Stores the stock item price - Mathematical operations will be applied in queries✓ |  |
| 4.1.2 | Telephone | (2) |
|  | Text ✓ No calculation will be made OR the leading 0 will be lost if it was a number type.✓ |  |
| 4.2 | One of the fields in *tblCustomer* contains the date that a sale was made. |  |
| 4.2.1 | Identify and describe the validation technique that can be used to ensure that the date entered is not greater than the current date. | (2) |
|  | Range check✓ only certain values are allowed as input ✓ |  |
| 4.2.2 | It is important to apply a format check on the sales date. Explain how the integrity of the database could be compromised if the date format is not validated. | (2) |
|  | The sequence of the data (YY/MM/DD) may differ without a format check✓ which may lead to incorrect dates being stored.✓ |  |
| 4.3 | Both tables have been allocated a primary key. |  |
| 4.3.1 | What role does a primary key play within a table? | (1) |
|  | ANY ONE✓  Uniquely identifies the record in the table  Ensures that no duplication of records can take place |  |
| 4.3.2 | Explain the relationship between a primary key and a foreign key within a relational database. | (2) |
|  | The primary key from one table✓ appears in a related table as the foreign key (linking field)✓ between the two tables. |  |
| 4.4 | There is a serious design flaw in the tblCustomer table as illustrated above. This means that this database is not normalised |  |
| 4.4.1 | Explain what is meant by the term database normalisation. | (3) |
|  | Normalisation is a series of steps followed✓...  Then any TWO of the following facts  ...to ensure that a database is in an optimal state✓ with no chance of anomalies✓ or data redundancy(✓) |  |

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| --- | --- | --- |
| 4.4.2 | The current design allows for only four sales items to be purchased per customer. Redesign the tables so that this problem is eliminated. Add more tables if necessary. Be sure to show the primary and foreign keys as well as the relationships between the tables in the new design. | (6) |
|  | |  |  |  | | --- | --- | --- | | **tblCustomer** |  |  | | **Field Name** |  |  | | **CustID (Primary key)** |  |  | | **Customer name** |  |  | | **Address** |  | **tblSales** | | **Telephone** |  | **Field Name** | |  |  | **SalesID (Primary key)** | |  |  | **CustID (Foreign key)** | |  |  | **StockID (Foreign key)** | |  |  | **Quantity** | | **tblStock** |  | **Date** | | **Field Name** |  |  | | **StockID (Primary key)** |  |  | | **Description** |  |  | | **Price** |  |  | | **Condition** |  |  | | **Cost** |  |  | | **Quantity** |  |  |   Third table created and named ✓  Correct foreign keys ✓✓  Removal of redundant fields from tblCustomer ✓  Move Price, Date and Quantity to the new table ✓  Correct PK and FK fields linked ✓ |  |
| 4.5 | RFID refers to a technology whereby digital data encoded in RFID tags are captured by a reader via radio waves. |  |
| 4.5.1 | Consider the business model at Jack’s Corner and suggest **TWO** applications of RFID technology that can benefit the business. | (2) |
|  | ANY TWO OF ✓✓  Help with stock control  Security / theft avoidance  POS using RFID scanners |  |
| 4.5.2 | Would passive or active tags be the most appropriate option for Jack’s Corner? Give **ONE** reason for your answer. | (2) |
|  | Passive ✓  Any **ONE** suitable reason ✓   * Cheaper - does not need batteries * Cheaper – can be attached in the form of a sticker * Only needs to be activated/read while passing through POS / security EMI field |  |
| 4.6 | How can Jack’s Corner use invisible data capturing (excluding RFID) to improve the business? | (1) |
|  | Give a suitable example of invisible data capture ✓  *E.g. Information about client’s spending is captured when the clients pay with credit cards or use a loyalty card.*  **OR**  Give a benefit that can be used to improve the business ✓  *E.g. This information can be used to provide targeted advertising, or manage stock (which items to buy more of) etc.* |  |
| **TOTAL SECTION D: 25** | | |

