

ICT
2023
YEAR 2 TO 4



KAPASA MAKASA UNIVERSITY

PAST EXAMINATION PAPERS

2023

DEPARTMENT OF ICT
SECOND YEAR ICT

COURSE CODES:

ICT 220 .

ICT 235 .

ICT 250

MA 210 .

ICT 230 .

ICT 220

PE 210 .



KAPASA MAKASA UNIVERSITY

DEPARTMENT OF ICT

ICT 250

Programming, Data Structures and Algorithms (C++)

2023 Early Session Examination

(3 hour 00 minutes)
(100 marks)

INSTRUCTIONS:

- They are two sections in this paper, answer them all in the answer booklet provided.
- Section A, choose, and write the best answer
- Section B, provide a brief statement as a response to the questions therein
- The use of calculators or any other computerized device (eg a phone) is not allowed.

Section A. Choose, and write the best answer

(30 marks)

1. Which of the following is the correct syntax to print the message in C++ language?
 - a. `cout <<"Hello world!";`
 - b. `Cout << Hello world! ;`
 - c. `Out <<"Hello world!;`
 - d. None of the above
2. C++ is a ____ type of language.
 - a. High-level Language
 - b. Low-level language
 - c. Middle-level language
 - d. None of the above
3. Which of the following is the correct identifier?
 - a. \$var_name
 - b. VAR_123
 - c. varname@
 - d. None of the above
4. Which language requires a programmer to know the instruction set of the computer?
 - a) High-Level Language
 - b) Low-Level Language
 - c) C++ Programming Language
 - d) An Algorithm
5. What are the two styles of comment in C++, C# and Java programming and their implication?
 - a) `/*.../*` for single line comment and `//` for multiline comments
 - b) `//.../*` for single line comment and `/**` for multiline comments
 - c) `*/.../*` for multiline comment and `//` for single line comments
 - d) `/*...*/` for multiline comment and `//` for is line comments
6. What name is used to refer to a loop that never ends?
 - a) While Loop
 - b) Recursive Loop
 - c) Infinite Loop
 - d) For Loop
7. Which of the sets of statements below will add 1 to x if x is positive and subtract 1 from x if x is negative but leave x alone if x is 0?
 - a. `If (x > 0) x++; else x--;`
 - b. `If (x > 0) x++; else if (x < 0) x--;`
 - c. `If (x == 0) x = 0; else x++; x--;`
 - d. `X++; x--;`
8. _____ is the process of finding errors and fixing them within a program.
 - a. Compiling
 - b. Executing
 - c. Debugging
 - d. Scanning
9. What is a class in C++ and Java programming?
 - a. A class is a blueprint from which individual objects are created. A class can contain fields and methods to describe the behaviour of an object.
 - b. Class is a special data type.
 - c. Class is used to allocate memory to a data type.
 - d. None of the above.

10. James currently runs a car rental dealership and wishes to write a program that allows the user to enter the temperature of the location they plan to visit and then recommend a car based on the data. Below is a summary of the program structure James is looking for.

Temp greater than 80 a Convertible should be selected.

Temp greater than 60 and less than 80 an SUV should be selected

Temp less than 60 a truck should be selected.

Jim has no trouble writing the code if the temperature is greater than 80 but gets stuck when he arrives at the second line of code which reads Temp greater than 60 and less than 80 an SUV should be selected. What type of operator is Jim needing to use within his code?

- a. &&
 - b. ||
 - c. !=
 - d. ==
11. A _____ array stores elements in tabular form, in row and column-based index (also known as matrix form), it is array of arrays.
- a. Tabular Array
 - b. Tensor Array
 - c. Multidimensional Array
 - d. Single Dimensional Array
12. The system defined data structures, which are the Built-in Data Type are known as Primitive Data Structures, and they include
- a) Integer, Float, Array, Queue
 - b) Integer, Float, Boolean, Void
 - c) Integer, Float, Boolean, String
 - d) Integer, Float, Boolean, Stack
13. Which predefined object of ostream class, is used to insert a new line characters and flushes the stream?
- a. endl
 - b. cin
 - c. cout
 - d. \d
14. Which of the following falls under the Boolean data type?
- a) Float
 - b) 22/7
 - c) 3.42
 - d) True
15. For inserting a new line in C++ program, which one of the following statements can be used?
- a. \n
 - b. \r
 - c. \a

16. None of the above Compare the following two if statements and select, which answer best, summarizes each line of code.

```
string name1, name2; int guess, answer;  
    if (name1.equals(name2))  
        if (guess == answer)
```

- a. The first if statement will compare the numerical value of the two names entered to see if they are equal and the second if statement will also compare the numerical values to see if they are equal
 - b. The first if statement will not work correctly due to string values being used, the second if statement will correctly compare the variables guess and answer
 - c. The first if statement will compare the two string values to see if they are equal and the second will compare the two integer values to see if they are equal.
 - d. The first if statement should read if (name1 == name2) in order to properly compare the values and the second if statement will compare the numerical values to see if they are equal.
- a.
17. Mary has implemented a While loop within her Java program. Assess the code statement below and select which answer best summarizes the output Mary will experience once the while statement is executed.

```
int count = 1; while (count <=25)  
{ printf (count);  
  Count = count -1;}  
printf ("Done");
```

- a. The while loop will execute 25 times and print the numbers 1 through 25 and finish with the printing of Done.
 - b. The while loop will execute 25 times and print the numbers 25 down to 1 and finish with the printing of Done
 - c. The while statement will not function correctly due to a missing semicolon (;) after the statement while (count
 - d. The while statement will execute by counting down from 1 until infinity and result in an infinite loop
18. What is the output of the given program?

```
#include<iostream>  
using namespace std;  
int main();  
{  
  int array[] = {10, 20, 30};  
  cout << -2[array];  
  return 0;  
}
```

- a. -15
- b. -30
- c. Compiler error
- d. Garbage value

19. Which one of the following represents the tab?

- a. \n
- b. \t
- c. \r
- d. None of the above

20. What will i and j be equal to after the code below is executed?

```
#include<iostream>
using namespace std;
int main();
{
    int i = 5;

    int j = i++;

    cout <<i<<" "<<j<<endl;
    return 0;
}
```

- a. i will equal 6, but j will equal 5.
- b. i will equal 5, but j will equal 6.
- c. i will equal 5, but j will equal 5.
- d. i will equal 6, but j will equal 7.

21. Study the source code below and answer which follow

```
#include <iostream>
using namespace std;
int main() {
    for (int i = 1; i <= 12; i++)
    {
        if (i == 6)
        {
            break;
        }
        cout<<i<<"\n";
    }
    system("pause");
    return 0;
}
```

What is the use of the syntax "break"?

- a) break a loop
- b) continue a loop
- c) pause a loop
- d) split a loop

22. Which of the following is not an advantage of using a low-level language?

- a. Makes more efficient use of primary memory.
- b. To perform a task very quickly.
- c. To enable the program to be run on multiple platforms.
- d. None of the above

23. What is the difference between equal to (==) and Assignment Operator (=)?
- (==) is an equality relational operator
 - (==) is used to assign a value to a variable
 - (=) is an inequality relational operator
 - (=) is used to assign a value to the right of the operator
24. June is considering adding a repetition statement within her C++ programming final project. June is unsure of the number of times each loop needs to execute. Analyze the conditional statements below and select which statement best fits the need identified by June within her programming.
- While loop
 - If-Else
 - For loop
 - Switch statement
25. Which of the following is the address operator?
- @
 - #
 - &
 - %
26. Which type of memory is used by an Array in C++ programming language?
- Contiguous
 - None-contiguous
 - Both A and B
 - Not mentioned
27. Which of the following refers to characteristics of an array?
- An array is a set of similar data items
 - An array is a set of distinct data items
 - An array can hold different types of datatypes
 - None of the above
28. If we stored five elements or data items in an array, what will be the index address or the index number of the array's last data item?
- 3
 - 5
 - 4
 - 88
29. How many types of the array are there in the C++ programming language?
- In the C++ programming language, there are three types of arrays
 - In the C++ programming language, there are four types of arrays
 - In the C++ programming language, there are two types of arrays
 - Both A and B
30. Which of the following is the correct syntax to add the header file in the C++ program?
- #include<userdefined>
 - #include "userdefined.h"
 - <include> "userdefined.h"
 - Both A and B

Section B. Provide a brief statement**(70 marks)**

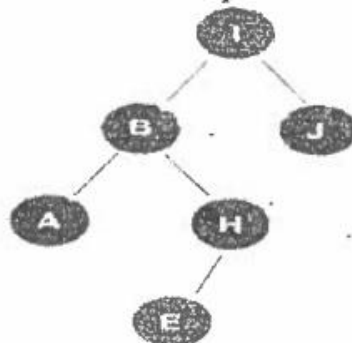
1. Write brief notes while providing definitions on the following: (5)
 - a. Difference between a higher-level language and machine language
 - b. cin, readln
 - c. Function
 - d. if...., else
 - e. do.... while
2. Write a program in C++ to traverse an array, arr[5]={ 10, 0, 20, 0, 30}, using a foreach loop. (5)
3. Puma Filling Station sells gasoline. Available is: regular at K26.25, unleaded at K 27.63, and super unleaded at K 29.50 per liter. You are required to write a program that prints a statement for a customer for the purchase. Remember, input consists of number of liters purchased and the kind of gasoline purchased (R, U, S, or for no purchase, N). (5)
4. Given two integers, A and B, A is a divisor of B if $B \% A = 0$. Write a complete program that reads two positive integers A and B and then, if A is a divisor of B, do the following: print A, print B, print the result of B divided by A. (5)
 - a. The following are among the data common basic terminologies, define and state each one's example (5)
 - i. Data
 - ii. Attribute
 - iii. Record
 - iv. File
 - v. Traceable
5. Among the commonly used data structures include Arrays, Linked List, Stacks Queues, Trees and Graphs. Define (5)
 - a. an array
 - b. a Linked List
 - c. a Stack
 - d. a Queue
 - e. a Graph
6. A public access modifier doesn't put any restrictions on access, the members, and the methods within a program. Write a full source code to elaborate on your understanding of a public access modifier. (5)
7. Given P, and M as your variables, which may stand for names. P has in his bank account 500, M has 800. Develop a program to swap the values for P and M, without using a third variable or a temporary variable. (5)
8. In object-oriented programming: (5)
 - a. an object is considered to have about three characteristics, list them.
 - b. What are the differences between:
 - i. polymorphism and inheritance
 - ii. an object and a class
9. List any five (5) characteristics of a good algorithm (5)

10. To calculate the complexity of an algorithm, the commonly used asymptotic notations are Big O(O) Notation, Omega (Ω) Notation, and Theta(Θ) Notation. Explain what the Big O(O) Notation, Omega (Ω) Notation, and the Theta(Θ) Notation are. (5)
11. State the variables used in the algorithm, and calculate the space complexity of the same algorithm: (5)

Step-1 Start
 Step-2 Input Two Numbers Say NUM1, NUM2
 Step-3 Display Before Swap Values NUM1, NUM2
 Step-4 TEMP = NUM1
 Step-5 NUM1 = NUM2
 Step-6 NUM2 = TEMP
 Step-7 Display After Swap Values NUM1, NUM2
 Step-8 Stop

Choose any three (3) from the questions below:

12. Perform the following activities:
- Calculate the balancing factor of the tree below
 - Balance the AVL tree
 - Calculate the depth of the balanced tree.



13. The following algorithm illustrates the principle of a recursive function.

```

function power(x, n) {
  if (n == 1) {
    return x;
  }
  else {
    return x * power(x, n - 1);
  }
}
display(power(2, 4)); // 16
  
```

Write a simple C++ to show how that algorithm can be implemented: (5)

14. In divide and conquer approach, the problem in hand, is divided into smaller sub-problems and then each problem is solved independently. (5)
- Discuss the three-step processes of divide-and-conquer approach
 - Give any two examples for divide-and-conquer approaches

15. Given below is a function for bubble sort, explain its working principle:

(5)

```
void bubbleSort(int array[], int size) {
    for (int step = 0; step < size - 1; ++step) {
        int swapped = 0;
        for (int i = 0; i < size - step - 1; ++i) {
            if (array[i] > array[i + 1]) {
                int temp = array[i];
                array[i] = array[i + 1];
                array[i + 1] = temp;
                swapped = 1;
            }
        }
        if (swapped == 0)
            break;
    }
}
```

16. Given is an array of 8 elements, int arr[8] = {42,20,17,13,28,14,23,15}. Using insertion sort, illustrate how the process is done, using the table below. The last column has been down for you.

(5)

	i=1	2	3	4	5	6	i=7
42							13
20							14
17							15
13							17
28							20
14							23
23							28
15							42



KAPASA MAKASA UNIVERSITY
DEPARTMENT OF EDUCATION AND ODL.
2023 FINAL PE210 EXAMINATION
PRINCIPLES OF EDUCATION

INSTRUCTIONS

1. TIME ALLOWED is only THREE (3) HOURS
2. This paper contains 7 questions you are required to attempt FIVE (5)
3. All answers should be couched in Standard English
4. Ensure that you write your SIN, on your answer booklet.

QUESTION ONE

- A. List 6 Agents of socialization for Adolescents or teenagers.
- B. Explain how each of these can influence behavior that leads to shaping of personality.

QUESTION TWO

Write a 600 word essay on common educational problems most African countries faced after independence.

QUESTION THREE

Write detailed notes on cognitive and behavioral theories of education as postulated by scholars that you learnt about during the year.

QUESTION FOUR

Explain the five (5) stages of motivation postulated by Abraham Maslow.

QUESTION FIVE

Write a 600 word essay on how and why the teaching profession has lost its past glory; suggest how this can be regained.

QUESTION SIX

Argue in favor of including sociology curriculum.

