THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE

FIRST SEMESTER EXAMINATIONS - 2022

SECOND YEAR BACHELOR OF COMPUTER SCIENCE

CS213 – CONCEPTS OF COMPUTER SCIENCE

TIME ALLOWED: 3 HOURS

INFORMATION FOR CANDIDATES

1. Write your name and student number clearly on the front of the examination booklet.
2. You have 10 minutes to read this paper. You must not begin writing during this time.
3. There are three parts to this exam:

    Part A: multiple choice questions; [11marks]

    Part B: short answer questions; [25 marks]

    Part C: working out type Questions; [40 marks]

4. All answers must be written in examination booklets only. No other written material will be accepted.
5. Start the answer for each question/part on a **new** page. Do **not** use red ink.
6. Notes and textbooks are not allowed in the examination room. All mobile phones and electronic/recording devices must be switched off during the examination.
7. Scientific and business calculators are allowed in the examination room.

MARKING SCHEME

Marks are indicated at the beginning of each question. They total **[76]**.

Label all your answers correctly and all answers must be written inside examination booklets.

Part A: multiple choice questions [1 mark each = 11 marks].

QUESTION 1
A computer is basically a programmable machine capable to perform arithmetic and logical operations automatically and sequentially. What is the correct order of Data handling in a computer?

A. Input of data, processing of data, output of data, display of data.
B. display of data, Input of data, storage of data, processing of data.
C. Input of data, processing of data, output of data, storage of data.
D. display of data, Input of data, processing of data, output of data.

QUESTION 2
The Central Processing Unit component of the computer system or processor controls the computer's functions and transmits data. What are the components of the CPU?

A. Control Unit, Arithmetic Logical Unit, Main Memory Unit.
B. Control Unit, Arithmetic Logical Unit, Main Memory Unit, Secondary Storage Device.
C. Control Unit, Arithmetic Logical Unit, Main Memory Unit, Secondary Storage Device, input Unit.
D. Control Unit, arithmetic Logical Unit, Main Memory Unit, Secondary Storage Device, input Unit, Output Unit.

QUESTION 3
How many bits does the ASCII code use to represent each character? (1mark)

A. 32 bits
B. 8 bits
C. 7 bits
D. 16 bits

QUESTION 4
In computer architecture, input-output devices act as an interface between the machine and the user. What is the order of the input-output configuration.

A. Keyboard > Input terminal > Transmitter interface > input register > accumulator > output register > Receiver Interface > Output Terminal > Printer
B. Input terminal > Transmitter interface > input register > accumulator > output register > Receiver Interface > Output Terminal
C. Input terminal > Transmitter interface > input register > accumulator > output register > Receiver Interface > Mouse
D. Input terminal > Transmitter interface > input register > address register > output register > Receiver Interface > Output Terminal

QUESTION 5

An effective System Development Life Cycle (SDLC) should result in a high-quality system that meets customer expectations, reaches completion within time and cost evaluations, and works effectively and efficiently in the current and planned Information Technology infrastructure. What are the steps or activities used in SDLC to develop information systems?

A. Requirements gathering, analysis, Design, Implementation, Testing, Deployment.
B. Systems analysis, Design, Implementation, Testing, Deployment, maintenance.
C. Requirements gathering, analysis, Design, Implementation, Testing, Deployment, maintenance.
D. Requirements gathering, analysis, Implementation, Testing, Deployment, maintenance.

QUESTION 6

A System Analyst may perform several different tasks depending on the organisation. However, the most common responsibilities of a system analyst are:

A. Determining requirements, Designing System, Programming.
B. Determining requirements, Designing System, Programming, Testing, Maintenance.
C. Determining requirements, Designing System, Programming, Testing.
D. Designing System, Programming, Testing.

QUESTION 7

A Programming Language is as good as its compiler. What are compiler features to be considered when evaluating a compiler?

A. Translation. Execution, Optimisation.
B. Efficiency, Reliability, Portability, Conditional Compilation, Optimisation.
C. Translation. Execution, Optimisation, Space.
D. Efficiency, Reliability, Portability, Conditional Compilation.

QUESTION 8

The number of bits used to store each pixel's colour is called:

A. Colour depth.
B. Screen Resolution.
C. Bitmap graphics.
D. Vector graphics

QUESTION 9

Complex shapes and filled shapes are better stored as vector Images?

A. True
B. False
C. Neither
D. Both

QUESTION 10

We say two logic circuits are equivalent if:

A. both logic circuits give the same output for all possible inputs.
B. Both logic circuits have the same number of logic gates.
C. Both logic circuits use the same types of basic logic gates in combination.
D. all of the above.

