I. Answers to Cameroon GCE O/L Computer Science Paper 2, June 2017

Disclaimer:

This is not an official marking guide. The answers given here express a personal point of view. Please use with caution. Feel free to contribute or report a problem at gamonana.wordpress.com/contact

1.

(a)

i. **Data Encryption** : This is a security method by which data is converted to a form where you need a secret key to access or read it. This secret key is formally called Encryption key. The converted text is called ciphertext while the original text is plaintext

ii. **Backup** : this refers to making copies of data to use in the event the original data is lost

iii. **Firewall** : this is a security system that filters incoming and outgoing traffic(messages) based on defined sets of rules. It is similar to a physical barrier that filters access in and out of the compound.

(b) **Data integrity** is the accuracy and completeness (consistency) of data throughout its lifecycle. Data integrity can be maintained through the use of various error-checking methods and validation procedures.

(c) **Data Verification** is a way of ensuring the user types in what he or she intends .i.e making sure the user does not make a mistake when inputting data. An example of this includes double entry of data when creating a password to prevent incorrect data input

Data Validation on the other hand is about checking if the input data conforms with the data requirements of the system to avoid unwanted data. An example is a date check to avoid inputting dates that are beyond the current date.

(d)

i. **Computer Simulation**: this refers to the use of a computer to imitate a system usually a real-world system. The imitation process is based on a sets of mathematical equations (mathematical model). The purpose of simulation is to predict the results of something

ii. Advantages:

Avoid disturbing real world systems: With Computer Simulation, it is possible to test the behavior of something. We can model a system close enough to real world. Experiments are done on the model without disturbing the real world system.

Help Students: Teachers can do simulation of systems and explain to students. Students can get an idea of any system easily be seeing a simulation

Disadvantages:

Expensive : Computer simulation is expensive because it requires a group of highly qualified individuals build the simulation model

Computer limitation : Complex simulation involves a computer with higher memory and processor speed. This is another drawback of simulation.

2.

(a)

i. Batch processing is a method of running data jobs **periodically** with **little or no user interaction**. Batch jobs are collected in bulk rather than direct input from user and are processed at a later time. **Example** :Scheduling the automatic payment of employees every month

ii. Online processing is a method of running data jobs **continuously** as they are inputted. The inputted data is directly processed and outputted. Example: the bank ATM is an example of online processing as data is immediately processed and outputted as customers send input to the machine.

Illustration 1: A bank ATM

(b)

i. A **command-line interface** is a text based way of interacting with a computer where the user issues commands in the form of successive lines of text called command lines and receives responses also in the form of successive lines of text. This type of interface is not ideal for novice users as you must remember the range of different commands

