**SCHOOL NAME**

**GRADE 12 - INFORMATION TECHNOLOGY**

**PAPER 2 (THEORY)**

**September 2019**

**Time 3 Hours – Marks 150**

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| This question paper consists of 16 pages. |

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of SIX sections:

SECTION A: Short Questions (15)

SECTION B: Systems Technologies (26)

SECTION C: Communication and Network Technologies (24)

SECTION D: Data and Information Management (25)

SECTION E: Solution Development (25)

SECTION F: Integrated Scenario (35)

1. Read ALL the questions carefully.
2. Answer ALL the questions.
3. The mark allocation generally gives an indication of the number of facts/reasons required.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Write neatly and legibly.

**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**

*MAKE SURE THAT YOUR LETTERS ARE CLEAR AND LEGIBLE*

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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) |
| 1.2.2 | Computers that run most of their applications from their local hard drives and make little use of network services. | (1) |
| 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) |
| 1.2.4 | The term that is used to describe **TWO** methods having the same name in the same class. | (1) |
| 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) |
| 1.2.6 | A way of designing computers that makes it easy to repair and upgrade by replacing components. | (1) |
| 1.2.7 | A permanent digital connection to the Internet using a telephone line. | (1) |
| 1.2.8 | Sifting through large datasets using algorithms to find informational patterns. | (1) |
| 1.2.9 | A graphic depiction of the interactions among the elements (e.g. the users) of a computerised system. | (1) |
| 1.2.10 | The unique hardware identifier that is given to every networking device when it is manufactured. | (1) |
| **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, ahard 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) |
| 2.2 | iOS is an example of an operating system. |  |
| 2.2.1 | Name the company that developed iOS. | (1) |
| 2.2.2 | What type of devices would typically have iOS installed on them? | (1) |
| 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) |
| 2.3.2 | Argue the advantages of your suggested solution. | (2) |
| 2.3.3 | Argue the advantages of your suggested solution. | (2) |
| 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) |
| 2.4.2 | Which of these devices would be best suited to a travelling writer? Give **TWO** reasons for your answer. | (3) |
| 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) |
| 2.4.4 | List **THREE** advantages that a tablet has over a desktop computer. | (3) |
| 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) |
| 2.4.6 | Which of the individual components listed in the table is most likely the slowest? Give a reason for your answer. | (2) |
| 2.5 | What is a firewall? | (2) |
| **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) |
| 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) |
| 3.2.2 | Give **TWO** possible disadvantages of connecting the network wirelessly. | (2) |
| 3.3 | Briefly describe the function of a router. | (2) |
| 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) |

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| 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) |
| 3.5.2 | Provide **TWO** reasons for your answer in 3.5.1. | (2) |
| 3.5.3 | How can you get access to files stored in the cloud? | (1) |
| 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) |
| 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) |
| 3.6.2 | Name **ONE** benefit of using SaaS. | (1) |
| 3.6.3 | Give an example of a SaaS application that can be downloaded and installed locally on your computer. | (1) |
| 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) |
| **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:

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| **Table 1: 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* |

*(Table continues on the next page)*

|  |  |  |
| --- | --- | --- |
| 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* |

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| **Table 2: 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) |
| 4.1.2 | Telephone | (2) |

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| 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) |
| 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) |
| 4.3 | Both tables have been allocated a primary key. |  |
| 4.3.1 | What role does a primary key play within a table? | (1) |
| 4.3.2 | Explain the relationship between a primary key and a foreign key within a relational database. | (2) |
| 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) |
| 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) |
| 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) |
| 4.5.2 | Would passive or active tags be the most appropriate option for Jack’s Corner? Give **ONE** reason for your answer. | (2) |
| 4.6 | How can Jack’s Corner use invisible data capturing (excluding RFID) to improve the business? | (1) |
| **TOTAL SECTION D: 25** | | |

**SECTION E: SOLUTION 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) |
| 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) |
| 5.1.3 | Briefly describe **TWO** ways that would make your code easier to read and maintain. | (2) |
| 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) |
| 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) |
| 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) |
| 5.2.2 | Accessor methods have been created for the class shown in the diagram. Name the accessor methods. | (2) |
| 5.2.3 | Show how a mutator method for the sSeatCost attribute would be written in the class diagram. | (1) |
| 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);  b. objSeat.create( false, true, ‘Sue’, 34.99 );  c. objSeat.setBooked := x = 4;  d. y := Round(objSeat.calcDiscount); | (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 the hall, and prints out the total cost of the seats. | (5) |
| **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) |
| 6.1.2 | Which **TWO** factors might limit the success of the use of technology in education? | (2) |
| 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) |
| 6.1.4 | The term algorithm is used in the description in 6.1 above. What is an algorithm? | (1) |
| 6.1.5 | Explain how an expert system differs from a machine learning system. | (2) |
| 6.1.6 | Give **ONE** example where an expert system can be used. | (1) |

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| 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) |
| 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) |
| 6.2.3 | Name **TWO** advantages for the criminal using ICT as a tool to commit his/her crime. | (2) |
| 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 the customer need to look for. | (2) |
| 6.3.2 | Would a webshop be hosted on a static or a dynamic website? | (1) |
| 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) |
| 6.3.4 | How does an interactive website differ from a dynamic website? | (2) |

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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 on the next page. 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) |
| 6.5 | 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) |
| 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) |
| 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. | (1) |
| 6.6.2 | Give **ONE** possible risk that journalists could face while using social media in this way. | (1) |
| 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) |
| 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) |
| **TOTAL SECTION F: 35** | | |
| **GRAND TOTAL: 150** | | |