QUESTION 11
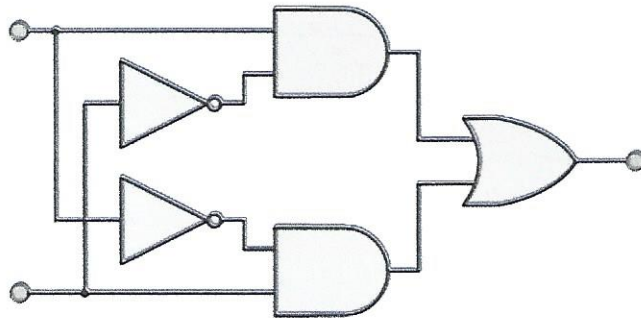
What basic logic gate is this logic circuit equivalent to?

A. OR.
B. AND
C. XOR
D. NAND

Part B: Short Answer Questions (4 + 4 + 3 + 4 + 4 + 6 = 25 marks)

QUESTION 1 (4 marks)
A program residing in the memory unit of a computer consists of a sequence of instructions. These instructions are executed by the processor by going through a cycle for each instruction. What does a cycle in a basic computer instruction consist of?

QUESTION 2 (4 marks)
Explain the difference between sprints and phases in SDLC documentation?

QUESTION 3 (3 marks)
What is meant by data, data representation and digitization?

QUESTION 4 (4 marks)
Several types of codes are employed by digital devices to represent character data. ASCII code and Unicode are the two most popular. In what way does ASCII code differ from Unicode?

QUESTION 5 (4 marks)
A use case diagram is a high-level representation of the system's functionality. It incorporates use cases, actors, and their relationships. Below is a snippet of a use case diagram of a simple website. It shows the include relationship and extend relationship of the use cases. Explain what the <<include>> and the <<extend>> relationship imply for the use cases in this diagram?
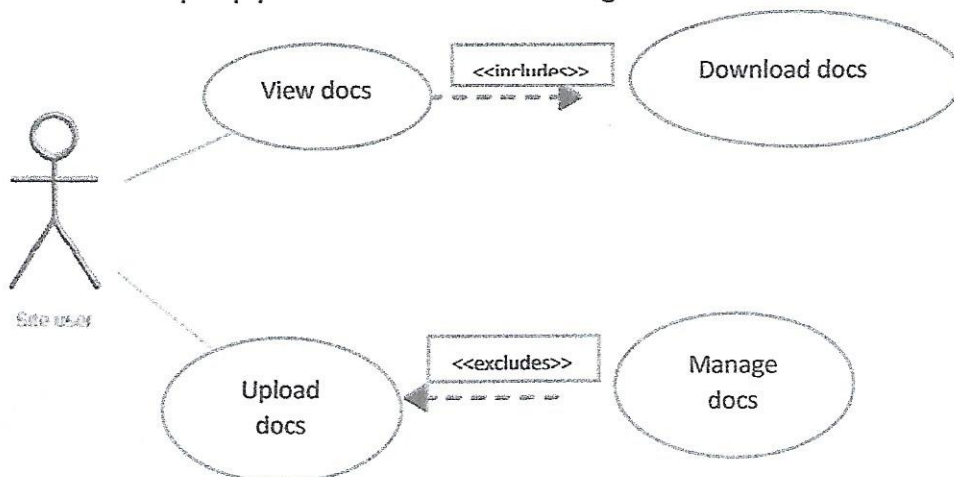
QUESTION 6 (6 marks)
information security revolves around the three key principles: confidentiality, integrity and availability (CIA). In general, how does an online messaging app (e.g. Gmail) utilize these three principles?

Part C: Working Out Questions (10 marks each = 40 marks).

QUESTION 1 (6 + 4 = 10 marks)
Convert the following (show working/steps).
A. ACDC hex to binary and octal number systems
B. Calculate the number of bits there are in:
  i. 3.5 GB?
  ii. 3000 KB?

QUESTION 2 (5 + 5 = 10 marks)
  A. If a 24 bit colour depth image is captured with a digital camera with a pixel dimension of 2,048 x 3,072. (show working).
    i. How many available colours for each pixel?
    ii. What is the size of the image in MB?
  B. What is the file size (in bytes) of a 6-inch x 8-inch black and white image captured at 100 dpi?

QUESTION 3 (10 marks)
Draw up a truth table and also draw in the logic circuit for the following Boolean expression:
A.~B + ~C.(A + B)

Note: (~ = not)

QUESTION 4 (10 marks)
Design an algorithm and draw a flowchart to represent a program to find the largest of two numbers entered in by the user.