**SECTION E: PROGRAMMING AND SOFTWARE DEVELOPMENT**

**QUESTION 5: ALGORITHMS AND PLANNING**

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| --- | --- | --- |
| 5.1 | You have been asked to write software that will allow people to book seats for the school play that is being held at your school. The hall has 35 rows of seats, and in each row there are 20 seats. |  |
| 5.1.1 | Suggest a suitable **GUI component** to display the seating in your Delphi program if the seats were stored in a 2D array. | (1) |
|  | StringGrid✔ |  |
| 5.1.2 | All bookings that are made need to be saved to secondary storage. Suggest **TWO** different secondary storage data structures that could be used to accomplish this. | (2) |
|  | Database ✓  Text File (flat file) ✓ (any other file type) |  |
| 5.1.3 | Briefly describe **TWO** ways that would make your code easier to read and maintain. | (2) |
|  | Any TWO of ✓✓  Indent different sections  Use descriptive variable names  Comment your code  Group related code together in functions/procedures |  |
| 5.1.4 | A syntax error occurs when the rules of the language are contravened and the program will not run.  Name (OR briefly describe) **TWO** other types of errors that can be encountered when programming. | (2) |
|  | Logical error ✓ (or suitable description E.g. bug/error in a program that causes it to produce unintended or uincorrect output or other behaviour).  Run-time error ✓ (or suitable description E.g. bug/error in a program that causes it to terminate abnormally (or crash)). |  |

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| 5.1.5 | Loops are structures that are commonly used within programs. Distinguish between conditional and unconditional loops. In your description of each of the loops, include a Delphi example of that type of loop. | (4) |
|  | Conditional: Unknown number of iterations✓ OR will loop if/while/as long as a condition is met.  Any correct Delphi while/repeat example with a condition.✓  Unconditional: Known number of iterations✓ Or infinite loop  Any correct for loop example✓ or while(true) |  |
| 5.2 | The software you are writing is required to store and manipulate information regarding each seat in the hall. You have decided to create a **TSeat** class.  Consider the following class diagram: |  |
|  | **TSeat** |  |
|  | **- sBooked : boolean**  **- sPaid : boolean**  **- sFirstName : String**  **- sSeatCost : real** |  |
|  | **+ <<Constructor>>**  **Create(pbooked, ppaid : Boolean; pFirstName : String; pSeatCost : real)**    **+ getSeatCost : real**  **- calcDiscount : real**  **+ setFirstName( firstName : String)**  **+ setBooked ( booked : boolean)**  **+ isBooked : boolean** |  |
|  |  |  |
| 5.2.1 | Data hiding is an important OOP concept with regard to *encapsulation.* Briefly explain how this concept is achieved, using the above class diagram to clarify your answer. | (2) |
|  | Any TWO facts of  The ‘-‘-sign preceding all the fields/class variables and calcDiscount in the TSeat class diagram ✓ indicate that they are hidden (private) ✓ and not directly accessible from other classes/forms.✓ |  |
| 5.2.2 | Accessor methods have been created for the class shown in the diagram. Name the accessor methods. | (2) |
|  | getSeatCost✓  isBooked✓ |  |
| 5.2.3 | Show how a mutator method for the sSeatCost attribute would be written in the class diagram. | (1) |
|  | + setSeatCost( cost : real) ✔ (must be fully correct to get the mark) |  |
| 5.2.4 | A TSeat object is defined in the program you are writing in the following way:  VAR  objSeat : TSeat;  x, y, z : integer;  State which of the following programming lines are **CORRECT**, and which lines are **INCORRECT**.  a. objSeat := TSeat.create(true, true, ‘Joe’ , 45.99);  Correct ✓  b. objSeat.create( false, true, ‘Sue’, 34.99 );  Incorrect ✓  c. objSeat.setBooked := x = 4;  Incorrect ✓  d. y := Round(objSeat.calcDiscount);  Correct ✓ | (4) |
| 5.3 | Seats in the *main body* of the hall cost R50, while seats on the *gallery* cost R30. If 4 or more seats are purchased (a block booking), the person is given a 30% discount on all seats over 4 that are purchased. (E.g. if 5 seats are bought, the initial 4 seats are charged at full price, and the fifth seat is discounted)  Write ***pseudocode*** that prompts for the number of seats and the location within in hall, and prints out the total cost of the seats. | (5) |
|  | 10 get numSeats  20 get location ✓ (10-20)  30 if location ← gallery  40 ticketCost ← 50 ✓ (30-40)  50 else  60 ticketCost ← 30 ✓ (50-60)  70 if numSeats > 4 ✓ (70-80)  80 totalCost ← (ticketCost \* 4) + ((numSeats - 4) \* ticketCost \* 0.7)  90 else  100 totalCost ← numSeats \* ticketCost  110 print totalCost ✓ (90-110)  Breakdown:  input gathered ✓  Ticket cost determined ✓✓  Total cost determined and displayed ✓✓  **Numbering in the pseudocode not required when awarding marks** |  |
| **TOTAL SECTION E: 25** | | |

