**COMBINED THEORY EXAM**

**INFORMATION TECHNOLOGY PAPER I**

**Grade 11**

**NOVEMBER EXAMINATION 2017**

**Marks: 150 Examiner: J Nocton-Smith**

**Time: 2 ½ hours Moderator: D Kench**

**Reading Time: 10 minutes**

**PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY**

1. This question paper consists of 14 pages (including the extra page and front cover). Please check that your question paper is complete.

2. Read the questions carefully and make sure that you answer all parts of each question.

3. Answer ALL questions in the space provided

4. Show all working where applicable.

5. A non-programmable calculator may be used.

6. It is in your own interest to write legibly and to present your work neatly.

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|  | **Q 1** | **Q 2** | **Q 3** | **Q 4** | **Q 5** | **Q 6** | **Q 7** | **Total** |
| **Possible Marks** | 20 | 12 | 18 | 22 | 19 | 14 | 45 | **150** |
| **Actual Marks** |  |  |  |  |  |  |  |  |

Question 1 Terminology 20 Marks

Define the following terms. Do NOT expand the acronym. May use an example to support your answer once you have provided a definition. Please note that examples on their own will not be given any credit. Please do not use brand names.

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| 1.1 | Northbridge | (2) |
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| 1.2. | IMAP | (2) |
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| 1.3 | Lossy Compression | (2) |
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| 1.4 | Clock Multiplication | (2) |
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| 1.5 | Parity | (2) |
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| 1.6 | Social Engineering | (2) |
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| 1.7 | Proxy Server | (2) |
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| 1.8 | Ransomware | (2) |
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| 1.9 | NAS | (2) |
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| 1.10 | Client-side scripting | (2) |
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Scenario

## The Gift Box Project collects and distributes gifts at Christmas time to underprivileged children throughout South Africa and Namibia. The organisation makes efficient use of technology to ensure that the gifts that are pledged are collected and reach the intended recipients timeously.

The drop off points are manned by volunteers who require a laptop and internet access.

Each drop off point is supplied with a handheld scanner.

Question 2 Hardware 12 Marks

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| 2.1 | For volunteers who need advice on acquiring a device, the organization provides the following recommended specifications for an entry level laptop.   |  |  | | --- | --- | | Processor | Intel Pentium N3540 “Bay Trail” Quad-Core 2.16-2.66GHz 2MB Cache | | Memory | 4GB RAM | | Graphics | Intel HD Integrated graphics | | Storage | 500GB HDD | | Connections and Expansions | 1 x USB 3  2 x USB 2  1 x HDMI | | Wireless | 802.11N  Bluetooth | | OS | Windows 8.1 | |  |
| 2.1 | The CPU has a **Quad-Core** processor. Explain the term quad core. | (1) |
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| 2.2 | The laptop is advertised as having 4GB of RAM (Primary memory) and a 500 GB HDD (Secondary memory). | | |  |
|  | | 2.2.1 | Briefly explain the purpose of primary memory. | (2) |
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|  | | 2.2.2 | Explain why it is necessary to have so much more secondary memory compared to primary memory? | (2) |
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| 2.3 | In a review on the laptop the reviewer states:  *As for RAM capacity, 4GB is enough for normal day-to-day multitasking.*  Explain what is meant by “normal day-to-day multitasking”. | | | (2) |
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| 2.4 | One of the upgrade options would be to replace the **500GB HDD** drive with a **Solid State Drive**:  Give ONE advantage and ONE disadvantage to replacing the HDD with a SSD. | (2) |
| Advantage | | |
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| Disadvantage | | |
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| 2.5 | The laptop does NOT have a LAN Ethernet point. Explain the impact of this on the user. | (2) |
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| 2.6 | Explain what HDMI is used for. | (1) |
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Question 3 Software 21 Marks

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| 3.1 | The operating system is responsible for memory management. | |  |
|  | 3.1.1 | Describe TWO memory management functions that must occur. | (2) |
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|  | 3.1.2 | Explain why virtual memory is used even though it can slow down a computers performance. | (2) |
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| 3.2 | The BIOS is still required in a computer system today. Motivate the need for the BIOS by stating two important tasks that it performs. | |  |
|  | 3.2.1 Many students confuse BIOS with CMOS. Define BIOS | | (2) |
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|  | 3.2.2 Explain how CMOS and BIOS are used during the Power On Self Test (POST). | | (2) |
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| 3.3 | The management are investigating having a mobile app developed to be used by the volunteers at the collection centres. | |  |
|  | 3.3.1 | Explain why they would need different versions of the application for different operating systems. | (2) |
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|  | 3.3.2 | Name two mobile operating systems they would need to support. | (2) |
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| 3.4 | The app may be developed using C++ or Java. | |  |
|  | 3.4.1 | Java is a language that is both compiled and interpreted. Explain why this is true. | (2) |
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|  | 3.4.2 | Briefly describe an advantage of using Java in this scenario. | (2) |
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| 3.5 | Mobile technologies are almost indispensable because they have the ability to connect to the web, interact with businesses and access information anywhere, anytime. | |  |
|  | 3.5.1 | Using the scenario give an example of data and information. | (2) |
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Question 4 Networks 21 Marks