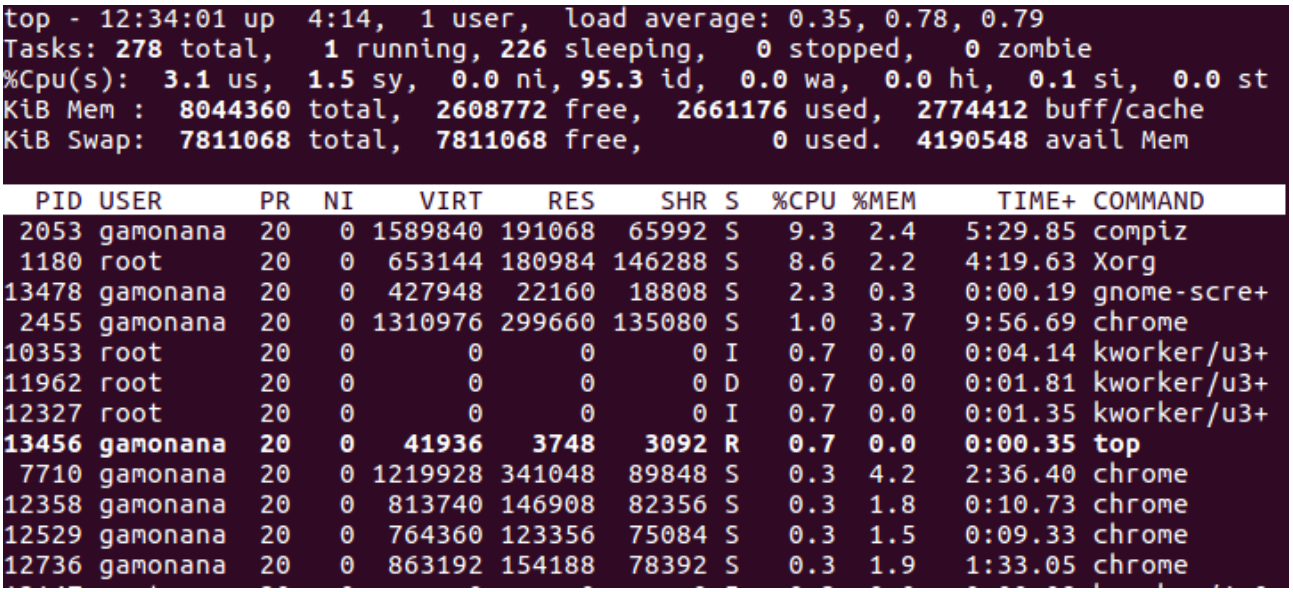


Illustration 2: A command line interface

ii. A **GUI** is a visual way of interacting with a computer program using items such as Windows, Icons, Menus and Pointers (WIMP)

Illustration 3: A GUI

iii. **Menu Driven Interface** : this is an interface that consist of a series of menus and sub-menus which the user accesses by pressing buttons, often on a touch-screen device. A common example is the ATM

Illustration 4: Example of Menu driven Interface

(c)

i. **NOT YET ANSWERED**

(d) **Synchronous data transmission** is a data transfer method in which data blocks are continuously and consistently being transfer. Examples include : telephonic conversations, video conferencing

Asynchronous data transmission is a data transfer method in which data is transmitted discontinuously and a start and stop being must being insereted in each data block to inform the receiver where it begins and ends. Examples include : emails

3.

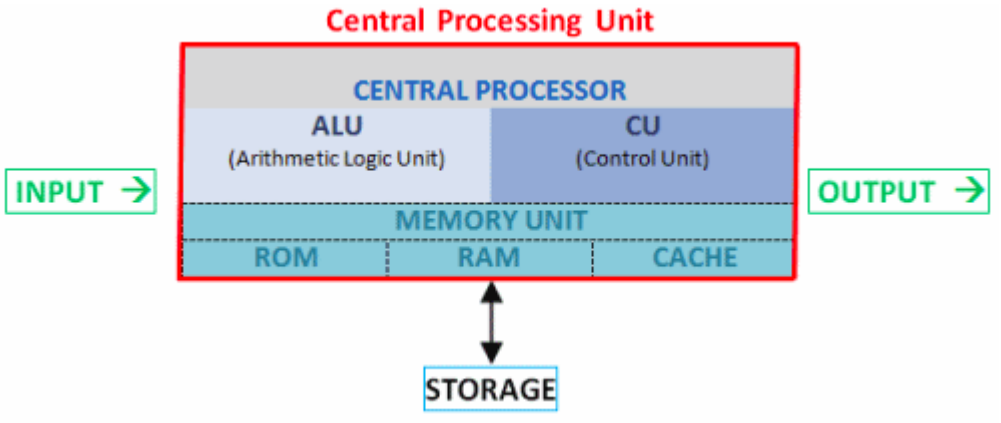


Illustration 5: Basic Components of a CPU

(a) **EXPLANATION:** C.P.U :- The CPU is the heart and brain of a computer .**The three components of the CPU**:

- (A.L.U) Arithmetic logic unit .
- (C.U) Control Unit .
- (M.U) Memory Unit .

A.L.U :- An arithmetic logic unit is a digital circuit used in computers to perform arithmetic and logic operation .

C.U :- A control unit is circuitry that directs operations within a computer's processor.

M.U :- Memory unit is the amount of data that can be stored.