QUESTION SEVEN

Prepare a two page grade 9 test paper in computer studies.

END OF EXAM

GOD BLESS YOU



KAPASA MAKASA UNIVERSITY

DEPARTMENT OF INFORMATION & COMMUNICATION TECHNOLOGY

2023 SESSIONAL EXAMINATIONS

ICT220 - Computer Organization and Architecture

DURATION: 3 HOURS

TOTAL MARKS: 100

INSTRUCTIONS:

- (i) **NO EXTRA** materials required for this exam apart from given Question Paper and Answer Booklet.
- (ii) This Exam consists of **FIVE (5)** Questions; **THREE (3)** in **Section A** and **TWO (2)** in **Section B**.
- (iii) Attempt to answer **ALL** Questions in **BOTH** Sections.
- (iv) **ALL** Questions carry equal marks as indicated.
- (v) **DO NOT TURN THIS PAGE UNTIL TOLD TO DO SO.**

Proverbs 3 vs 5 – 7

SECTION A: FUNDAMENTAL CONCEPTS AND COMPREHENSION**[60 Marks]****QUESTION ONE****{20 marks}**

- a) With regard to Computer Memory Structure, distinguish between memory and storage. [4]
- b) Explain the main factors that characterizes memory with regard to memory hierarchy? [4]
- c) Why is memory referred to by so many names? Explain with specific examples. [4]
- d) A microprocessor has a 32-bit address line. The size of the memory contents of each address is 8 bits. The memory space is defined as the collection of memory position the processor can address.
- (i) What is the address range (lowest to highest, in hexadecimal) of the memory space for this microprocessor? [4]
- (ii) What is the size (in bytes, KB, or MB) of the memory space? [4]

QUESTION TWO**{20 marks}**

- a) With the aid of well labelled diagram, state and explain the **computer system buses**. [6]
- b) Study and complete the table given below with appropriate information regarding the generation of computers. [6]

GENERATION	TECHNOLOGY (SWITCHING DEVICE)	PROGRAMMING LANGUAGE
FIRST		
SECOND		
THIRD		
FOURTH		
FIFTH		

- c) High-level or low-level languages can be used when writing a computer program.
State **two** advantages of using a high-level language (HLL) and **two** advantages of using a low-level language (LLL). [4]
- d) What is a semiconductor device and state **three (3)** materials it is made from? [4]

QUESTION THREE**{20 marks}**

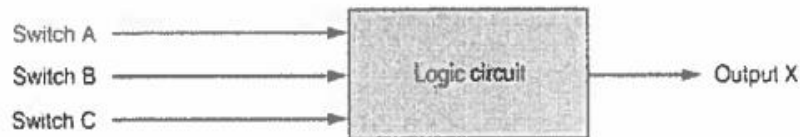
- a) State and explain **six (6)** main attributes of a computer. [4]
- b) With the aid of Logic Circuit and Truth Table, state and explain **De Morgan's Theorems**. [8]
- c) Compare and contrast Combinational and Sequential circuits. [2]
- d) With regard to Digital Circuits:
 - (i) Define the **Modulus of a Counter**. [2]
 - (ii) Compute the maximum possible modulus of a **6-bit Counter**. [4]

SECTION B: CONCEPTS AND APPLICATIONS**[40 Marks]****QUESTION FOUR****{20 marks}**

- a) A manufacturer of aeroplane engines assigns a denary identification number (ID) to each engine. One engine has the ID: **0431**.
 - (i) Convert this denary number to a 12-bit binary format. [3]
 - (ii) Show how this number would be represented in hexadecimal. [2]
- b) The current status of the engine is sent to a computer in the aeroplane. Each piece of data collected is **8 bytes** in size. Data collection occurs every **30 seconds**. Calculate the number of kilobytes that would be needed to store the data collected during a **10-hour** flight. Show your working. [5]
- c) At the end of the flight, all of the data are sent to the aeroplane engine manufacturer using the Internet. The computer in the aeroplane has a **MAC address** and an **IP address**. State and explain what is meant by the two terms.
 - (i) MAC Address [3]
 - (ii) IP Address [3]
- d) When sending this data, security is very important. Data are sent over the Internet using Transport Layer Security (**TLS**) protocol. Name the two layers that make up TLS. [4]

QUESTION FIVE**{20 marks}**

Three switches, **A**, **B** and **C**, each send values of **0** or **1** to a logic circuit. Value **X** is output from the logic circuit.



Output X has a value of **1** depending on the following conditions:

Switch A sends value **1** **AND** **Switch B** sends value **0**

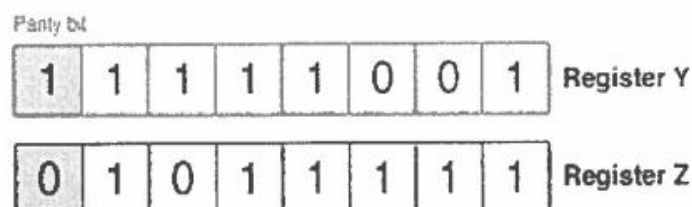
OR

Switch B sends value **1** **AND** **Switch C** sends value **0**

- Write a logic expression to represent the conditions given above. [4]
- Draw a logic circuit to represent the conditions given above. [5]
- Construct the truth table for the conditions given above. [4]
- A microprocessor regularly samples the output, **X**. Each sample value is stored in an 8-bit register as shown below. One bit of this register is reserved as a **parity bit**.

Five consecutive output values of **1** indicate a fault condition.

Identify which of the following registers shows a fault condition and show proof for your choice? [2]



- When eight bytes of data have been collected, they are transmitted to a computer 100km away. Parity checks are carried out to identify if the data has been transmitted correctly. The system uses **even parity** and **column 1** is the **parity bit**. The eight bytes of data are sent together with a ninth parity byte:

	parity bit	column 2	column 3	column 4	column 5	column 6	column 7	column 8
byte 1	1	0	0	0	0	1	0	0
byte 2	1	1	1	1	0	0	1	1
byte 3	0	1	0	0	1	0	0	0
byte 4	0	1	1	1	0	0	0	1
byte 5	1	0	0	0	1	1	1	1
byte 6	0	0	0	0	0	0	0	0
byte 7	1	1	1	0	1	0	0	0
byte 8	1	0	0	0	1	1	1	0
parity byte	1	0	1	1	0	1	1	1

- (i) Identify which of the eight bytes contains an error? [1]
- (ii) Identify which column contains an error? [1]
- (iii) The incorrect bit is indicated where the byte number and column cross. Give the corrected byte (8-bits). [1]
- (iv) Calculate the denary value of the corrected byte in part (iii) above. [1]
- (v) Considering the fault condition given in part (c), explain why it is very important that the incorrect bit is located and corrected. [1]



KAPASA MAKASA UNIVERSITY
COMPUTER SCIENCE DEPARTMENT

SOFTWARE ENGINEERING

ICT WITH EDUCATION
ICT 230

FINAL EXAM

Instructions

- i. Time allowed: **3 hours**, Total Marks allocated to each question: **20 Marks**
- ii. There **SIX Questions** in this Paper Answer **ANY FIVE** questions.
- iii. The marks allocated on each question give a clue as to the depth of your answer.
- iv. **Please, where appropriate, use diagrams and/or examples**

QUESTION ONE

- a) As a software engineer, why is it necessary to consider the confidentiality of our clients?

2 Marks

- b) Before an organization invests in a project, feasibility studies are usually conducted. The main areas of focus are (1) technical feasibility, economic and financial feasibility, and operational feasibility.

- i. State the reasons to explain why technical feasibility is important?

5Marks

- ii. State the reasons to explain why economic and financial feasibility is conducted?

5 Marks

- c) State any four (4) things that can be done to projects that fail feasibility test?

4 Marks

- d) State any two (2) reasons why we need to apply standards when approving the feasibility study?

4 Marks

QUESTION TWO

- a) Why projects are initiated?

2 Marks

- b) List and explain four (4) sources of project requests

8Marks

- c) what are criteria used in selecting system projects

6 Marks

- d) There are various kinds of committees that select projects. Name any three.

4 Marks

QUESTION THREE

- a) Based on its investigation, the project team can make three possible recommendations. The three Possible recommendations that the project team can make are: **3 Marks**
- b) What are three main categories of how-to questions that the software engineer considers in design phase? **3 Marks**
- c) Name Four types of system Testing and why do we test systems **9 Marks**
- d) What is the main reasons for evaluation during system maintenance? **5 Marks**

QUESTION FOUR

- a) Name any six core processes required in the development of any new application: **6 Marks**
- b) Draw well labeled diagram and explain each stages of the traditional system development life cycle (waterfall model) **10 Marks**
- c) Nam three main issues that the functional requirements report should outline: **4 Marks**

QUESTION FIVE

- a) In general, umbrella activities are applied throughout a software project and help a software team manage and control progress, quality, change, and risk. Name and explain five typical umbrella activities. **6 Marks**
- b) i. What is the difference between closed and open systems also give one example of each system? **4 Marks**
- ii. Draw well labeled diagram of Closed and Open system. **4 Marks**
- iii) list explain three types of information system **6 Marks**

QUESTION SIX

- a) Name three advantages and limitation of waterfall model? **6 Marks**
- b) what are strengths, weaknesses, and limitations of using development methodologies? **6 Marks**
- c) What is the significance of the closed system concept in software engineering? **4 Marks**
- d) What is the difference between deterministic systems and self-organising systems? **4 Marks**

END OF EXAM



KAPASA MAKASA UNIVERSITY

SESSIONAL EXAMINATION: 2023 ACADEMIC YEAR
COURSE NAME: ENGINEERING MATHEMATICS
COURSE CODE: MA210

VENUE: UPPER LIBRARY
YEAR OF STUDY: 2

October 27, 2023

Duration: 3 hours

Instruction to Candidate:

1. There are seven (7) questions in this paper Attempt **any five**
2. All questions carry equal marks
3. Non-programmable calculator can be used
4. Show all necessary working to attract full marks

1. (a) Given that $f(x) = x + x^2$ for $-\pi < x < \pi$. [6]
Find the Fourier series expression of $f(x)$ and

i. Deduce that [6]

$$\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \sum_{n=1}^{\infty} \frac{1}{n^2}$$

- ii. Identify the series in (i) and state whether it is convergent or divergent (give a reason to support your answer) [3]

- (b) Find the point to which the origin is to be shifted so as to remove the first degree terms from the equation [5]

$$4x^2 + 9y^2 - 8x + 36y + 4 = 0$$

2. (a) Let us take it that a particular equation is translated to and rotated at $(3, 4)$ and $\theta = 45^\circ$ [10]

$$x^2 + y^2 + 7\sqrt{2}x + \sqrt{2}y - 11 = 0$$

- (b) By limit comparison test show that [5]

$$\sum_{n=1}^{\infty} \frac{\sqrt[3]{3n^2 + 1}}{\sqrt[4]{4n^3 + 2n + 7}} = \frac{3^{\frac{1}{3}}}{\sqrt{2}}$$

and state why you think the series is convergent or not convergent.

- (c) Determine the radius and the interval of convergence for the function $f(x) = \frac{3}{x^2 - x - 2}$ by representing the function as a power series. [5]

3. (a) Find the exact solution for the partial differential equation $y'' = 4(y - x)$ given $0 < x < 1$, $y(0) = 0$, $Y(1) = 2$ [10]

- i. Discretize your answer in (a) by taking $h = 0.25$ and find the values of Y at the 4 nodes [4]

- (b) You are invited by a construction company as a specialist in applied mathematics. They want to construct a semi-elliptical archway over a one-way road with height of 10 feet and width of 40 feet. Can a truck with width of 10 feet and a height of 9 feet, clear the opening of the archway? What is your justified advice? [3]

(c) Suppose that $\frac{(x-2)^2}{16} + \frac{(y+3)^2}{9} = 1$.

i. Find the foci [1]

ii. Evaluate the coordinates for the major and minor axis. [1]

iii. Determine the x and the y intercepts [1]

4. (a) Solve $\frac{dy}{dx} + \frac{1}{x}y = xy^2$ [10]

(b) When the axes are rotated through an angle 45° , the transformed equation of a curve is [6]

$$17x'^2 - 16x'y' + 17y'^2 = 225,$$

Find the original equation of the curve.