The Gift Box Project have a small head-office in Cape Town with printers, PCs and tablets. They employ 4 permanent staff, however need flexibility for extra staff who assist over the busy period from September.

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| 4.1 | Give TWO different examples why connecting the computers in a network would be of benefit to the project. | | (2) |
| Example 1 | | | |
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| Example 2 | | | |
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| 4.2 | The network at the head-office includes a **file-server.** | |  |
|  | 4.2.1 | The server is more “powerful” than the other computers on the network. Give TWO hardware specifications of components/devices or factors that determine how ‘powerful’ a computer is. | (2) |
| Specification 1 | | | |
| Specification 2 | | | |
| 4.3 | Wired and wireless LANs are installed at the head-office. | |  |
|  | 4.3.1 | Name ONE negative aspect of using a WLAN. | (1) |
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|  | 4.3.2 | State one advantage of using UTP cables other than cost. | (1) |
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|  | 4.3.3 | What device is needed to connect UTP cabled devices to the server in a star topology? | (1) |
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|  | 4.3.4 | As wireless connectivity is provided. what would be the best wireless security protocol to use? Justify your answer | (2) |
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| 4.4 | The LAN will be making use of Ethernet technology. | |  |
|  | 4.4.1 | Name two features of ethernet technology. | (2) |
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| 4.5 | Why is it advisable for the company to have a firewall installed?  Briefly describe TWO reasons. | | (2) |
| Reason 1 | | | |
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| Reason 2 | | | |
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| 4.6 | It is important for the head-office to have access to the internet. They have and ADSL line and have chosen their ISP. | |  |
|  | 4.6.1 | What device would be required to connect the LAN to the internet? | (1) |
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| 4.7 | The company’s database was planned and created by a consultant. The consultant has explained that the data base security is guaranteed as the server has RAID disks and the database is backed up daily.  Explain the difference between RAID and backups and how they work together to ensure that the data is secure. | (4) |
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| 4.8 | At the collection centres the volunteers use wireless scanners that connect to their laptops, creating a PAN. Considering that the collection centres may not have access to a WLAN answer the following questions. | |  |
|  | 4.8.1 | What technology would be used to create a PAN? | (1) |
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|  | 4.8.2 | What technology would the volunteer use to connect to the internet? | (1) |
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|  | 4.8.3 | Explain how they would achieve this. | (2) |
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Question 5 e\_Communication and security 19 Marks

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| 5.1 | The Gift Box Project website is an important interface for the company.  Websites can be categorised as static or dynamic. |  |

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|  | 5.1.1 | What do we mean when we say a website is static? | (1) |
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|  | 5.1.2 | What is the essential difference between static and dynamic websites? | (2) |
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|  | 5.1.3 | Name and describe two ways that web 2.0 features that would be useful on the Gift Box Project website | (2) |
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| 5.2 | It is the responsibility of the Gift Box Project to protect the data of all users who register on their website.  Name and describe two measures the Gift Project can take to ensure that the users’ data is safe. | (2) |
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| 5.3 | As the Gift Project rely on the generosity of the public they feel they may be susceptible to **phishing** and **spoofing scams**. |  |

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|  | 5.3.1 | Explain the difference between these two terms. | (4) |
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|  | 5.3.2 | What is the best measure the Gift Box Company can take to protect their users from these scams. | (2) |
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| 5.4 | The database designer would like to make use of cookies on the website. |  |

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|  | 5.4.1 | What is a cookie? | (2) |
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|  | 5.4.2 | Describe how The Gift project could make use of cookies. | (2) |
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Question 6 Social 15 Marks

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| 6.1 | All staff at Gift Box Project need to sign an Acceptable User Policy (AUP).  Describe TWO clauses that the Gift Box Project may include in their Acceptable User Policy. | (4) |
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| 6.2 | The Gift Box Project would like to employ an IT person. They are confused about the skills sets required for the following IT jobs.   * Programmer * Database analysts * Web designer * Project manager |  |