(b) **Address Bus**: It is a group of wires which carries **address only**.Address bus is unidirectional because data flow in one direction, from microprocessor to memory or from microprocessor to Input/output devices

Data Bus:It is a group of wires which carries Data only.Data bus is bidirectional because data flow in both directions, from microprocessor to memory or Input/Output devices and from memory or Input/Output devices to microprocessor

Control Bus: It is a group of wires, which is used to generate timing and control signals

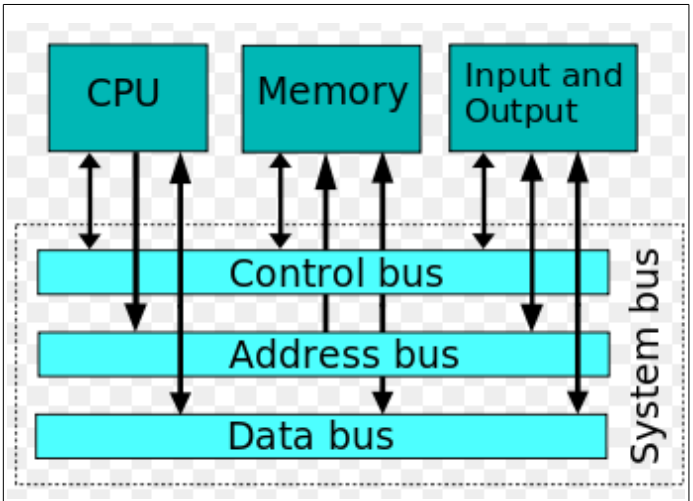


Illustration 6: Types of buses in a Computer

(c) the machine instrcution cycle consists of : Fetch the instruction, decode the instruction, Execute and Store result.

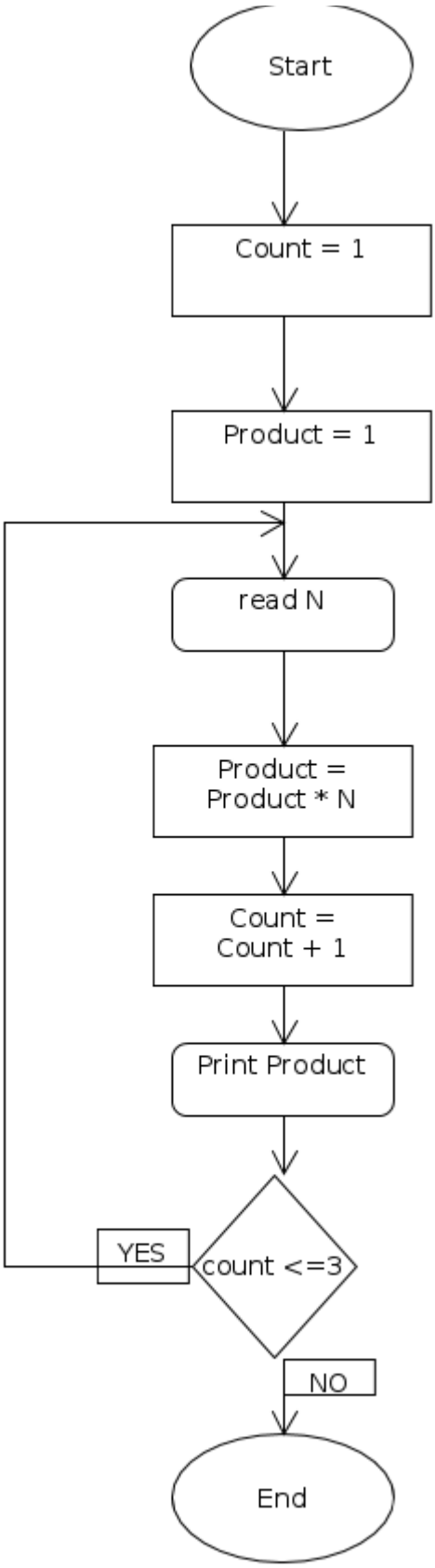
(d)

i. for N = 2, Product = 2

for N = 3, Product = 6

for N = 5, Product = 30

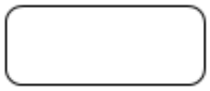
ii.


Start
Count = 1
Product = 1
read N
Product =
Product * N
Count =
Count + 1
Print Product
count <=3
YES
NO
End

EXPLANATION: The decision symbol always appear at the end of a while loop. If the condition is true, the arrows goes back to the start of the loop otherwise the loop is terminated

the input/output symbol is .

but because my software does not have it I have used



4.