(c) Determine the first three terms of the Taylor series expansion of $f(x) = \sqrt[3]{x}$ [8]

i. Use the series in (c) to calculate $\sqrt[3]{10}$ [2]

5. (a) Given the line $2x + 3y = 8$, translated to $(1, 2)$ and rotated at $\theta = 30^\circ$. Find the transformed equation. [4]

(b) Evaluate $\int_0^{0.4} x \ln(1+x) dx$ using Mclaurin theorem. Correct to 3 decimal places [6]

(c) Determine the Fourier series for the full wave rectified sine wave function $i = 5 \sin \frac{\theta}{2}$ which is a periodic function of period 2π [10]

6. (a) A semi elliptical archway over a one way road has a height of 20 feet and with width of 50 feet. Your truck has a width of 10 feet and a height of 14 feet. will your truck clear the opening of the archway? [4]

(b) Test the following series for convergence by using D'Alembert's Ratio Test

i. [4]

$$1 + \frac{2}{5}x + \frac{6}{9}x^2 + \frac{14}{17}x^3 + \dots + \frac{2^n - 2}{2^n + 1}x^{n-1} + \dots$$

(c) Test the series [3]

$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{n^3 + 1}$$

(d) Find the curve which satisfies the equation the equation $xy = (1 + x^2) \frac{dy}{dx}$ and passes through the point $(0, 1)$ [9]

7. (a) Find the angle through which the axes are to be rotated so as to remove the xy term in the equation

$$x^2 + 4xy + y^2 - 2x + 2y - 6 = 0$$

[6]

- (b) Find the radius of convergence and interval of convergence for the following series

[4]

$$\sum_{n=0}^{\infty} \frac{n(x+2)^n}{3^{n+1}}$$

- (c) Determine the Fourier series defined by

[10]

$$f(x) = \begin{cases} 1 - x, & -\pi < x < 0 \\ 1 + x, & 0 < x < \pi \end{cases}$$

which is periodic of period 2π



KAPASA MAKASA UNIVERSITY

DEPARTMENT OF INFORMATION & COMMUNICATION TECHNOLOGY

2023 SESSIONAL EXAMINATIONS

ICT220 - Computer Organization and Architecture

DURATION: 3 HOURS

TOTAL MARKS: 100

INSTRUCTIONS:

- (i) **NO EXTRA** materials required for this exam apart from given Question Paper and Answer Booklet.
- (ii) This Exam consists of **FIVE (5)** Questions; **THREE (3)** in **Section A** and **TWO (2)** in **Section B**.
- (iii) Attempt to answer **ALL** Questions in **BOTH** Sections.
- (iv) **ALL** Questions carry equal marks as indicated.
- (v) **DO NOT TURN THIS PAGE UNTIL TOLD TO DO SO.**

Proverbs 3 vs 5 – 7

SECTION A: FUNDAMENTAL CONCEPTS AND COMPREHENSION**{60 Marks}****QUESTION ONE****{20 marks}**

- a) With regard to Computer Memory Structure, distinguish between memory and storage. [4]
- b) Explain the main factors that characterizes memory with regard to memory hierarchy? [4]
- c) Why is memory referred to by so many names? Explain with specific examples. [4]
- d) A microprocessor has a 32-bit address line. The size of the memory contents of each address is 8 bits. The memory space is defined as the collection of memory position the processor can address.
 - (i) What is the address range (lowest to highest, in hexadecimal) of the memory space for this microprocessor? [4]
 - (ii) What is the size (in bytes, KB, or MB) of the memory space? [4]

QUESTION TWO**{20 marks}**

- a) With the aid of well labelled diagram, state and explain the **computer system buses**. [6]
- b) Study and complete the table given below with appropriate information regarding the generation of computers. [6]

GENERATION	TECHNOLOGY (SWITCHING DEVICE)	PROGRAMMING LANGUAGE
FIRST		
SECOND		
THIRD		
FOURTH		
FIFTH		

- c) High-level or low-level languages can be used when writing a computer program.
State **two** advantages of using a high-level language (HLL) and **two** advantages of using a low-level language (LLL). [4]
- d) What is a semiconductor device and state **three (3)** materials it is made from? [4]

QUESTION THREE**{20 marks}**

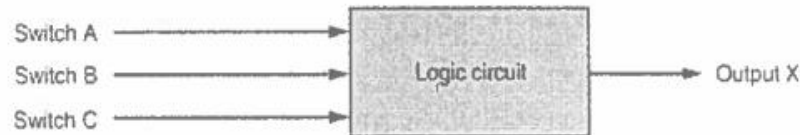
- a) State and explain **six (6)** main attributes of a computer. [4]
- b) With the aid of Logic Circuit and Truth Table, state and explain **De Morgan's Theorems**. [8]
- c) Compare and contrast Combinational and Sequential circuits. [2]
- d) With regard to Digital Circuits:
 - (i) Define the **Modulus of a Counter**. [2]
 - (ii) Compute the maximum possible modulus of a **6-bit Counter**. [4]

SECTION B: CONCEPTS AND APPLICATIONS**[40 Marks]****QUESTION FOUR****{20 marks}**

- a) A manufacturer of aeroplane engines assigns a denary identification number (ID) to each engine. One engine has the ID: **0431**.
 - (i) Convert this denary number to a 12-bit binary format. [3]
 - (ii) Show how this number would be represented in hexadecimal. [2]
- b) The current status of the engine is sent to a computer in the aeroplane. Each piece of data collected is **8 bytes** in size. Data collection occurs every **30 seconds**. Calculate the number of kilobytes that would be needed to store the data collected during a **10-hour** flight. Show your working. [5]
- c) At the end of the flight, all of the data are sent to the aeroplane engine manufacturer using the Internet. The computer in the aeroplane has a **MAC address** and an **IP address**. State and explain what is meant by the two terms.
 - (i) MAC Address [3]
 - (ii) IP Address [3]
- d) When sending this data, security is very important. Data are sent over the Internet using Transport Layer Security (TLS) protocol. Name the two layers that make up TLS. [4]

QUESTION FIVE**{20 marks}**

Three switches, **A**, **B** and **C**, each send values of **0** or **1** to a logic circuit. Value **X** is output from the logic circuit.



Output X has a value of **1** depending on the following conditions:

Switch A sends value **1** **AND** **Switch B** sends value **0**

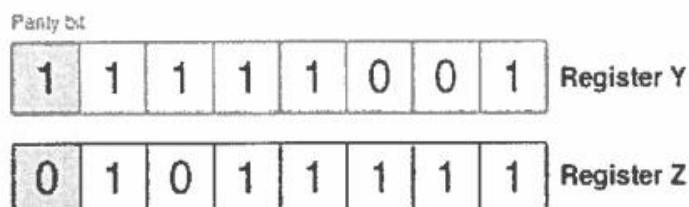
OR

Switch B sends value **1** **AND** **Switch C** sends value **0**

- Write a logic expression to represent the conditions given above. [4]
- Draw a logic circuit to represent the conditions given above. [5]
- Construct the truth table for the conditions given above. [4]
- A microprocessor regularly samples the output, **X**. Each sample value is stored in an 8-bit register as shown below. One bit of this register is reserved as a **parity bit**.

Five consecutive output values of **1** indicate a fault condition.

Identify which of the following registers shows a fault condition and show proof for your choice? [2]



- When eight bytes of data have been collected, they are transmitted to a computer 100km away. Parity checks are carried out to identify if the data has been transmitted correctly. The system uses **even parity** and **column 1** is the **parity bit**. The eight bytes of data are sent together with a ninth parity byte:

	parity bit	column 2	column 3	column 4	column 5	column 6	column 7	column 8
byte 1	1	0	0	0	0	1	0	0
byte 2	1	1	1	1	0	0	1	1
byte 3	0	1	0	0	1	0	0	0
byte 4	0	1	1	1	0	0	0	1
byte 5	1	0	0	0	1	1	1	1
byte 6	0	0	0	0	0	0	0	0
byte 7	1	1	1	0	1	0	0	0
byte 8	1	0	0	0	1	1	1	0
parity byte	1	0	1	1	0	1	1	1

- (i) Identify which of the eight bytes contains an error? [1]
- (ii) Identify which column contains an error? [1]
- (iii) The incorrect bit is indicated where the byte number and column cross. Give the corrected byte (8-bits). [1]
- (iv) Calculate the denary value of the corrected byte in part (iii) above. [1]
- (v) Considering the fault condition given in part (c), explain why it is very important that the incorrect bit is located and corrected. [1]



**THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY CAMPUS
DEPARTMENT OF ICT**

**ICT 250
DATA STRUCTURES, ALGORITHMS AND PROGRAMMING
(PROGRAMMING C++)**

Supplementary examination 2020

SIN:

Duration: 3 Hours

INSTRUCTIONS:

- They are three sections in this paper, answer all.
- Section A is multi-choice type, choose the best answer
- Section B, write in the spaces provided.
- Section C, answer using a separate booklet provided.
- Where you are required to write a program, make a source code that will make the program to be executable.
- Cell phones should not be brought into the examination room.

SECTION	MARKS (100)
A	
B	
C	
TOTAL	

SECTION A *Multiple Choice Questions, Choose the Best Answer* **(20)**

1. Software that translates and executes a high-level language program one line at a time is known as?
 - a) A compiler
 - b) An interpreter
 - c) An assembler
 - d) An executor
2. What data type can be used to restrictively hold a number like 3.142857142857 in a program?
 - a) Float
 - b) Double
 - c) String
 - d) Integer
3. What are the two styles of comment in C++ and Java programming and their implication?
 - a) /*.../* for single line comment and // for multiline comments
 - b) //.../* for single line comment and /** for multiline comments
 - c) /*.../* for multiline comment and // for single line comments
 - d) /*...*/ for multiline comment and // for is line comments
4. A user-defined header file for input and out libraries is included by the following statement.
 - a) #include "iostream.h"
 - b) #include <iostream.h>
 - c) #include <iostream>
 - d) #include iostream.h
5. What is a class in C++ programming?
 - a) A class is a blueprint from which individual objects are created. A class can contain fields and methods to describe the behaviour of an object.
 - b) Class is a special data type.
 - c) Class is used to allocate memory to a data type.
 - d) None of the above.
6. Which of the following falls under the Boolean data type?
 - a) Float
 - b) 22/7
 - c) 3.42
 - d) True
7. What will i and j be equal to after the piece of code below is executed?


```
int i = 5;
int j = i++;
```

 - a) i will equal 6, but j will equal 5.
 - b) i will equal 5, but j will equal 6.
 - c) i will equal 5, but j will equal 5.
 - d) i will equal 6, but j will equal 7.

8. What is a Constant in programming?
- An expression that has a fixed value
 - An expression that is declared
 - A variable with a value
 - A variable which will not change
9. Which of the following are the correct examples of the various Compound Assignment Operators in C++ ?
- `+=^, -=, *=, /=`
 - `>>=, <<=, &=`
 - `<>=, <<=, &=`
 - `%#, >>=, <<=`
 - `+=, -=, *=, \=`
10. What is the results of running the code below:

```
#include <iostream>
using namespace std;
int main()
{
    int x;
    if (x < 0)
        cout << "X is negative";
    else
        cout << "X is non-negative";
}
```

- Error: variable x is not initialized
 - X is negative
 - X is non-negative
 - Error: variable x is not declared
11. An array is index-based, the third element of the array is stored at the ____th index
- 0
 - 1
 - 2
 - 3
12. What are the two examples of Greedy algorithms?
- Merge sort and Kruskal's Minimal Spanning Tree
 - Quicksort and Knapsack Problem
 - Knapsack Problem and Dijkstra's Minimal Spanning Tree
 - None of the above combination
13. A ____ is a set of step-by-step instructions that directs the computer to do the tasks you want it to do and produce the results you want.
- Procedure
 - Algorithm
 - Program
 - Data

14. What type of an array is?

`int Arr [] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}`

- a) list
- b) Single dimensional array
- c) Dual dimensional array
- d) Multidimensional arrays

15. What name is given to a data structure which is a first-in, first-out, or FIFO structure

- a) Tree
- b) Array
- c) Queue
- d) Stack

16. The system defined data structures, which are the Built-in Data Type is known as Primitive Data Structures, and they include:

- a) Integer, Float, Array,
- b) Integer, Float, Byte
- c) Integer, Float, Queue
- d) Boolean, String, Integer

17. The last item contains link of the first element as next and the first element has a link to the last element as previous

- a) Doubly Linked List
- b) Circular Linked List
- c) Singly-linked list
- d) Binary search tree

18. The Θ notation in asymptotic evaluation represents

- a) Worst case
- b) Base case
- c) Average case
- d) None of the above

19. Visiting left node after visiting a root node and right sub-trees are called

- a) Post-order Traversal
- b) Pre-order Traversal
- c) In-order Traversal
- d) Search Traversal

20. In a max-heap:

- a) parent nodes have values less than or equal to their children
- b) parent nodes have values greater than or equal to their children
- c) both statements are true
- d) parent nodes always have values equal to their children

SECTION B*Use a word or a brief statement to answer in this section***(40)**

1. What term is used extensively in programming, to mean detecting, locating, and correcting mistakes in a source code? (1)
.....
2. A variable is a space holder for the value stored in the memory and this value can be used in the application. For Example, `int age = 25`, where age is a variable, and int is (1)
.....
3. What do we call a program that convert each instruction of a software (ie source code) into machine code one statement at a time, and executes them without generating intermediate object code? (1)
.....
4. Below are the C++ Programming Languages common operators and precedence, provide their descriptions (the first one have been done for you): (4)

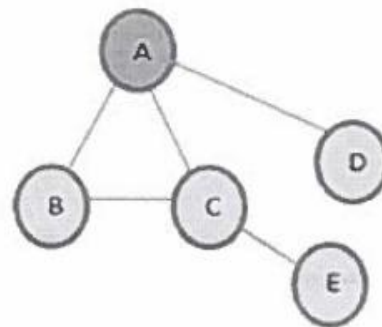
	Operator	Description
	<code><=</code>	Less than or equal to
i.	<code>&&</code>	
ii.	<code>>=</code>	
iii.	<code>!=</code>	
iv.	<code>-- Exp</code>	

5. What operation can be performed on a stack to (8)
 - a. checks if stack is full
 - b. checks if stack is empty
 - c. adds an item to stack:
 - d. gives value of top item without removing it:
6. Algorithms are analyzed to find and implement the best suitable available algorithm; they are analyzed generally based on which factors? (2)
.....
7. Provide the name of operation that perform the following actions on a stack: (4)
 - a) adds an item to stack:
 - b) gives value of top item without removing it:
8. What do u call a data structure which follows First-In-Last-Out principle, where one end is always used to insert data (enqueue) and also to remove data (1)
.....
9. What do you call a function that calls another function and that function calls the calling function in C++ programming, for example: function A calls function B and Function B calls function A? (1)
.....