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|  | 6.2.1 | Which type of person would you recommend would be of most use to The Gift Box Project? | (1) |
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|  | 6.2.2 | Describe three core skills for the person you have chosen in 6.2.1? | (3) |
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|  | 6.2.3 | Explain how this person would be able to add value to the Gift Box Project? | (2) |
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| 6.3 | One of the effects of **Digitilisation** on the workplace is **mobile offices.** |  |

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|  | 6.3.1 | Explain the concept of a mobile office? | (1) |
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|  | 6.3.2 | What technologies are needed to set up a mobile office? | (2) |
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|  | 6.3.3 | How can the Gift Box project benefit from mobile offices for collections? | (1) |
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Question 7 Software development 44 Marks

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| 7.1 | The APP is being designed using Object Oriented Principles.  Consider the UML diagram of the Child class below. |  |
|  | |  | | --- | | **Child** | | - firstName : String  - age : int  - gender : char  - centreNo : int | | + Child (inFirstName: String, inAge :int, inGender :char, inCentreNo : int)  + setAge (inAge:int)  + getCentreNo() : int  + toString (): String | |  |
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|  | One of the characteristics of Object Oriented Programming is Encapsulation. |  |

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|  | 7.1.1 | Describe encapsulation. | (1) |
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|  | 7.1.2 | What are the benefits of encapsulation? | (1) |
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|  | 7.1.3 | How is this achieved in the **Child** class? | (2) |
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| 7.2 | There are four different method types in the class above. Constructors, mutators, accessors and toString.  For each method type explain the purpose and give an example in the Child class. Complete the table below.   |  |  |  | | --- | --- | --- | | **Method Type** | **Purpose** | **Example** | | Constructor |  |  | | Mutator |  |  | | Accessor |  |  | | toString |  |  | | (8) |
| 7.3 | Write the Java Method header for this method :  + setAge (inAge:int) | (2) |
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| 7.4 | The project’s database has been set up in MS ACCESS. |  |

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|  | 7.4.1 | Name 2 advantages of using a database management system (DBMS) | (2) |
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|  | 7.4.2 | Give an example of another DBMS | (1) |
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| 7.5 | The database has a table with the information for each centre. |  |

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|  | 7.5.1 | Using the data above determine the result of the following query.  SELECT CentreLocation, count(\*) AS NumberOfCentres  FROM tblCentre  GROUP BY CentreLocation  HAVING count(\*) < 2; | (4) |
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|  | 7.5.2 | Describe the function of the HAVING statement. | (2) |
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| 7.6 | One of the field that users’ enter when they are registering is the email address.  The accepted format for an email address is :  <username>@<domain>.co.za, For example Themba@mweb.co.za  Write down 3 rules to validate the email address. For each rule, write down the corresponding algorithm in pseudocode. The first row of the table contains an example.  .   |  |  | | --- | --- | | **Rule** | **Algorithm - Pseudocode** | | **Example**  Email address cannot be a null string | if email = null  then errorMessage ← “Email is empty”  endif | |  |  | |  |  | |  |  | | (6) |

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| 7.7 | Given the following array :  **int [] age = new int [20];** |  |

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|  | 7.7.1 | Create an algorithm to efficiently search for a given integer stored in the array. You need to identify and display the position of the matching element. The array is NOT sorted.  Display -1 if the element is not found.  Prompt the user for the number to search for.  You may use **pseudocode** or a **flow chart** to describe your algorithm. | (7) |
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|  | 7.7.2 | Explain why your search is efficient? | (2) |
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|  | 7.7.3 | Name another search algorithm you could have used. | (1) |
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| 7.8 | Study the algorithm below that supposedly calculates and displays the average age.  The algorithm reads the ages from the keyboard as test data.  **ageArr** is an array with a maximum of 5 values to store the ages.  For testing purposes only 5 values are being used   |  |  | | --- | --- | | .**Line Number** | **Description** | | 3 | total = 0 average =0 | | 4 | input age | | 5 | loop 5 times | | 6 | input age | | 7 | ageArr [loop] 🡨age | | 8 | total 🡨 total + age | | 9 | end loop | | 10 | display average | | |  |
|  | 7.8.1 | Use the given algorithm and the following test data to populate **ageArr** below. Test data : 8,6,9,5,6  **ageArr**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **0** | **1** | **2** | **3** | **4** | |  |  |  |  |  | | (2) |

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|  | 7.8.2 | The array has been incorrectly populated because of an error occurring between lines 3 and 9.  Explain how the algorithm must be changed in order to correct the error. | (2) |
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|  | 7.8.3 | Assuming that the error has been corrected and that the array has been populated with the following values:  **ageArr**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **8** | **6** | **9** | **5** | **6** |   The following is displayed at line 10  **0**  Rewrite lines 10 onwards to display the correct average.  Additional statements may be required. | (2) |
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