(a)

i. F represents the result of an AND GATE: A.B

G represents the result of an OR GATE: C+D

ii. H: F + G

H:(A.B) + (C+D)

iii. F: FALSE

G: TRUE

H: TRUE

(b)

i. An **input device** is a hardware device that sends data to a computer allowing you to interact with it. Examples include : keyboard, mouse, scanner, microphone, bar code reader.

ii. An **output device** is a hardware device that displays (or receives) data from a computer. Examples include: Printers, Monitors, Projectors

iii. An **input / output device** is a device that can both send data to a computer and display (or receive) data from a computer. Example: A USB Drive sends data to a computer and displays (or receives) data from a computer

(c)

i. 1 100 101 (represents 101 in base ten) - 0 001 010 (represents 10 in base ten) = 1 011 011 (represents 91 in base ten)

EXPLANATION: with binary subtraction 0 − 1 = 1 and 1 is borrowed from the next significant bit. Note that with successive borrows, the values are deducted accordingly.

Eg 1: consider 1001 − 101 . in the third substraction (I.e 0 − 1) 1 is borrowed and appended to zero which now becomes 10 − 1 (I.e 2 −1) which is equal to 1. The fourth substraction becomes 0 − 0 = 0. the final result gives 100.

Eg 2: Consider 1000 − 111 = 0001. In the first substraction (I.e 0 - 1) 1 is borrowed from the 1 at the fourth position. This 1 is appended to the zero at the third position becoming 10. 1 again is deducted here so that what is left is 1 and the second position becomes 10. 1 is again deducted here so that what is left is 1 and we have a 10 at the first position. We now have 10 − 1 which gives 1. The next substractions are 111 − 111 which gives 000. hence the result 0001. Visit this to learn more about Binary subtraction and here to have for binary to decimal conversions

ii. 1 101 011 (represents 107) + 00 011 01 (represents 13) = 1 111 000 represents 120 note that with binary addition 1 + 1 = 0 and 1 is carried. Also 1+1+1=1 and 1 is carried

(d) $505_8 = 1\,010\,001\,01_2$. **EXPLANATION**: octal means base 8 notation. There are only 8 symbols : from 0 to 7. the algorithm to convert from octal to binary is :

- convert each digit in the octal number into its 3 digit binary equivalent.
- The result is the binary number

5.

(a) **Character** : it consist of 8 bits. 8 bits can also be called a byte. A bit is the smallest unit of data representation. The value of a bit is either 0 or 1.

Field : a field consist of a group of characters. A field is used to descrie an entity (object, person, place or event). E.g the entity person may have as field: name

Record : a Record is a collection of fields, with each field describing the entity. E.g the entity person may have a record consisting of the fields : name, age and sex

File: A group of related records make up a file. E.g the Person's file consisting of a series of records of persons

Database : it refers to an integrated collection of related records or files. Databases are managed by specialised software called Database Management Systems (DBMS)

EXPLANATION: These items from the **Hierachy of data**.

(b)

i. 5 fields and 5 records

ii. key: it is the field that enables to uniquely identify a record

iii. EMPLOYEE → ID; DEPARTMENT → DEPTCODE; SALARY → SALCODE

iv. by using the ID field which will be different for both employees

v. NO. Because the entry in the ID field shoud be unique. The ID 6 has already being used

vi. some of the employee's corresponding record might not figure in the DEPARTMENT and SALARY tables. Add the corresponding record to the DEPARTMENT and SALARY tables

6.

(a)

i. **Computer literacy** is defined as the knowledge and ability to utilize computers and related technology efficiently

ii. Booting, Memory management, Disk management, Providing Interface.

(b)

i. keyboard, mouse, monitor, printer

ii. Hardware device: keyboard

software: A Word Processing software

iii. Internet browser: Mozilla Firefox, Google Chrome

iv. Spreadsheet Software : A tool used to create letters, word sheets

Desktop Publishing Software: A tool used to create illustrative worksheets, banners

Database Software: A tool used to store data like text information

Presentation Software: used to create multimedia apps

7.

(a)

EXPLANATION: SDLC stands for Software Development Life Cycle. It represents all the phases involved in the development of a software.

i. **Parallel conversion** is an implementation technique in which an existing system runs in parallel with the new system, to verify that both produce identical results and thus ensure that the new system can correctly takeover the existing system.

ii. **Plunge conversion** is an implementation technique in which there is an abrupt change from the old system to the new system at a predefined time. This method forces the users to make the new system work since they have no other method to fall back on.

iii. **Pilot conversion** is an implementation technique in which a working version of the system is implemented in one part of the organization, such as a single department. As the system is being used, changes can be made to improved it. When the system is deemed complete, it is installed throughout the organization, either at once (direct conversion) or gradually (phased or piece meal conversion). Pilot conversions are only possible in organizations that have discrete sections or branches.

iv. **Piecemeal conversion** otherwise called Phased conversion is an implementation technique in which the new system is introduced gradually. It can be used when it is not possible to install a new system throughout an organisation all at once.