10. What name is given to a sorting algorithm that repeatedly breaks down a list into several sub-lists until each sub-list consists of a single element and merges those sub-lists in a manner that results into a sorted list?
(1)
11. What name is given to a theoretical analysis of an algorithm, where the efficiency of an algorithm is measured based on the assumption of all factors of an algorithm?
(1)
12. AVL tree is a height balancing binary search tree where each node is associated with a balance factor, write down the equation for calculating the balancing factor. (2)
13. In programming, any entity that has state and behavior is known as an _____. For example a chair, pen, keyboard, bike, etc. It can be physical or logical. (1)
14. When one object acquires all the properties and behaviors of a parent object, it is known as _____. It provides code reusability. It is used to achieve runtime polymorphism. (1)
15. Below is a Fibonacci series of a number, complete the source code for the Fibonacci function, by providing the missing codes. (4)

```
# _____<iostream>
using namespace std;
int fib_r(int s)
{
    if (s == 1 || s == 2)
        return 1;
    else
        return (fib_r(s - 1) + fib_r(_____));
    // fib(n-1) + fib(n-2) for adding successive terms
}
int main()
{
    int k, n;
    cout << "Enter number of n terms: ";
    cin >> n;
    cout << "calculated fibonacci numbers are" << endl;
    for (k = 1; k <= n; _____)
        cout << fib_r(k) << endl;
    return _____;
}
```

16. A graph can also be defined as a pair of vertices, connected by the edges. From the diagram below, provide all the: (3)



b. Vertices

c. Edges

d. The longest path from D to E

12. Below is an array insertion source code, complete it by filling in the blanks (4)

```

#include <iostream>
using _____ std;
int main() {
    int item = 10, k = 3, n = 5;
    int LA[] = { 1,3,5,7,8 }, i = 0, j = n;
    printf("The original array elements are :\n");
    for (i = 0; i < n; i++) {
        printf("LA[%d] = %d \n", i, LA[i]);
    }
    n = _____;
    while (j >= k) {
        LA[j + 1] = LA[j];
        _____ = j - 1;
    }
    LA[k] = item;
    printf("The array elements after insertion :\n");
    for (i = 0; _____ < n; i++) {
        printf("LA[%d] = %d \n", i, LA[i]);
    }
}

```

SECTION C (Answer all question in this section, use the answer booklet provided) (40)

1. The code below assigns elements to a specific location in the array, answer the questions which follow

```
#include <iostream>
using namespace std;
int main()
{
    int a[5];
    a[0] = 10;
    a[1] = 20;
    a[2] = 70;
    a[3] = 40;
    a[4] = 50;
    for (int i = 0; i < 5; i++) //traversing array
    {
        cout << a[i] << "\n";
    }
    return 0;
}
```

- What is the output of executing the java source code? [1]
 - If `a[4]=50` was replaced with `a[5]=50`, what will be the value of 'length' [1]
 - Will the program result change if '`System.out.println(a[i]);`' is changed to '`System.out.print(a[i]);`'? [1]
 - What is the result of '`cout<<a[i];`', if `(int i = 0; i < 5; i++)` is replaced by `(int i = 2; i < 5; i++)`? [2]
 - What is the use of the value inclosed in [], for `a[0]=10`, or `a[4]=50` to an array initialization? [1]
- Provide an algorithm as a solution to the problem in form of a flowchart for the recursive Tower of Hanoi problem. (3)
 - Provide an algorithm in form of pseudocode for Fibonacci series. (3)
 - Write a source code in C++ to add the values of an array, given that the array has the following values: 8, 5, 0, 8, 2, 8. (3)
 - Write a C++ source code to swap three variables, given their values as 2, 3 and 5. (3)
 - Provide an algorithm in form of pseudocode for implementing a quicksort.
 - You are required to write a program to do the following: [5]
 - Enter two courses, and marks for the four courses,
 - Check the pass mark for all four courses.
 - If one has passed all four courses, display proceed,
 - if passed in two courses, display, proceed and repeat the failed courses,
 - if failed in three courses, display exclude from the programme.

THE COPPERBELT UNIVERSITY

ICT235: DATABASE SYSTEMS

Supplementary/Deferred Exam

February 2023

Duration: 3 Hours

ANSWER FOUR QUESTIONS ONLY**Question 1**

- a) What is database normalization and in what ways can it be used to support database design? (7 marks)
- b) How would you embed database security at the following development stages in order to reduce the risk of security breaches?
 - i) Database requirements (3 marks)
 - ii) Database design. (3 marks)
- c) Briefly explain the threats to online databases and detail how you would mitigate against the identified risks. (12 marks)

Question 2

- a) Give a definition of a database transaction. (2 marks)
- b) Describe Transaction Recovery and Transaction Atomicity and explain their importance in the processing of database transactions. (7 marks)
- c) The terms Authorisation and Authentication are associated with techniques that maintain database security and integrity.
Explain the difference between these terms and outline the basic techniques that they use. (8 marks)
- d) Explain what is meant by Auditing in a DBMS, discuss why it is important and outline a strategy or a technique that is used to carry it out. (8 marks)

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Question 3

a)

i) Define the **FOUR** terms that form the ACID acronym which defines the correct behaviour of transactions in a relational database. (8 marks)

ii) Which **ONE** of these four terms is most likely to affect the throughput of transactions when multiple users access the database? Justify your answer. (2 marks)

b) A travel agent has a late booking service in which customers can book available seats on flights a day or so before the departure date. Sales are brisk as there are many bargain hunting customers trying to get seats at discounted prices. Consider the following transcript of a telephone conversation between a ticket agent and a customer:

Study the above transcript and then answer the following:

Customer: "I'd like two tickets to Honolulu for January 15."

Ticket agent: "OK, I have two seats on flight number 192 leaving at 10 a.m."

Customer: "What is the price?"

Ticket agent: "£900"

Customer: "Great, I'll take them."

Ticket agent: "The screen has refreshed and the price now is £920"

Customer: "OK please book them."

Ticket agent: "Oops – I'm sorry. I just tried to reserve them, and they've been sold by another agent.

Nothing else seems to be available on that date."

Customer: "Argh – that's frustrating"

i) Explain the need for concurrency control given the problems that have occurred above. (3 marks)

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ii) Describe **each** of the following anomalies that can occur in database processing and discuss how they could be the cause of the problems that occurred above:

- Lost Update
- Dirty Read
- Unrepeatable Read.

(12 marks)

Question 4

A database developer normally uses several fact-finding techniques during a single database project.

The **five (5)** most commonly used techniques are examining documentation, interviewing, observing the business in operation, conducting research, and using questionnaires.

Describe each fact-finding technique and identify the advantages and disadvantages of each.

(25 marks)

Question 5

a) Database development and fact finding are inseparable. One factor for the success of the development processes is user involvement. Discuss the role played by users in the database development process.

(10 marks)

a) List four institutions that you know of that use database systems for their operations.

(4 marks)

b) Briefly describe how the institutions you have listed in Question 5(b), use database systems.

(8 marks)

c) What does the term "partial dependency" mean in database systems?

(3 marks)

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Question 6

Database design involves a number of key steps, such as identification of entities, identification of relationships, identifying attributes, representing the design as, for example, an ERD diagram and identifying keys and normalisation. Answer the following in this context.

a) Define the following concepts and provide an example for **each**:

- i) Attribute (2 marks)
- ii) Derived Data (2 marks)
- iii) One-to-many relationship (2 marks)
- iv) Recursive relationship (2 marks)
- v) Foreign key. (2 marks)

b) Using an example, explain what a many-to-many relationship is and show how you would resolve this in your design. (5 marks)

c) Today, databases often support systems with web-based front ends. The architectural style used in this context is a three-tier architecture.

i) Give **THREE** reasons why a three-tier architecture is more desirable for web systems than a traditional client-server setup. (3 marks)

ii) Using a clearly labelled diagram show a typical three-tier architecture and explain the role of **each** tier. (7 marks)

End of Exam

February 2023



KAPASA MAKASA UNIVERSITY

ICT DEPARTMENT

SESSIONAL EXAMINATION

FEBRUARY- 2023

COURSE CODE: ICT 220

COURSE NAME COMPUTER DESIGN AND ARCHITECTURE

INSTRUCTIONS

1. Do not answer until you are told to do so
2. Answer five questions only
3. Malpractices are not allowed during the examinations
4. Time allowed is 3 hours

QUESTION 1

1 Using computer number presentation, calculate and convert the following:

a. **Decimal to binary**

i. 25_{10} to binary

(2 Marks)

b. **Binary to Decimal**

ii. 11110101_2 to Decimal

(2 Marks)

iii. 11.01_2 to Decimal

(3 Marks)

c. **Binary to Octal**

iv. 111111_2 to Octal

(2 Marks)

v. 1010101_2 to Octal

(2 Marks)

d. **Binary to Hexadecimal**

vi. 110101_2 to hexadecimal

(2 Marks)

vii. 1101110_2 to Hexadecimal

(2 Marks)

e. **Decimal to octal**

viii. 78_{10} to Octal

(2 Marks)

f. **Calculate**

$$\begin{array}{r} 1010 \\ +0110 \\ \hline \end{array}$$

(3 Marks)

QUESTION 2

4.a) Briefly account the generations of computers.

(10 Marks)

4.b) Perform calculations on the following below:

i) 1010101_2 to Octal

(2 Marks)

ii) 1101110_2 to Hexadecimal

(2 Marks)

4.c) Convert the following into 1s compliment

i) 1101110

(1 Mark)

4.d) Convert the following into 2s compliment

i) 10000

(2 Marks)

QUESTION 3

3.a) Briefly describe each one of the following:

i Memory Data Register

ii Program counter

iii Virtual memory

iv Cache

v DRAM

vi SRAM

(10 Marks)

3.b) Describe Fetch- Decode-Execute Cycle. Your answer should clearly state the steps involved in the cycle. Your answer you should also include an illustration using a sketch diagram (10 Marks).

QUESTION 6.

- 6.a) List atleast four (4) factors that you should consider when purchasing computer memory (4 Marks).
- 6.b) Briefly describe the following:
- i Exceptional reports
 - ii Regular Reports
 - iii Ad hoc reports
 - iv Impact printers
 - v Non Impact printers
 - vi Graph plotters printers (12 Marks)
- 6.c) Define the following : (4 Marks)
- i Data security
 - ii Data integrity

QUESTION 7

- 7.a) Sketch a detailed block diagram of a computer and its components. (8 Marks)
- 7.b) Using computer number presentation, calculate and convert the following:
- i. Decimal to binary 0.8125 to binary (3 Marks)
- 7.c) Computers perform arithmetic operations on signed magnitude numbers in much the same way as humans carry out pencil and paper arithmetic. Using an 8- bit signed magnitude you are required to convert:
- i) Positive 5 into 8- bit signed magnitude (3 Marks)
 - ii) Negative 5 into 8- bit signed magnitude (3 Marks)
- 7.d) Define the following: (3 Marks)
- i Logic gate
 - ii Computer virus
 - iii Logical error

END

QUESTION 4

- 4.a) Define a Bus (2 Marks)
- 4.b) Write short notes on the following: (6 Marks)
- Data bus
 - Address Bus
 - Control Bus
- 4.c) What do the following stand for: (4 Marks)
- MICR
 - OCR
 - QR CODE
 - OMR
- 4.d) Write short notes on each of item in (4.c) (8 Marks)

QUESTION 5

- 5.a)
- Interpreter (2 Marks)
 - An Assembler (2 Marks)
 - A compiler (2 Marks)
 - Expert system (2 Mark)
- 5.b) Carefully analyse the truth tables for the following and determine the value or output for each truth table (8 Marks)

i) AND			ii) OR			iii) NOR			iv) NAND		
A	B	X	A	B	X	A	B	X	A	B	X
0	0		0	0		0	0		0	0	
1	0		1	0		1	0		1	0	
0	1		0	1		0	1		0	1	
1	1		1	1		1	1		1	1	

- 5.c) Outline four factors you have consider prior purchasing personal computer.(4 Marks)



KAPASA MAKASA UNIVERSITY
PAST EXAMINATION PAPERS
2023

DEPARTMENT OF ICT
THIRD YEAR

COURSE CODES:

PE 330

ICT 361

ICT 320

TM 310

ICT 320

ICT 350



KAPASA MAKASA UNIVERSITY
DEPARTMENT OF ICT

ICT 350
Object Oriented Programming (Java)

2023 Referred / Deferred Examination

(3 hour 00 minutes)
(100 marks)

INSTRUCTIONS:

- This examination has no sections.
- In this theory examination question paper, answer it all in the answer booklet provided.
- Provide a brief statement as a response to the questions therein
- The use of calculators or any other computerized device (eg a phone) is not allowed.