**SECTION F: INTEGRATED SCENARIO**

**QUESTION 6**

**Scenario:**

More and more individuals are finding ways of making a living using technology. This includes online shops and services, as well as earning money through the use of social media. Companies employ technology that enables employees to work from home instead of in the physical office. Technology is rapidly influencing education and how teachers and learners work and learn.

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| --- | --- | --- |
| 6.1 | Machine learning is a category of algorithm that allows software applications to become more accurate in predicting outcomes without being explicitly programmed. The basic idea behind machine learning is to build algorithms that can receive input data and use statistical analysis to predict an output while updating outputs as new data becomes available.  Everyday examples of machine learning include Siri, Alexa, and Google Now. These are some of the popular examples of virtual personal assistants. These computerised devices can assist you with finding information when you ask them a question by speaking to them. For example, you could ask “What flights are there to Durban today?”. |  |
| 6.1.1 | Describe **TWO** ways in which you think machine learning can be used effectively in teaching. | (2) |
|  | *(Accept any two reasonable answers)*  Support teachers by helping teachers improve their lessons by identifying where learners are struggling based on mark analysis ✓  Predict Student Performance ✓  Artificial intelligence-based assessment provides constant feedback to teachers, learners and parents about how the student learns, the support they need and the progress they are making  Mark learners more fairly by removing human biases  Create a unique learning experience for each learner by using data gathered from the learner’s learning activities  Machine learning could allocate learners to teachers (and vice versa) according to their needs and abilities |  |
| 6.1.2 | Which **TWO** factors might limit the success of the use of technology in education? | (2) |
|  | *(Accept any two reasonable answers)*  Lack of resources / funding ✓  Limited/no access to the Internet ✓  Fear of using technology (from teachers that are inexperienced in the use of technology)  Distraction factor where learners are doing other things such as engaging with social media where the teacher is not fully aware of what the learners are doing |  |
| 6.1.3 | Facebook uses machine learning for facial recognition when tagging photos. It performs the task with 97% accuracy. Describe **ONE** way in which this kind of machine learning could be used to improve home security systems. | (1) |
|  | *(Accept any reasonable answer)*  The system could use facial recognition to identify the people who have legitimate regular access to the home ✓ / and the opposite - report faces that it does not recognise. |  |
| 6.1.4 | The term algorithm is used in the description in 6.1 above. What is an algorithm? | (1) |
|  | An algorithm is a step by step method of solving a problem. ✓ |  |

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| 6.1.5 | Explain how an expert system differs from a machine learning system. | (2) |
|  | An expert system incorporates a knowledge base containing accumulated human experience and a set of rules for applying the knowledge base to each particular situation that is described to the program - it is usually limited to a specific area of expertise. It can only provide answers if the answers exist in its database ✓  Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves. ✓ |  |
| 6.1.6 | Give **ONE** example where an expert system can be used. | (1) |
|  | *(Accept any one reasonable answer)*  Medical diagnosis ✓  Help desks  Mineral exploration  Financial decision making |  |
| 6.2 | Criminals have also spotted the ‘business potential’ of using technology. |  |
| 6.2.1 | Ransomware is a type of malware that prevents users from accessing their own system or personal files and demands a ransom payment in order to regain access. What would be the most typical way in which your computer could get infected by ransomware? | (1) |
|  | Opening an attachment on an email ✓ |  |