(b)

i. **Machine Language** is a programming language consisting of binary or hexadecimal instructions which a processor can respond to directly. Such programming langages need no translations to be understood by the processor. Machine languages are processor dependent and thus not portable (ie the code written for one processor can not be used on a different processor). Machine langages are difficult to read, write and maintain

ii. **An assembly language**, also reffered to as ASM, is a low-level programming language in which there is a very strong correspondence between the program's statements and the instructions which the processor understands. Assembly langages are translated into machine langage using an assembler Assembly langages are also difficult to read,write and maintain. They are not very portable.

iii. **High level language** is a programming langage close to human langage, is machine independent and thus portable. They are easier to read, write and maintain. They are translated into machine langage using a compiler or interpreter

(c) two disadvantages of Machine Language: difficult to read, write; not portable

advantage: quickly interpreted by the Processor

II. Answers to Cameroon GCE O/L Computer Science Paper 2, June 2016

Disclaimer:

This is not an official marking guide. The answers given here express a personal point of view. Please use with caution. Feel free to contribute or report a problem at gamonana.wordpress.com/contact

1.

(a) 03 advantages of email communication: it is fast;it is inexpensive; it is permanent - you can keep a record of messages and replies, including details of when a message was received

03 disadvantages of email communication: accessible to others that can read your emails without you knowing; presence of spam that can flood your mail box with undesirable mail ; presence of virus that can damage your computer.

(b)

i. **GIF**: Graphic Interchange Format

characteristics: gif uses loss-less compression algorithm meaning it does not get blurry; gif can be animated; it displays a maximum of 256 colours. This makes it a poor format for photographic images

ii. JPEG: Joint Photographic Experts Group

characteristics: jpeg uses a lossy compression algorithm; it is capable of displaying a million of colors that makes it suitable for photographic images; it cannot be animated

(c)

i. **System software** is software used to operate computer hardware. It provides platform to run application software. E.g Operating System. **Application software** is software that provides facilities to user to perform specific task. E.g word processor software

ii. **Primary storage** otherwise called main memory is memory that can be directly accesed by CPU. Primary storage is volatile in nature. Examples include RAM, Cache

Secondary storage cannot be directly accessed by the CPU. It is used to store data on a long term basis . Examples include Hard Disk drives, USB drives

2.

(a)

i. An **operating system** (OS) is system software that manages hardware and software resources of a computer.

ii. Ubuntu, CentOS, Windows 7

iii. Memory Management, File management, Booting of the computer, Process Management, Providing Interface (Command Line Interface and Graphical User Interface)

(b)

i. A **Computer generation** is characterized by a major technological development that fundamentally changes the way a computer operates, like the use of vacuum tubes, transistors, and the microprocessor.

ii.

Main Technology	**Generation**
Integrated Circuit	4^{th}
Vacuum Tube	1^{st}
Very large-scale Integration (VLSI)	3^{rd}
Transistors	2^{nd}

(c) A **real time system** is a system which provides immediate processing and response to the data being inputted e.g an Airline Reservation system

An **online system** is a system connected to the Internet. Such system may not immediately process and give a response to an inputted data. E,g browsing a webpage

(d) high level langage is machine independent while low level langage is machine dependent

high level langage is close to human langage while low level is not close to human language

3.