1. What is java, and what makes a java program, so different from other programming languages' programs like C++ or C#? (05)
2. Alice is working on a loop that will execute several lines of code multiple times within a program. Each time the code executes the program should prompt the user to enter in a test grade. She is debating the following program statement setups

```
for (int index = 0; grade < index; index++)
System.out.print ("Please enter another grade);
grade= keyboard.readDouble();
```

Explain how the following program will operate, and how it can be adjusted to correctly run. (05)
3. In object-oriented programming: (05)
 - a. an object is considered to have about three characteristics, list them.
 - b. What are the differences between:
 - i. polymorphism and inheritance
 - ii. an object and a class
4. Below are the C++ Programming Languages common operators and precedence, provide their descriptions (the first two have been done for you): (05)

	Operator	Description
	*=	Add assignment
	<=	Less than or equal to
i.	&&	
ii.	>=	
iii.	!=	
iv.		
v.	-- Exp	

5. You can traverse array elements by using foreach loop, and it will return the array element one by one. Study the foreach below and fill in the blanks. (05)

```
package com.company;
public class Main {
    public static void _____ (String[] args) {
        int [] arr={10, 0, 20, 0, 30};
        for (int i= 0; i < _____; i _____)
        {
            System._____.println(arr[i]);
        }
    }
}
```

6. Discuss the following types of control statements or words: (05)
 - a. If..., Else
 - b. Do..., while
7. Write a correct syntax to add the scan input library in the Java program, and create the data input stream (object)? (05)
8. Write a Java program to display the first 10 counting numbers. (05)

9. What is the output of the following application?

(05)

```
class Automobile {
    private String drive() {
        return "Driving vehicle";
    }
}

class Car extends Automobile {
    protected String drive() {
        return "Driving car";
    }
}

public class ElectricCar extends Car {
    public final String drive() {
        return "Driving electric car";
    }
    public static void main(String[] wheels) {
        final Car car = new ElectricCar();
        System.out.print(car.drive());
    }
}
```

10. What do the following acronyms stand for

(05)

- a. JDK
- b. JRE
- c. JVM
- d. OOP
- e. SDK

11. Define what an array, and differentiate between a single-dimensional and a multi-dimensional array, with examples? (05)

12. People prefer to work with source code rather than object code because source code is easier to understand than object code. So why is object code necessary, and what is the primary benefit of bytecode over object code? (05)

13. Data types can be classified as either Primitive or Non-primitive. Primitive data types are the most basic kinds of data types and they directly contain values, such as int, short, byte, boolean, double. Describe the following datatypes, and state each one's respective size: (05)

- a. Boolean
- b. Byte
- c. Double
- d. Int
- e. Short

14. Write the following mathematical expressions as a java programme, with input and output operations: (05)

- a. $\frac{1}{2} + \frac{1}{xy}$
- b. *the remainder of $(17 - X) \div 2 \times 7.5$*

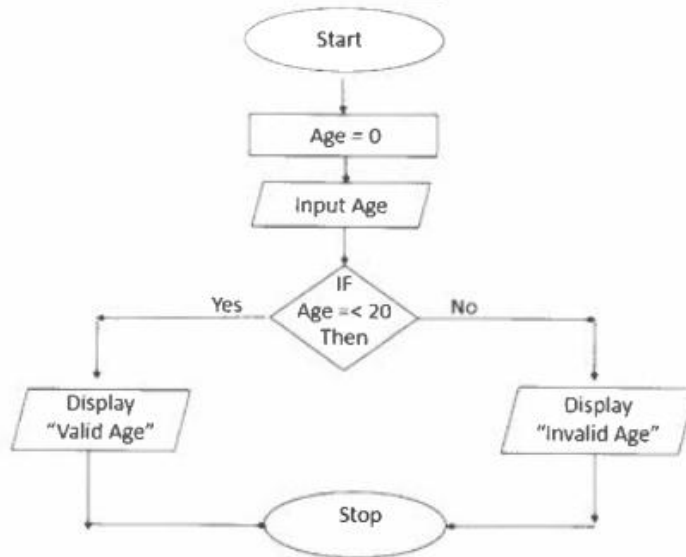
Choose any six from the questions below:

15. Given an array arr, with {10, 11, 12, 13, 14}, make a program to change value stored at index 3, to 9 and show the new array. (05)
16. Puma Filling Station sells gasoline. Available is: regular at K26.25, unleaded at K 27.63, and super unleaded at K 29.50 per litter. You are required to write a program that prints a statement for a customer for the purchase. Remember, input consists of number of litters purchased and the kind of gasoline purchased (R, U, S, or for no purchase, N). (05)
17. Write a Java program to create a class called "Dog" with a name and breed attribute. Create two instances of the "Dog" class, set their attributes using the constructor and modify the attributes using the setter methods and print the updated values. (05)
18. Write a Java program to create a class Employee with a method called calculateSalary(). Create two subclasses Manager and Programmer. In each subclass, override the calculateSalary() method to calculate and return the salary based on their specific roles (05)
19. Write any java program that throws an exception and catch it using a try-catch block, using any variables and/or values of your choice. (05)
20. Explain the concept of inheritance with a real-life example. (05)
21. Using the code below, explain Encapsulation in Java.

```
public class EncapTest
{
    private String name; private String idNum; private int age;
    public int getAge() {
        return age;
    }
    public String getName() {
        return name;
    }
    public String getIdNum() {
        return idNum;
    }
    public void setAge( int newAge) {
        age = newAge;
    }
    public void setName(String newName) {
        name = newName;
    }
    public void setIdNum ( String newId) {
        idNum = newId;
    }
}
```

22. Below is a pseudocode and flow chart for a program, construct a working computer code in any language of your choice. (05)

Flowchart



Pseudo-code

1. Set Age = 0
2. Input Age
3. If Age < 20 Then
4. Display "Valid Age"
5. Else
6. Display "Invalid Age"

23. What is the difference between compile time and runtime. Use examples. (05)



THE COPPERBELT UNIVERSITY

**2023 SESSIONAL EXAMINATION
ICT TEACHING METHODS (TM 310)**

Duration: 3 hours

Marks: 100

Date: 23 October 2023

Instructions:

1. There are **Seven (7)** questions in this paper. You are required to attempt any **Five (5)** questions of your choice.
2. The question paper has **Four (3)** pages
3. Write only your **Student Identity Number (SIN)** on the answer booklet.
4. Always clarify key concepts in a question.
5. Use examples relevant to **ICT or ONLY** where possible.
6. Write all your answers on the answer sheets provided.
7. Indicate the numbers of the questions you have attempted on the answer booklet.

1. (a) Ms. Nambeni during her teaching practice at Mulakupikwa Day Secondary School prepared the chart shown below for her lesson on Parts of a Computer. During the lesson she requested two learners to hold it while he was teaching. In her lesson evaluation, she indicated that the lesson was not taught successfully.



Identify and discuss in details at least **five** aspects that can compel you to disagree against her evaluation that the lesson was taught successfully and state some improvements that would be made so that her evaluation can be supported. [10]

- (b) Describe the proposition of problem solving made by Ortega, Pecharromán and Sosa. Give a detailed explanation to show your understanding of this definition. [10]

2. (a) Re-constructionism and Perennialism are among the philosophies that support education. Which one of the two would you recommend to best suit a doing curriculum and why? [10]

- (b) State and describe any **five** interactive components of the learning processes [10]

3. (a) Briefly discuss any **five** facets of a good curriculum. [10]

- (b) Learners in schools need to acquire the 21st century skills. Briefly discuss the role of a teacher in imparting such skills and show how you can carry out that role in the classroom in your teaching of computer studies. [10]

4. (a) For effective teaching to take place, classroom management is an integral component. Discuss any **five** ways in which you as a teacher can manage the class in order to achieve the set learning objectives. [10]
- (b) Spiral curriculum is predicted on cognitive theory advanced by Jerome Bruner (1960) who wrote that, "We begin with the hypothesis that any subject can be taught in some intellectually honest form to any child at any stage of development (p. 33)". In other words, even the most complex material, if properly structured and presented, can be understood by very young children. In line with your understanding of sequencing discuss for or against this proposition. [10]
5. (a) As an effective teacher of Computer Studies, you took your learners to **ZAMTEL in Nakonde** on 07/09/2023 so that they could learn a lesson about networking. Discuss how this lesson was effectively taught. [10]
- (b) As a teacher you are required to prepare a good test at the end of the term. State any **six features** of a good test and defend why you think the features stated should be adhered to as a teacher prepares every test. [10]
6. (a) Compare and contrast formative and summative assessments. State any 5 reasons why you think the two types of assessments are important. [10]
- (b) Kapasa Makasa Debate club stated the motion that, "George Polya had made significant contributions to education by proposing the 4 steps of problem solving". As a member of KMU debate club, you are chosen to discuss in favor of this motion. Use a class room practical example as you debate in support of the above motion. [10]
7. (a) Constructivism is one of the most renowned philosophies in education. Briefly discuss any five teaching methods that are very much in line with the ideologies that constructivism underpins. [10]

- (b) Teaching File organization is very critical for a teacher. What are the most important components of the Teaching File and why do you think those components are vital in the teaching and learning process? [10]



THE COPPERBELT UNIVERSITY

**2023 SUPPLIMENTARY
EXAMINATION TM 310
ICT TEACHING METHODS**

Duration: 3 hours

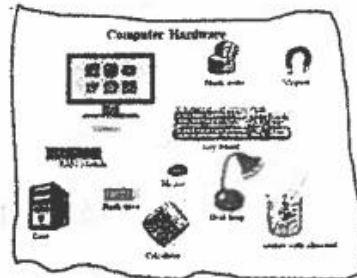
Marks: 100

Instructions:

1. There are **Seven (7)** questions in this paper. You are required to attempt any **Five (5)** questions of your choice.
2. The question paper has **Four (4)** pages
3. Write only your **Student Identity Number (SIN)** on the answer booklet.
4. Always clarify key concepts in a question.
5. Use examples relevant to ICT or Science where possible.
6. Write all your answers on the answer sheets provided.

1. (a) Mr. Samukonga during his teaching practice at Mulakupikwa Day Secondary

School prepared the chart shown below for his lesson on Parts of a Computer. During the lesson he requested two learners to hold it while he was teaching. In his lesson evaluation, he indicated that the lesson was not taught successfully.



Identify and discuss in details at least 5 aspects that lead to the lesson not being taught successfully and improvements that would be made so that it could be taught successfully. [10]

- (b) (i) Justify why you think IDEA HUB can be an effective tool over the teaching aid used by Samukonga in (a) and

(ii) with a practical example, demonstrate how IDEA HUB can be used in the teaching of ICT. [10]

2. (a) Discuss the parallels in the preposition of what a problem is as advance by Tomas Ortega and others to that proposed by Polya. [10]

(b) The following is an extract from grade 9 Computer Studies syllabus.

TOPIC	SUB TOPIC	SPECIFIC OUTCOME	KNOWLEDGE	SKILLS	VALUE
9.4 Productivity Tools (Word processing)	9.4.1 Keyboard skills	9.4.1.1 Exhibit mastery of the keyboard keys including function keys and touch	How to use function keys (F1 to F12) and combination	Using function keys (F1 to F12) and combination	Productivity (letter writing, minutes)



THE COPPERBELT UNIVERSITY

**2023 SUPPLIMENTARY
EXAMINATION TM 310
ICT TEACHING METHODS**

Duration: 3 hours

Marks: 100

Instructions:

1. There are **Seven (7)** questions in this paper. You are required to attempt any **Five (5)** questions of your choice.
2. The question paper has **Four (4)** pages
3. Write only your **Student Identity Number (SIN)** on the answer booklet.
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5. Use examples relevant to ICT or Science where possible.
6. Write all your answers on the answer sheets provided.



KAPASA MAKASA UNIVERSITY

ICT DEPARTMENT

ICT 320 FINAL THEORY EXAM

OCTOBER 2023

INSTRUCTIONS

Do not turn this page until you are told to do so

This Question paper contains 5 Questions, attempt any three.

Start each question on a new page.

Time allowed is **1 h 30 Minutes** hours only

Calculators are allowed in the exam

[Question 1]

- A. With the help appropriate diagrams, explain four categories of networks used in data communication. [8]
- B. Communication between two devices can be simplex, half-duplex, or full-duplex. Briefly but adequately explain what the three modes of communication. [6]
- C. The government wants to set up communication using radio between nearby places via line of sight. Give the frequency band and range that can be used e.g. Extremely Low Frequency – ELF, 3Hz to 3KHz [3]
- D. An analog signal carries 8 bits in each signal unit. If 600 signal units are sent per second, find the baud rate and the bit rate. [3]

[Total 20 Marks]

[Question 2]

- A. Give a clear difference between analog transmission and digital transmission. [3]
- B. If a periodic composite sine wave signal of an alarm system has third harmonics with respect to the fundamental frequency. Draw its time domain decomposition showing the amplitude and time. [5]
- C. In data communication it is common to transmit non periodic digital signal from source to destination using baseband or broadband transmission. Clearly explain how the two transmission systems can be achieved. [6]
- D. The power of a signal is 20 mW and the power of the noise is 1 microW; what are the values of SNR and SNRdB? [6]

[Total 20 Marks]

[Question 3]

- A. What is modulation and why do we need to modulate an analog signal? [3]
- B. You have received a digital signal 1101001 and are required to use digital to analog conversion in order to carry out the implementation for OOK, FSK and PSK. Show the implementation clearly depicting the received signal, carrier signals and the modulated signals. [9]
- C. Using polar line coding scheme, show the implementation of polar NRZ-I and NRZ-L for the digital signal 0111010 [4]
- D. A system is using NRZ-I to transfer 1-Mbps data. What are the average signal rate and minimum bandwidth? [4]

[Total 20 Marks]

[Question 4]

- A. Mention and briefly explain the three processes of Pulse Code Modulation (PCM) [6]
- B. A complex low-pass signal has a bandwidth of 250 kHz. What is the minimum sampling rate for this signal? [2]
- C. We want to digitize the human voice. What is the bit rate, assuming 6 bits per sample? [4]
- D. Five channels, each with a 120-kHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the link if there is a need for a guard band of 5 kHz between the channels to prevent interference? [2]
- E. List and explain the three broad categories of switching used in data communication and networking [6]

[Total 20 Marks]

[Question 5]

- A. Differentiate between in-band and out-of-band signaling as used in the telephone networks and give the most common signaling protocol in use today. [3]
- B. In data communication a single bit error is less likely to occur as compared to a burst error. Explain why this is so. [2]
- C. What is minimum hamming distance? Consequently calculate the minimum hamming distance for the following p1 (01001, 11010), p2 (00001, 00111), p3 (10101, 01011). [4]
- D. Consider the following destination addresses: a. 4A:30:10:21:10:1A, b. 47:20:1B:2E:08:EE and c. FF:FF:FF:FF:FF:FF. How do you tell whether the address is broadcast, unicast or multicast MAC address between a, b and c? [3]
- E. Find the subnet mask, the network address and the broadcast address to which the IP address 192.168.20.10/28 belong. [8]

[Total 20 Marks]

The End.
The future is in your hands



THE COPPERBELT UNIVERSITY

**2023 SESSIONAL EXAMINATION
ICT TEACHING METHODS (TM 310)**

Duration: 3 hours

Marks: 100

Date: 23 October 2023

Instructions:

1. There are **Seven (7)** questions in this paper. You are required to attempt any **Five (5)** questions of your choice.
2. The question paper has **Four (3)** pages
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KAPASA MAKASA UNIVERSITY

ICT DEPARTMENT

ICT 320 PRACTICAL EXAMS

OCTOBER 2023

INSTRUCTIONS

Do not turn this page until you are told to do so

This Question paper contains 2 Questions, attempt both of them.