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| 6.2.2 | How would the payment of the ransom typically be done? Consider the fact that the criminal would want to stay unknown and that they would in all probability be located in another country. Name TWO possible payment methods. | (2) |
|  | Cryptocurrency / Bitcoin ✓ / Credit card ✓ |  |
| 6.2.3 | Name **TWO** advantages for the criminal using ICT as a tool to commit his/her crime. | (2) |
|  | *(Accept any two reasonable answers)*  Difficult to trace the origin ✓  No physical danger to themselves ✓ as they operate from the safety of their desk  Relatively quick way to make money |  |
| 6.3 | Businesses that want an online presence in the form of an online shop (webshop) have certain responsibilities towards their customers. |  |
| 6.3.1 | How does the customer know that the online webshop has been secured? Name **TWO** features to look for. | (2) |
|  | *(Accept any two reasonable answers)*  https in the URL ✓  Lock symbol ✓  A link to the security provider such as Verisign |  |
| 6.3.2 | Would a webshop be hosted on a static or a dynamic website? | (1) |
|  | Dynamic ✓ |  |
| 6.3.3 | Provide a reason for your answer to 6.3.2. Include an explanation of the **TWO** types of websites in your answer. | (3) |
|  | A static website has fixed content that does not change much over time.✓  A dynamic website changes according to the user’s preferences/actions.✓  The website should be able to display related products to those you have searched for - e.g. other people that bought this also bought … (or some such idea about why the content changes often) ✓ |  |
| 6.3.4 | How does an interactive website differ from a dynamic website? | (2) |
|  | Dynamic websites contain Web pages that are generated in real-time.✓  An interactive website is essentially an Internet page that uses different kinds of software to create a rich, interactive experience for the user.✓ For example, a simulation of an experiment where the user inputs different values and the simulation produces a result accordingly. |  |

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| 6.4 | Moving through a maze provides us with a simple idea of how artificial intelligence works. Examine the maze illustrated here. The round token represents the movements a robot has made after it entered the maze. The robot is currently in position A. Reflect on the options that the robot has to consider in order to make the next move.    The following is an incomplete algorithm for the decisions that could be made. Complete the missing sections by writing down the question number with the correct step.  While exit **6.4.1** do  If there is not a wall on the left then  move one step left  Else if **6.4.2** then  move one step right  Else if **6.4.3** then  move **6.4.4**  Else  move one step back  End if  End while | (4) |
|  | 6.4.1. not reached ✓  6.4.2. there is not a wall on the right ✓  6.4.3 there is not a wall in front ✓  6.4.4 move one step forwards ✓ |  |

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| 6.5 | The Internet of Things (IoT) has become a reality for us with more and more devices of various types connecting to our wireless networks. |  |
| 6.5.1 | Other than the normal mobile devices such as smartphones, laptops, and tablets, name **TWO** other ‘things’ that may connect to a home wireless network. | (2) |
|  | *(Accept any two reasonable answers)*  security cameras/systems ✓  light bulbs✓  home automation systems / heating / cooling systems |  |
| 6.5.2 | There are security concerns around all these IoT devices connecting to our home networks. In recent years there have been some major breaches in the USA. Explain how these devices might cause vulnerabilities on our wireless networks. | (2) |
|  | These devices do not have any anti-malware software and thus their controllers could become ‘infected’ ✓  They don’t have firewalls and are thus vulnerable to hackers and provide a portal into the home network ✓ |  |
| 6.6 | Social media has become a popular platform for journalists to promote their articles to the public and to spread the news quickly. |  |
| 6.6.1 | Recommend the most appropriate social media platform to accomplish this.  Twitter ✓ | (1) |
| 6.6.2 | Give **ONE** possible risk that journalists could face while using social media in this way. | (1) |
|  | Any ONE logical risk ✓  Could be trolled / harassed by people who don’t agree.  Negative comments on twitter on the article  One wrong tweet could end their careers |  |
| 6.7 | With the increased use of technology, it is important for all employees and members of organisations to know what they are permitted to do using the technology belonging to the employer or organisation. |  |
| 6.7.1 | Name the document that all employers and organisations should have in place in order to regulate the use of technology. | (1) |
|  | Acceptable Use Policy (AUP) ✓ |  |

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| 6.7.2 | Name **TWO** measures that the network administrator should put in place to protect the integrity of the organisation’s network from threats originating with disgruntled employees. | (2) |
|  | *(Accept any TWO correct answers)*  Assign correct access rights ✓  Ensure compliance with strong passwords / force regular password changes ✓  Monitor user behaviour on the network  Network policy settings correct  **Do not accept answers relating to external threats such as firewall in place (unless specifically mentioned to block certain outgoing ports)** |  |
| **TOTAL SECTION F: 35** | | |
| **GRAND TOTAL: 150** | | |