(a)

i. **Human–computer Interface** (HCI) is a field of study that focuses on the design and use of computer technology, and in particular the interaction between humans (users) and computers

ii. A **command-line interface** is a text based way of interacting with a computer where the user issues commands in the form of successive lines of text called command lines and receives responses also in the form of successive lines of text.

```
top - 12:34:01 up  4:14,  1 user,  load average: 0.35, 0.78, 0.79
Tasks: 278 total,   1 running, 226 sleeping,   0 stopped,   0 zombie
%Cpu(s):  3.1 us,  1.5 sy,  0.0 ni, 95.3 id,  0.0 wa,  0.0 hi,  0.1 si,  0.0 st
KiB Mem :  8044360 total,  2608772 free,  2661176 used,  2774412 buff/cache
KiB Swap:  7811068 total,  7811068 free,        0 used.  4190548 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU %MEM     TIME+ COMMAND
 2053 gamonana  20   0 1589840 191068  65992 S   9.3  2.4   5:29.85 compiz
 1180 root      20   0  653144 180984 146288 S   8.6  2.2   4:19.63 Xorg
13478 gamonana  20   0  427948  22160  18808 S   2.3  0.3   0:00.19 gnome-scre+
 2455 gamonana  20   0 1310976 299660 135080 S   1.0  3.7   9:56.69 chrome
10353 root      20   0       0      0      0 I   0.7  0.0   0:04.14 kworker/u3+
11962 root      20   0       0      0      0 D   0.7  0.0   0:01.81 kworker/u3+
12327 root      20   0       0      0      0 I   0.7  0.0   0:01.35 kworker/u3+
13456 gamonana  20   0   41936   3748   3092 R   0.7  0.0   0:00.35 top
 7710 gamonana  20   0 1219928 341048  89848 S   0.3  4.2   2:36.40 chrome
12358 gamonana  20   0  813740 146908  82356 S   0.3  1.8   0:10.73 chrome
12529 gamonana  20   0  764360 123356  75084 S   0.3  1.5   0:09.33 chrome
12736 gamonana  20   0  863192 154188  78392 S   0.3  1.9   1:33.05 chrome
```

iii. A **GUI** is a visual way of interacting with a computer program using items such as Windows, Icons, Menus and Pointers (WIMP)

Illustration 7: An example of GUI

(b)

i. the algorithm multiplies the price of an item with the number of items

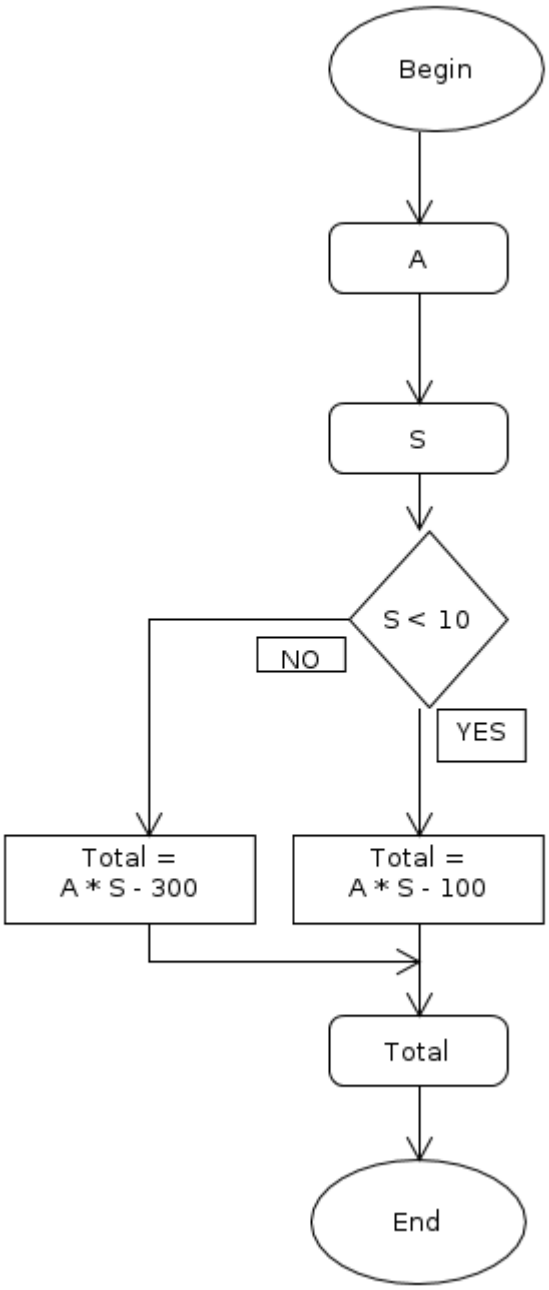
if the number of items is less than 10, a discount of 100 is applied to the total price

if the number of items is greater than or equal to 10, a discount of 300 is applied to the total price

ii. Sequential and Selection Control Structures

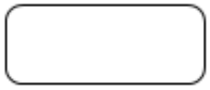
iii. Total = 800

iv.