Save your work with your ID and Question Number.

The folder should be named with your student ID

Time allowed is **1 h 30 Minutes** hours only

No calculators are allowed in the exam

ICT361: Introduction to Web Programming
Final Exam July 2023

ANSWER 5 (FIVE) QUESTIONS ONLY

Question 1

A style sheet can be created in one of the following three ways:

- Inline style,
- Internal style sheet, and
- External style sheet.

As the Website code trainer you are required to produce a set of notes for your students explaining the following:

- a) Explaining the three style sheets. (6 marks)
- b) Explaining THREE advantages of using style sheets. (6 marks)
- c) Explaining a disadvantage of using style sheets. (3 marks)
- d) Explaining what is contained in the CSS style rule with the aid of an example (5 marks)

Question 2

- a) What are the opening and closing tags of PHP script? (2 marks)
- b) Compare and contrast the GET and POST methods of HTTP (6 marks)
- c) Write a program to print "Hello World" using echo only? You cannot use any variable (4 marks)
- d) Write a program to check student grade based on the marks using if-else statement. (8 marks)

Conditions:

- i. If marks are 60% or more, grade will be First Division.
- ii. If marks between 45% to 59%. grade will be Second Division.

Question 3

- a) Briefly discuss the legal, social, ethical and security considerations of Website development. (16 marks)
- b) Explain the use of implementing CAPTCHAs on your website. (4 marks)

Question 4

- a) The statement `<!DOCTYPE>` is an important statement in the web page code. What is the function of the `<!DOCTYPE>`, and what happens if the statement is not included in the coding? (4 marks)
- b) How would you mark up the comment below in an HTML document so that it doesn't display in the browser window? (2 marks)

product list begins here

- c) All of the following markup examples are incorrect. Describe what is wrong with each one, and then write it correctly. (8 marks)
 - i. `<img "birthday.jpg">`
 - ii. `<i>Congratulations!<i>`
 - iii. `<a href="file.html">linked text</a href="file.html">`
 - iv. `<p>This is a new paragraph<\p>`
- d) What is the difference between an HTML tag and an HTML element? (2 marks)
- e) Explain TWO reasons why, when designing a web page, a programmer wishes to use both graphical and text based links. (4 marks)

Question 5

- a) Write out the recommended minimal structure of an HTML5 document. (4 marks)
- b) An important task to be done when planning a website is to analyse the audience the web site is aimed at. Give and explain a reason why a programmer would need to analyse the proposed audience. (4 marks)
- c) Give and describe **FOUR** benefits of applying CSS rules to standard HTML markup. (12 marks)

Question 6

- a) What are Cookies? Explain why cookies are an important feature of websites. (8 marks)
- b) Is it ethical to implement cookies in websites? Discuss (12 marks)

Question 7

- a) What is the difference between a ul and an ol. Give examples? (4 marks)
- b) Radio Buttons are frequently used in web pages. Explain **TWO** reasons why and when you would incorporate Radio Buttons on your web pages. (4 marks)
- c) Explain the difference between dynamic and static websites. (4 marks)
- d) Write a JavaScript program to convert degrees centigrade into degrees Fahrenheit, and to write the result to the page in a descriptive sentence. The JavaScript equation for Fahrenheit to centigrade is as follows:

$$\text{degFahren} = 9 / 5 * \text{degCent} + 32 \quad (8 \text{ marks})$$

END OF EXAM



THE COPPERBELT UNIVERSITY

(KAPASA MAKASA CAMPUS-CHINSALI)

Bachelor of Science – (ICT with Education)

COURSE: PE 330 (Principles of Education)

END OF THIRD YEAR SESSIONAL EXAMINATIONS

Date: 4th October, 2023. 14:00 Hours

Duration: 3 hours

Marks: 100

Instructions:

1. There are two sections in this paper; Sections A and B
2. Section A has eight (8) items, choose only five (5) and write brief notes about them.
3. Section B has four (4) questions, choose only two (2) questions.
4. Always clarify key concepts in a question.
5. Use examples relevant to your field of specialisation or study where possible.
6. Write all your answers on the answer sheets provided.
7. There are two (2) typed pages in this examination paper.

Lecturer: Philip Siwale

SECTION A (40 Marks)

1. There are **eight (8)** items under this question, choose only **five (5)** and write brief notes about each one of them. Each question carries **8 marks**.
 - (a) Systematic random sampling
 - (b) Skewness of data
 - (c) Educational research
 - (d) Purpose of the study
 - (e) Positivist paradigm
 - (f) Study population
 - (g) Parenthetical citations
 - (h) Grounded theory

SECTION B (60 Marks)

Section B has four (4) questions. Choose only two (2). *Each question carries 30 marks.*

2. A questionnaire is a vital research instrument for survey designs:
 - (a) What is a questionnaire? *(5 marks)*
 - (b) Outline the qualities of a good questionnaire. *(25 marks)*
3. Describe the differences between qualitative and quantitative research approaches as regards data collection and data analysis methods. *(30 marks)*
4. With relevant examples, discuss the main advantages of sampling as compared to the collection of data on the whole population. *(30 marks)*
5. Construct and interpret the box plot using the sample;
13, 7, 10, 16, 2, 5, 9 *(30 marks)*

End of Paper.



KAPASA MAKASA UNIVERSITY
PAST EXAMINATION PAPERS
2023

DEPARTMENT OF ICT
FOURTH YEAR ICT

COURSE CODE:

ICT 471

ICT 460

ICT 445

MG 420

ICT 480

Corrected parts



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES AND EDUCATION
2023 SESSIONAL EXAMINATION

ICT 480 – MOBILE NETWORKS

INSTRUCTIONS

- (1) Time allowed is **Three (3) hours**.
- (2) There are six questions in this paper. ^{FWa} Answer any ~~four~~ (5) questions.
- (3) Each question carries **20 Marks**.

Ecclesiastes 9 vs 10-11

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO

Question Four

- i. Explain the concept of Destination sequence distance vector (DSDV) and provide a distinction between Dynamic Source Routing (DSR) and Ad Hoc On-Demand Distance Vector Routing (AODV). **[5 Marks]**
- ii. Discuss the Caching Invalidation Mechanisms as used in mobile computing. **[5 Marks]**
- iii. Describe the client-server computing in 2, 3, or N-tier architectures. **[5 Marks]**
- iv. CSMA with collision avoidance (CSMA/CA) is one of the access schemes used in wireless LANs following the standard IEEE 802.11. Use well labelled diagrams to illustrate how the carrier is combined with a back-off scheme in case of a busy medium for the purpose of achieving some fairness among competing stations. **[5 Marks]**

Question Five

- i. Explain how Code division multiple access (CDMA) systems apply codes with certain characteristics to the transmission to separate different users in code space and to enable access to a shared medium without interference. **[5 Marks]**
- ii. Explain the concepts of GPRS. **[5 Marks]**
- iii. Mention various types of agents used in Mobile IP. **[5 Marks]**
- iv. Explain the connection establishment between the mobile node in home network and corresponding node in foreign network. **[5 Marks]**

Question Six

- i. Explain the classical TCP improvements and Snooping TCP. **[4 Marks]**
- ii. Explain how optimization is achieved in Mobile IP. Explain tunneling and encapsulation in Mobile IP. **[4 Marks]**
- iii. Compare Snooping TCP with mobile TCP with example network scenario. **[4 Marks]**
- iv. Discuss fast-retransmit and fast-recovery mechanisms for mobile TCP in detail. **[4 Marks]**
- v. Satellite is an object which has been placed into orbit by human endeavor. Modern satellites can receive and re-transmit thousands of signals simultaneously, from simple digital data to the most complex television programming. Such objects are sometimes called artificial satellites to distinguish them from natural satellites such as the Moon. As part of this question, you are required to discuss the global mobile satellite systems. In your discussion, you are expected to discuss the types of satellites



KAPASA MAKASA UNIVERSITY
DEPARTMENT OF EDUCATION AND ODL.

2023 FINAL MG420 EXAMINATION
EDUCATION MANAGEMENT AND ADMINISTRATION

INSTRUCTIONS

1. TIME ALLOWED is only THREE (3) HOURS
2. This paper contains 7 questions; you are required to attempt FIVE (5).
3. All answers should be couched in Standard English
4. Ensure that you write your **SIN**, on your answer booklet.

QUESTION ONE

Define and explain with clear examples from the field of education, the following acronyms.

- A. SMART
- B. MBWA
- C. PEST
- D. SWOT

QUESTION TWO

Many scholars have supported the idea of educational plans

- A. What is a plan?
- B. Write briefly notes on 5 functions of any educational plan.
- C. Give examples of SMART objectives from your TP lesson plans.



**THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY CAMPUS
BACHELOR OF ICT WITH EDUCATION
INTERNET TECHNOLOGIES EXAM - 2024**

COURSE CODE: ICT460

TIME: 3 HOURS

TOTAL MARKS: 100

01 - Nov - 2024

09-12 hours

INSTRUCTIONS:

1. Do not turn over the page until you are told to do so.
2. There are **seven (7)** questions in this paper. Attempt any **five (5)** questions.
3. Credit will be given for legible writing, proper punctuation and correct use of English.
4. Cell phones are not allowed in this exam.
5. Calculators are allowed in this exam.
6. Textbooks, laptops, exercise books, phones and other devices are not allowed in the examination room. If found a candidate will be disqualified.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

QUESTION 3

- a) The Domain Name System (DNS) handles the growing number of Internet users. DNS performs an important function on TCP/IP-based networks, of converting hostnames to IP addresses. Discuss the three (3) entries used by DNS. (6 marks)
- b) Electronic mail (email) is a digital mechanism for exchanging messages through Internet or intranet communication platforms. Email messages are relayed through email servers, which are provided by all Internet service providers (ISP). Emails are transmitted between two dedicated server folders: sender and recipient. A sender saves, sends or forwards email messages, whereas a recipient reads or downloads emails by accessing an email server. Discuss three (3) protocols used in email communications. (9 marks)
- c) Devices on a local area network normally use address resolution protocol (ARP) to communicate. Describe the basic operations of this protocol. (5 marks)

[Total: 20 marks]

QUESTION 4

- a) Transport Control Protocol (TCP) and User Datagram Protocol (UDP) are the two common protocols used for transportation of data on a network. Stating the services, discuss three (3) application of each of these protocols in industry. (6 marks)
- b) Imagine you have been employed as a network technician and your manager has instructed you to undertake network troubleshooting because some users are having challenges to access Internet. Discuss three (3) steps you would undertake in order to solve the problem. (6 marks)
- c) Networks have got a carrying capacity called maximum transmission unit (MTU). Discuss the process of fragmentation, re-assembly, its importance and outlining how it is performed in both IPv4 and IPv6. (8 marks)

[Total: 20 marks]

QUESTION 5

- a) File transfer protocol (FTP) is used to transfer files on the Internet from server to the client. However, FTP uses two kinds of connections, describe these connections stating the port numbers. (6 marks)
- b) Explain the process and need for encapsulation on the network. (5 marks)



KAPASA MAKASA UNIVERSITY

DEPARTMENT OF ICT

ICT 471

Introduction To Artificial Intelligence

2023 Final Examination

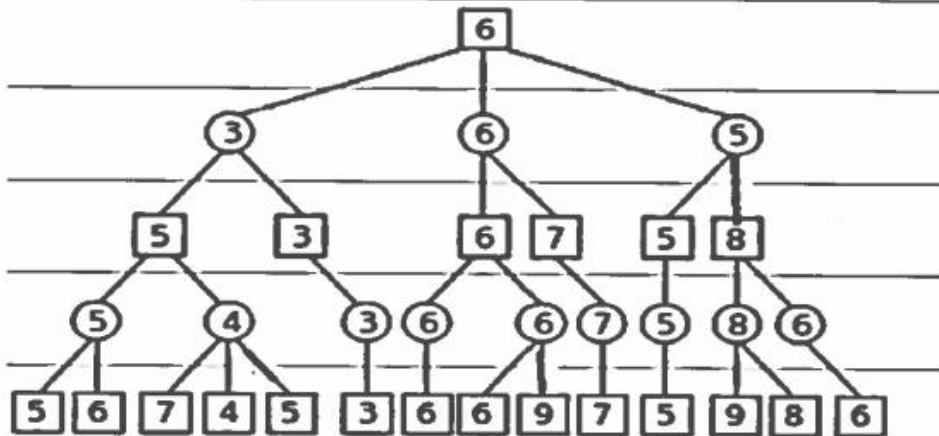
(3 hours 00 minutes)
(100 marks)

INSTRUCTIONS:

- This paper has no sections, and answer all the questions using the answer booklet provided.
- Questions 1 to 14 are mandatory.
- Choose any five questions, from question 15 to question 21
- Be brief in your responses to the questions, and the use of examples is encouraged to help you highlight your point.

The use of calculators is allowed.