The input/output symbol is .

but because my software does not have it I have used



4.

(a) **Data Validation** is about checking if the input data conforms with the data requirements of the system to avoid unwanted data. An example is a date check to avoid inputting dates that are beyond the current date.

Data Verification is a way of ensuring the user types in what he or she intends .i.e making sure the user does not make a mistake when inputting data. An example of this includes double entry of data when creating a password to prevent incorrect data input

(b) Good:is less than 5 characters in length

w-6856: has a non alphabetic or numeric character which is -

(c)

i. TCP/IP: Transmission Control Protocol/ Internet Protocol

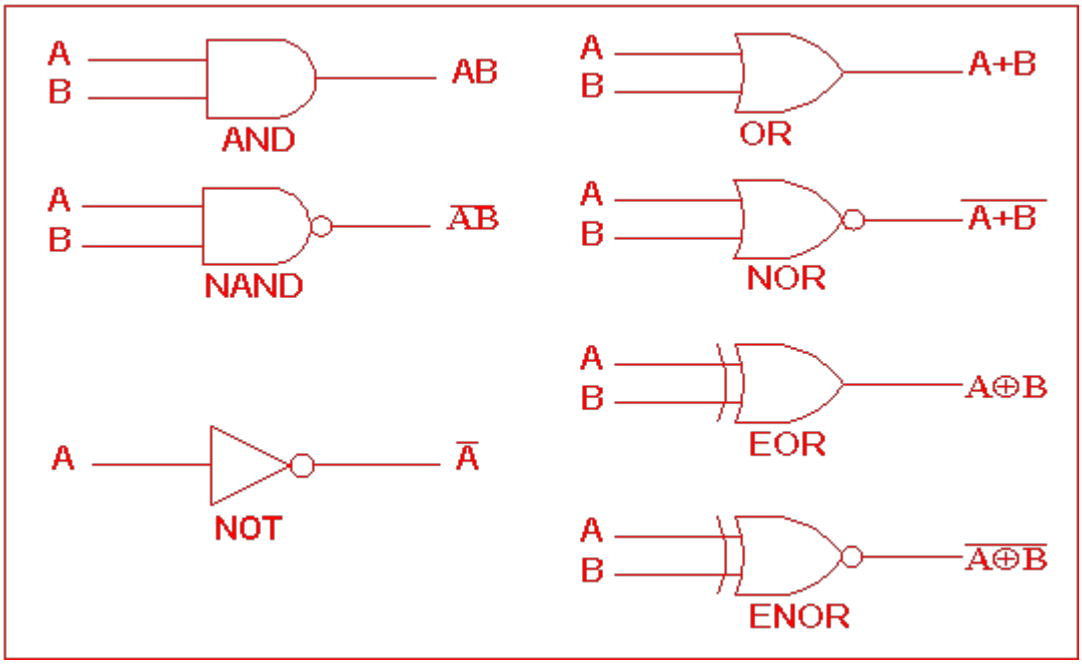
HTTP: HyperText Transfer Protocol

DSL: Digital Subscriber Line

ADSL: Asymmetric Digital Subscriber Line

ii. HTTP is used to transmit website information (text,graphic, sound, audio…) across the Internet

TCP/IP transmission of data (web pages, email, files …) across the Internet



(d)

i. **EXPLANATION**: choose the OR, AND and NOT gates

ii.

A	B	Not A	(NOT A) or B
1	0	0	0
0	1	1	1
1	0	0	0
0	1	1	1

5.

(a)

i. **Bandwidth**: the amount of data that can be transmitted in a fixed amount of time. It is expressed as bytes per second

ii. **Optic fibre**: A technology that uses glass threads (fibers) to transmit data

(b)

i. **Management Information System**: refers to an information system that is used in decision-making and provide tools for managers to coordinate, evaluate and efficiently manage an organization

ii. an **expert system** is a computer system that emulates the decision-making ability of a human expert

(c) A:2

B: 1

C:3

D:4

(d)

i. a **project** is an temporary endeavour with a defined start and end date.

ii. These two project management tools help:

to identify tasks

to estimate project duration

to show the interdependency of tasks

PERT (Program Evaluation Review Technique) charts are generally used before a project begins to plan and determine the duration of each task. They are used for large and complex projects. **Gantt charts** are used while a project is happening to break projects into smaller tasks and highlight scheduling constraints. They are used for small projects.

6.

(a)

i. An **input device** is a hardware device that sends data to a computer allowing you to interact with it. Examples include : keyboard, mouse, scanner, microphone, bar code reader.

ii. An **output device** is a hardware device that displays (or receives) data from a computer. Examples include: Printers, Monitors, Projectors

iii. An **input / output device** is a device that can both send data to a computer and display (or receive) data from a computer. Example: A USB Drive sends data to a computer and displays (or receives) data from a computer

(b)

i. **RAM**: Random Access Memory

ROM: Read Only Memory

ii. RAM is volatile, while ROM is not

(c)

i. The data stored in ROM is used primarily in the startup process of a computer, where as data in RAM is used after the Operating System has been loaded

ii. RAM data can be modify, ROM data is not modifiable

(d)

i. 1KB = 1,024 bytes because 1KB is 2^{10} bytes

ii. 4GB = 4000MB = 4 000 000KB

7.

(a) **EXPLANATION**: there are 5 components of an Information System: People (Procedures), Hardware, Software, Data, Network

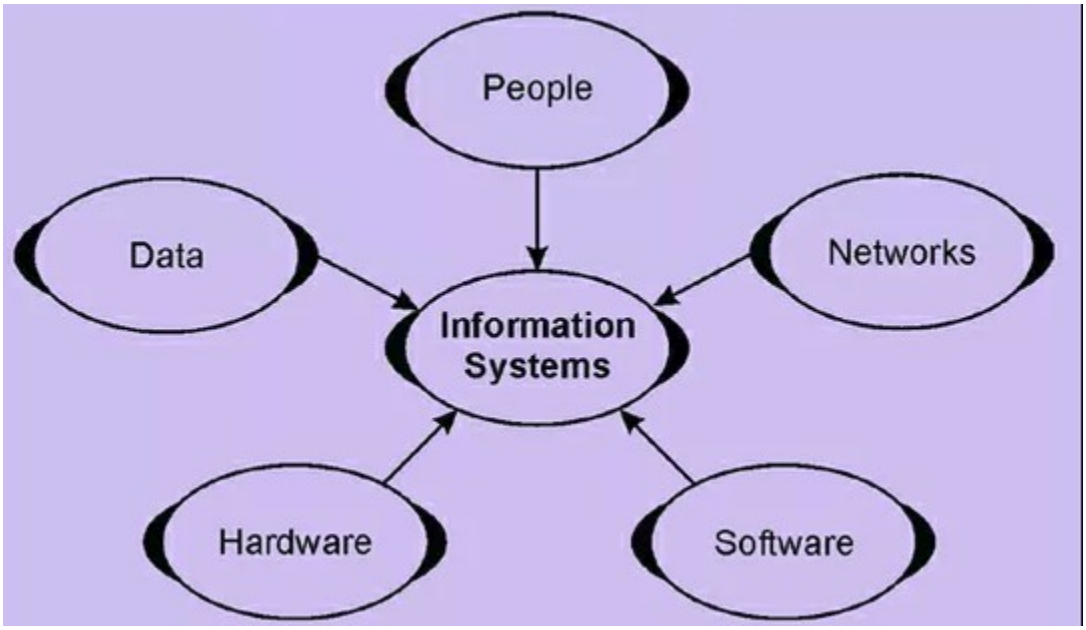


Illustration 8: Components of an Information System

(b)

i. **CPU**: it is used to process data

ii. **Primary Memory**: this is main memory. It stores data directly accessible by the CPU. Eg. RAM

iii. **Secondary Memory**: this is memory that holds data on a long term basis. It stores data that is not directly accessible by the CPU e.g Hard disk drive

(c) it measures the performance of a CPU. The unit of measurement is called Hertz

(d) time = Number of instructions / frequency

for microprocessor A, time = 4/300 = 0.01s

for microprocessor B, time = 5/250 = 0.02s

microprocessor A is faster since it executes its instruction in fewer time

EXPLANATION: truly speaking **time = Number of instructions * (1 / frequency)**