8. The Prisoners' Dilemma states that two players in the game can choose between two moves, either "cooperate" or "defect". Using a diagram, show the illustration of the prisoners' dilemma. (05)
9. What is an agent's percept sequence, and how can you use the concept for artificial intelligence machine learning? (05)
10. Semantic networks are an alternative to predicate logic for knowledge representation, they can categorize the object in different forms and can also link those objects. Using the IS-A statements, make a semantic network using the following statements: (05)
- Suzuki is a car
 - Car is a vehicle
 - Vehicles travel by road
 - Bedford is a truck
 - Truck is a vehicle
 - Vehicles travel by road
11. Artificial Intelligence (AI) systems are making the world systems more efficient and consequently richer, transforming our lives for the better. They are achieving that by optimizing logistics, detecting fraud, composing art, conducting research, and providing translations. But there are some concerns, briefly explain any five of them. (05)
12. Game theory studies sequential games with perfect information using the game tree, which is a graph representing all possible game states within such a game. The goal of game tree search is to determine one move for Max player that maximizes the guaranteed payoff for a given game tree for MAX, using the Minimax Rule. We can improve the performance of the minimax algorithm through alpha-beta pruning. Demonstrate the principle of alpha-beta pruning on the diagram below: (05)



13. There are 3 missionaries (MMM), 3 cannibals (CCC), and 1 boat that can carry up to two people on one side of a river.
 Goal: Move all the missionaries and cannibals across the river.
 Constraint: Missionaries can never be outnumbered by cannibals on either side of the river, or else the missionaries are killed.
 State: configuration of missionaries and cannibals and the boat on each side of the river.
 Operators: Move a boat containing some set of occupants across the river (in either direction) to the other side.
 Solve the problem given, given the initial state as MMMCCC B _ _ _ _ _ (05)



**THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY CAMPUS
BACHELOR OF ICT WITH EDUCATION
INTERNET TECHNOLOGIES EXAM - 2023**

COURSE CODE: ICT460

TIME: 3 HOURS

TOTAL MARKS: 100

INSTRUCTIONS:

1. Do not turn over the page until you are told to do so.
2. There are **seven (7)** questions in this paper. Attempt any **five (5)** questions.
3. Credit will be given for legible writing, proper punctuation and correct use of English.
4. Cell phones are not allowed in this exam.
5. Calculators are allowed in this exam.
6. Textbooks, laptops, exercise books, phones and other devices are not allowed in the examination room. If found a candidate will be disqualified.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

QUESTION 4

- a) Differentiate between IPv4 and IPv6. (4 marks)
- b) Given the subnet mask Subnet mask is 255.255.255.240; what is the Subnet ID, Broadcast IP address, First Usable IP address, or Last Usable IP address on the subnetwork that the node 192.168.12.50 belongs to and why? [Show your working] (10 marks)
- c) Explain three (3) reasons why subnets are created. (6 marks)

[Total: 20 marks]

QUESTION 5

- a) Discuss any three (3) ICMP error messages. (6 marks)
- b) With the use of two (2) examples in each case, discuss the use and application of TCP and UDP in the industry today. (8 marks)
- c) Fragmentation is the process of subdividing a large packet into many. In IPv4 and IPv6, this process is done differently, discuss how this process is done in the two (2) of IP. (6 marks)

[Total: 20 marks]

QUESTION 6

- a) Explain the importance of having Address Resolution Protocol (ARP) on network. (4 marks)
- b) Discuss the methods used by TCP to ensure reliability of data transfer. (4 marks)
- c) Automatic Private Internet Protocol Addressing (APIPA) or Link local protocol is used on a local network. Explain the need to have this protocol running and the IP address used. (4 marks)
- d) Discuss the concept of Network Address Translation (NAT). (4 marks)
- e) Differentiate between Loopback IP address and limited broadcast IP addresses. (4 marks)

[Total: 20 marks]



KAPASA MAKASA UNIVERSITY

ICT DEPARTMENT

ICT 445 (COMPUTER SECURITY)

2023 FINAL EXAMS

INSTRUCTIONS

Do not turn this page until you are told to do so

This Question paper contains 7 Questions, attempt 5 questions.

Question 1 and 2 are compulsory

Time allowed is 3 hours only

Only calculators are allowed in the Exam room.

[Question 4]

- A. Differentiate between a vulnerability and a threat in network security. [5 Marks]
- B. Outline the difference between passive and active cyber-attacks. [5 Marks]
- C. Give and explain five examples of active cyber-attacks. [10 Marks]

[Question 5]

- A. Using a diagram, explain the components of a network security model [10 Marks]
- B. What are the three goals of fire walls? [5 Marks]
- C. Firewalls are classified in three categories, list and explain the three categories. [5 Marks]

[Question 6]

- A. Using a Caesar cipher with $S = 5$ decode the received message YMNX YJXY NX NSYJWJXYNSL. [5 Marks]
- B. Using a Caesars cipher with $S = 3$ and $S = 7$, Encrypt the message WELCOME TO CRYPTOGRAPHY using a C1C2C2C1C2 sequence. [5 Marks]
- C. The centurion who was supposed to inform you of s was killed en route, but you have received the message MXX SMGX UE PUHUPQP in a Caesar cipher. Find the value of s and decode the message. Hint: Use Brute Force. [10 Marks]

[Question 7]

- A. You receive a message that was encoded using a block encoding scheme with the encoding matrix, Decode the cipher text MXOSHI
$$M = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix} \quad M' = \begin{bmatrix} 5 & 24 \\ 19 & 3 \end{bmatrix}$$

Prove that $M \times M' = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ [15 Marks]
- B. The DES algorithm combines two bit strings by applying the XOR operator on each pair of corresponding bits. Compute the 6-bit string that results from XORing 100110 and 001100 [5 Marks]

The End
The Future Is In Your Hands

ICT

2024

YEAR 2 TO 4



SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
ICT DEPARTMENT
BACHELOR OF SCIENCE ICT WITH EDUCATION

ICT 235: DATABASE SYSTEMS
SESSIONAL EXAMINATION 2024
DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your Student Identification Number on the Answer Booklet provided
 2. Answer any five (5) questions
-

INSTRUCTIONS:

- Answer five (5) questions only.
 - Clearly number the questions you have answered.
-

Question 1

- a) i) Define the FOUR terms that form the ACID acronym which defines the correct behaviour of transactions on a relational database. (8 marks)
- ii) Which ONE of these four terms is most likely to affect the throughput of transactions when multiple users access the database? Justify your answer. (4 marks)
- b) The terms Authorisation and Authentication are associated with techniques that maintain database security and integrity. Explain the difference between these terms and outline the basic techniques that they use. (8 marks)

Question 2

- a) One possible disadvantage of a database approach compared to a more traditional file based approach relates to performance. Explain why this might be so and what might be done to combat this. (5 marks)
- b) List the three generations of DBMSs. (3 marks)
- c) Database design is made up of three main phases: conceptual, logical, and physical design. Explain briefly what is involved in these phases. (12 marks)

Question 3

- a) Discuss the potential security threats that can occur in a database environment. (12 marks)
- b) What controls can be used to counter the threats discussed in Question 3(a)? (8 marks)

Question 4

A travel agent has a booking service in which customers can book available seats on flights a day or so before the departure date. Sales are brisk as there are many bargain hunting customers trying to get seats at discounted prices.

Consider the following transcript of a telephone conversation between a ticket agent and a customer:

Customer: "I'd like two tickets to Honolulu for January 15."
Ticket agent: "OK, I have two seats on flight number 192 leaving at 10 a.m."

Customer: "What is the price?"
Ticket agent: "£900"

Customer: "Great, I'll take them."
Ticket agent: "The screen has refreshed and the price now is £920"

Customer: "OK please book them."
Ticket agent: "Oops – I'm sorry. I just tried to reserve them, and they've been sold by another agent.
 Nothing else seems to be available on that date."

Customer: "Argh – that's frustrating *I*.... "

Study the above transcript and then answer the following:

- i) Explain the need for concurrency control given the problems that have occurred above. (4 marks)

- ii) Describe each of the following anomalies that can occur in database processing and discuss how they could be the cause of the problems that occurred above:
 - Lost Update
 - Dirty Read
 - Unrepeatable Read.

(12 marks)

- b) Describe Transaction Recovery and explain its importance in the processing of database transactions. (4 marks)

Question 5

- a) Describe the five components of the DBMS environment (15 marks)
- b) List some of the disadvantages of DBMSs. (5 marks)

Question 6

Use the following tables to answer the questions below:

Employee Table

Emp_No	Emp_Name	Start_Date	Dept
1234	John Smith	01-Jul-1983	10
2345	Julie Brown	15-May-2001	10
3456	Tom Jones	01-Mar-2010	20
2245	Susan Sharp	01-Feb-2015	30
1498	Peter Thomas	15-Sept-1999	20
3214	Vera Jones	25-Jun-1995	30
4512	Ali Patel	15-Oct-2005	10

Department Table

Dept_No	Dept_Name
10	Sales
20	Research
30	Human Resources
40	Manufacturing

- a. Write a SQL statement to produce a list of all the records in the Employee table. (3 marks)
- b. Write a SQL statement to produce the Emp_No, Emp_Name, Start_Date of all employees who work in department 20 (4 marks)
- c. Write a SQL statement to produce a list of employee names (Emp_Name) who started on, or after the 1st January 2000. (4 marks)
- d. Write a SQL statement that produces a list of department names that have no employees. (5 marks)
- e. It has been decided that the budget for the department needs to be stored, for example:

Dept_No	Dept_Name	Budget
10	Sales	10,000
20	Research	500,000
30	Human Resources	15,000
40	Manufacturing	25,000

Write a SQL statement to make this change to the table structure.

(4 marks)



KAPASA MAKASA UNIVERSITY
Department of Education and Open Learning
BSc. in Information and Communication Technology
Course: Engineering Mathematics
Course Code: MA210
SESSIONAL EXAMINATIONS
Venue: Upper Library
Date: October 14, 2024; Duration: 3 Hours

Instructions:

- This **Sessional Examination** consists of **7 questions** over 4 pages.
- Answer **any 5** questions.
- Show all the necessary working to earn full marks
- Non programmable scientific calculator can be used

Question 1: (20 marks)

- (a) Show that the characteristic equation of the matrix

$$A = \begin{pmatrix} 2 & 1 & 0 \\ 0 & 3 & 1 \\ 0 & 0 & 4 \end{pmatrix}$$

is satisfied by its own matrix A .

- (b) Solve the following system of simultaneous differential equations using Laplace Transforms:

$$2\frac{dy}{dt} - y + x + \frac{dx}{dt} = 5\sin t, \quad 3\frac{dy}{dt} + x - y + 2\frac{dx}{dt} = e^t$$

where $x(0) = 0$, $y(0) = 0$ and $t = 0$

Question 2: (20 marks)

- (a) Let

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

Find the similarity transformation that diagonalises matrix A

- (b) Define the Laplace Transform and explain its importance in solving differential equations. Why is the inverse Laplace Transform necessary?
- (c) State and prove the first shifting theorem of Laplace Transforms.

Question 3: (20 marks)

- (a) Determine the Fourier series for the function $f(\theta) = \theta^2$ in the range $-\pi < \theta < \pi$. The function has a period of 2π . Let $\theta = \pi$ and show that

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$

- (b) Find the directional derivative of the scalar point function $f = x^2y + y^2z + z^2x$ at the point $(3, 3, 3)$ in the direction of the normal to the surface $4x^2y + 2z^2 = 2$ and at the point $(2, -1, 3)$

Question 4: (20 marks)

- (a) Show that the following 3 by 3 square matrix normalizes to 1:

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

- (b) Solve the differential equation using the Laplace transform:

$$\frac{d^2y}{dt^2} + 3\frac{dy}{dt} + 2y = \sin(t), \quad y(0) = 0, \quad y'(0) = 0$$

- (c) A vector $\bar{r}$ is defined by $\bar{r} = ix + jy + kz$. If $|\bar{r}| = r$ then show that the vector $r^n \bar{r}$ is irrational.

Question 5: (20 marks)

- (a) Determine

$$\int \frac{dx}{\cos x}$$

using trigonometric substitution. (Hint: $t = \tan \frac{x}{2}$)

- (b) Test the following for convergence and state the the Radius and interval of convergence and draw the number line.

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x-4)^n}{n9^n}$$

- (c) Find the characteristic equation of the matrix $A = \begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$,

verify Cayley -Hamilton theorem and hence evaluate the matrix equation

$$A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 = 5A^3 - 8A^2 + 2A - I$$

Question 6: (20 marks)

- (a) Show that

$$\int_1^2 \left(\frac{2 + \theta + 6\theta^2 - 2\theta^3}{\theta^2(\theta^2 + 1)} \right) d\theta = 1.606,$$

correct to 4 significant figures

- (b) Solve the Bernoulli equation $2y - 3\frac{dy}{dx} = y^4 e^{3x}$

Question 7: (20 marks)

- (a) Find the power series representation for the function

$$f(x) = \frac{1}{(x-1)(x+2)}.$$

For each resulting fraction from the decomposition, express it as a geometric series. Then, combine these geometric series to obtain a single power series for $f(x)$ and determine the radius and interval of convergence.

- (b) Evaluate

$$\int_0^{\frac{\pi}{3}} \sqrt{1 - \frac{1}{3}\sin^2\theta} d\theta$$

using Simpson rule with 6 intervals, correct to 3 decimal places.



SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY
BACHELOR OF CYBER SECURITY

SOFTWARE ENGINEERING
ICT230

SESSIONAL EXAMINATION

DATE: 04-Nov-2024

TIME: 14.00 - 17.00 HRS, 3 HOURS

Instructions to candidates

1. Write your **Name** and **Student ID** on the **Answer Sheet** provided
2. There are **Seven (7) questions** in this paper. Attempt only **five (5)**. **Questions 1 and 2 are compulsory**. Indicate on the Answer sheet your choice from the optional questions.
3. Write your Answers on the answer Sheet provided.
4. No Foreign material will be allowed in this examination.
5. The number of marks is shown in brackets [] at the end of each question or part question.
6. Clear handwriting and neat work is encouraged.
7. The total number of marks for this paper is **100**

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

[Question 1]

- A. Define the systems development life cycle [SDLC] and explain its main phases. How does the SDLC help in managing the development of information systems? **[6 Marks]**
- B. Describe the key responsibilities of a systems analyst in each phase of the SDLC. **[6 Marks]**
- C. Explain the concept of feasibility study in project initiation. What are the three main types of feasibility that should be considered? **[8 Marks]**

[Question 2]

- A. Define the following object-oriented concepts and explain their importance in software design:
- Classes and Objects
 - Attributes and Methods
 - Inheritance and Polymorphism **[9 Marks]**
- B. Draw a class diagram for a simple Bank Account system with the following classes:
- BankAccount [attributes: accountNumber, balance; methods: deposit, withdraw, getBalance]
 - SavingsAccount [inherits from BankAccount, additional attribute: interestRate; additional method: calculateInterest]
 - CheckingAccount [inherits from BankAccount, additional attribute: overdraftLimit; modified method: withdraw]

Clearly show the relationships between the classes. **[6 Marks]**

- C. Write a C++ code snippet to define the BankAccount class with its attributes and methods. Demonstrate the use of encapsulation by making the attributes private and providing public getter and setter methods. **[5 Marks]**

[Question 3]

- A. Compare and contrast the traditional Waterfall model and Agile methodologies in software development. What are the key differences in their approach and suitability for different types of projects? **[8 Marks]**

- B. Explain the concept of requirements gathering in software engineering. Describe two modern techniques used for eliciting and documenting system requirements. [6 Marks]
- C. What is the role of CASE [Computer-Aided Software Engineering] tools in systems development? Provide two examples of CASE tools and explain their benefits. [6 Marks]

[Question 4]

- A. Describe the Model-View-Controller [MVC] architectural pattern. How does it promote separation of concerns and modularity in software design? [5 Marks]
- B. Draw a sequence diagram to illustrate the interaction between objects in a typical online shopping scenario [User, ShoppingCart, Product, Payment]. Explain your design choices. [10 Marks]
- C. What is the difference between collaboration diagrams and sequence diagrams in UML? When would you prefer to use one over the other? [5 Marks]

[Question 5]

- A. Explain the concept of coupling and cohesion in software design. Why is it desirable to have low coupling and high cohesion in a system? [6 Marks]
- B. Describe three key principles of effective input design in software engineering. Provide examples of how these principles can be applied in a real-world application. [9 Marks]
- C. What are the main objectives of output design? Explain two factors that should be considered when designing user interfaces for effective information presentation. [5 Marks]

[Question 6]

- A. Describe the four main levels of software testing and their purposes:
- i. Unit Testing
 - ii. Integration Testing
 - iii. System Testing
 - iv. Acceptance Testing
- [8 Marks]
- B. What is the role of a test plan in software testing? Outline the key components that should be included in a comprehensive test plan document. [6 Marks]
- C. Explain the concept of risk management in software projects. Describe two common risks and suggest appropriate mitigation strategies for each. [6 Marks]

[Question 7]

- A.** Compare and contrast two popular software development methodologies: Structured Systems Analysis and Design Method [SSADM] and Rapid Application Development [RAD] **[8 Marks]**
- B.** What is the purpose of a post-implementation review in software development? Describe three key areas that should be assessed during this review. **[6 Marks]**
- C.** Explain the importance of software documentation. Describe two types of documentation that are essential for the long-term maintainability of a software system. **[6 Marks]**

The End
All the best!



KAPASA MAKASA UNIVERSITY

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

BARCHELOR OF SCIENCE IN ICT WITH EDUCATION

ICT 220 – COMPUTER ARCHITECTURE AND ORGANIZATION

SESSIONAL EXAMINATIONS

Date: 17th October,2024.

Time: 3hours

Total Marks: 100.

Instructions to candidates:

Write your Student Identification number on the answer booklet provided.

This paper consists of three (3) sections:

- *SECTION A: Answer all questions from this section. 20 Marks*
- *SECTION B: Answer all questions from this section. 40 Marks*
- *SECTION C: Answer question one and choose any 40 Marks*

Calculators are allowed.

SECTION A | 20 MARKS|

Answer all the questions in this section.

1.

- a) Discuss the Memory Hierarchy in computer system with regard to speed, size and cost?

[6marks]

- b) Explain the computer's main/primary memory and its types.

[4marks]

2.

- a) The denary values 64, 101 and 242 are converted to 8-bit binary values. Give the 8-bit binary value for each denary value. *(show your working)*

i. 64 [2 marks]

ii. 101 [2 marks]

iii. 242 [2 marks]

- b) The hexadecimal values 42 and CE are converted to binary. Give the binary value for each hexadecimal value. *(show your working)*

i. 42 [2 marks]

ii. CE [2 marks]

SECTION B | 40 MARKS|

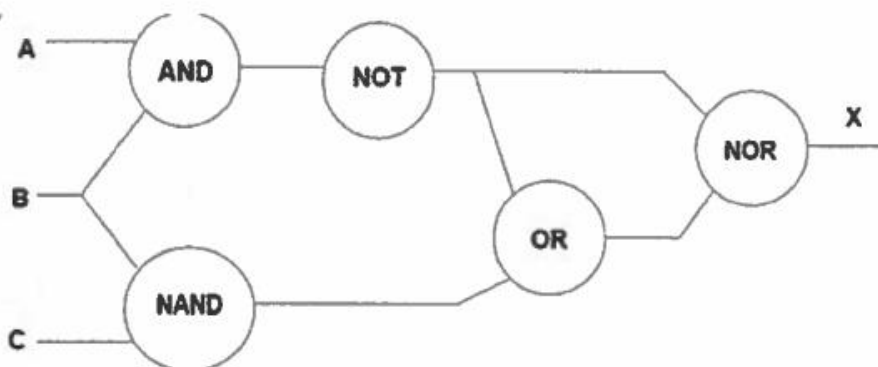
Answer all the questions in this section.

1. (a) Draw an **AND gate** and a **NOT gate** and show the truth table for the two gates (AND and NOT)

[8 marks]

- (b) Complete the truth table for the below shown logic gate

[12 marks]



A	B	C	X
1	1	1	
1	1	0	
1	0	1	
1	0	0	
0	1	1	
0	1	0	
0	0	1	
0	0	0	

2. (a) Use examples to help you explain the difference between Computer Organization and Computer Architecture. **[8 marks]**

(b) Define the following terms;

- i. RAM **[2 marks]**
- ii. ROM **[2 marks]**
- iii. Peripheral device..... **[2 marks]**
- iv. SSD..... **[2 marks]**
- v. Cache Memory **[2 marks]**
- vi. USB **[2 marks]**

SECTION C [40 MARKS]

Question 1 is compulsory and choose any one question from the remaining 2.

1. Compare and contrast the first, second and third generation of computers in terms of there technology, size and performance? **[20 marks]**
2. Discuss the various types of computer malware and their impact on computer security. Also describe mechanism that you can use to protect the computer system against your named malware. **[20 marks]**
3. Draw and explain the block diagram of a computer system, identifying the key components and their interactions. **[20 marks]**

KAPASA MAKASA UNIVERSITY



2024 SESSIONAL EXAMINATION

PRINCIPLES OF EDUCATION – PE210

INSTRUCTIONS:

1. Time Allowed **THREE (3)** Hours
2. Attempt Any **FIVE (5)** Questions
3. Each Question Carries **TWENTY (20)** Marks
4. Ensure You Indicate Your SIN On Your Answer Script

QUESTION ONE

Prepare a grade nine ICT End of Term Test which is guided by Bloom's Taxonomy active cognitive verbs. (20 marks)

QUESTION TWO

Write brief notes on the following:

- a) Drivers constructivism's learning theory
 - b) social learning theory
 - c) Classical conditioning
 - d) Edgar Dales's Cone experience
 - e) Edward Nkonde's 2018 on the use of mother tongue on a medium of instruction
- (4 marks each)

QUESTION THREE

Define the following:

- a) Socialisation
- b) Quality of education
- c) Sustainable development
- d) Pedagogy
- e) Education psychology

(4 marks each)

QUESTION FOUR

Write a 500 word essay on 5 different types of transfer of learning. (20 marks)

QUESTION FIVE

Discuss with clear pedagogical examples of two of the following:

- a) Edward Thorndike trial and error experiment
 - b) Levy Vygotsky's theory of learning
 - c) Abrahams Maslow's motivation hierarchy
- (20 marks)

QUESTION SIX

State 4 advantages and 3 disadvantages of Jerome Bruner's discovery learning theory. (20 marks)

QUESTION SEVEN

- a) List 5 major challenges of education the Zambian government has been trying to address since 1964. (15 marks)
- b) What have been the main obstacles for each challenge above? (5 marks)

QUESTION EIGHT

- a) State various reasons why the teaching profession has lost its past glory?
- b) Why has the government introduced free education in Zambia?
- c) What are the social and economical functions of education in African countries?

(20 marks)

END OF EXAMINATION



SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
ICT DEPARTMENT
BACHELOR OF SCIENCE ICT WITH EDUCATION

ICT 361: INTRODUCTION TO WEB PROGRAMMING
SESSIONAL EXAMINATION 2024
DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your Student Identification Number on the Answer Booklet provided
2. This paper consists of TWO (2) sections:
 - **SECTION A:** Answer **ALL** questions from this section -20 marks
 - **SECTION B:** Answer **FOUR** questions from this section -80 marks

Total = 100 marks

SECTION A: Answer ALL questions from this sectionTotal marks in this section = 20 marks

Question 1

Given the following Javascript array: `var myArray = [1, "two", 3, "4"]`. Write what the alert message will say for each of these examples:

- a. `alert( myArray[0] );`
- b. `alert( myArray[0] + myArray[1] );`
- c. `alert( myArray[2] + myArray[3] );`
- d. `alert( myArray[2] - myArray[0] );` (4 marks)

Question 2

What will each of these Javascript alert messages say?

- a. `var foo = 5; foo += 5; alert( foo );`
- b. `var foo = 5; alert(foo++);`
- c. `var foo = 2; alert( foo + " " + "remaining" );`
- d. `var foo = "Mat"; var bar = "Jennifer"; if( foo.length > bar.length ) { alert( foo + " is longer." ); } else { alert( bar + " is longer." ); }`
- e. `alert( 10 == "10" );`

(5 marks)

Question 3

Write a PHP script that checks if a given number is even or odd. Use ``if``, ``else``, and ``elseif`` statements

(2 marks)

Question 4

Write a PHP script to perform and display the result of the following arithmetic operations on given variables `$a = 10;` `$b = 5;`

- i. Addition
- ii. Subtraction
- iii. Multiplication
- iv. Division

(4 marks)

Question 5

Write a program to print "Hello PHP" using a php variable? You cannot use text directly in echo but can use variables. (2 marks)

Question 6

Write a program to print 2 php variables using single echo statement.

Conditions:

- First variable with text "Good Morning."
- Second variable with text "Have a nice day!"

Your output should be "Good morning. Have a nice day!" (3 marks)

PLEASE TURN OVER THE PAGE FOR SECTION B

SECTION B: Answer FOUR questions from this sectionTotal marks in this section = 80 marks

Question 1

- a) Briefly explain the difference between the Internet and the World Wide Web (4 marks)
- b) What is the difference between the ``<section>``, ``<article>``, and ``<div>`` tags? (6 marks)
- c) Using an example explain the function `:hover Pseudo-Class`. Why do users of the website consider this function very useful? (6 marks)
- d) Describe the contents and purpose of the CSS Box Model in website development (4 marks)

Question 2

- a) Explain the importance of responsive web design. Provide three key techniques used to achieve responsiveness in web design. (10 marks)
- b) Explain the concept of an Application Programming Interface and give examples of how they are used. (10 marks)

Question 3

- a) One of the best ways to display data is to use a table, where data can be arranged in cells, rows, and columns. Describe FOUR table elements that you would use to format the table and for each of your choices explain their function. (16 marks)
- b) How would you create a table in HTML with the following columns: StudentID, Name, Age? (4 marks)

Question 4

- a) What is cookie technology in website development? Explain why cookies are an important feature of websites. (8 marks)
- b) Is it ethical to implement cookies in websites? Discuss (12 marks)

Question 5

- a) Discuss the significance of web accessibility. What are three best practices to ensure a website is accessible to users with disabilities? (10 marks)
- b) Discuss briefly the concept of Progressive Web Apps (PWAs). What are the advantages of PWAs over traditional web and native mobile apps? (10 marks)



KAPASA MAKASA UNIVERSITY

ICT DEPARTMENT

ICT 320 FINAL EXAM

7TH NOVEMBER, 2024

TIME: 09:00 – 12:00HRS

INSTRUCTIONS

Do not turn this page until you are told to do so

This paper contains 6 Questions in the two SECTIONS.

Attempt **all** questions in **SECTION A** and any other TWO from **SECTION B**.

Start each question on a new page.

Time allowed is **3 HOURS** only.

Calculators are allowed in the **EXAM**

SECTION A

[QUESTION_1]

- A. Chelakatwishi Tech Solutions, a multi-national IT organization, has decided to set up a four regional offices in southern Africa. They will have offices in Lusaka, Cape Town, Lilongwe and Windhoek. They each expect to have 470, 800, 240 and 120 hosts respectively. Four WAN Links are used to interconnect the four regional offices. Use VLSM to subnet the internetwork. The IP Address is 172.16.0.0 255.255.0.0. **Clearly show the Design and the following details.** [20]
- i. Show the subnet for each network
 - ii. The range of valid IP addresses
 - iii. The Block Size and
 - iv. Broadcast address for each subnet
- B. John Sakala has just reported at Kapasa Makasa University as a first year ICT student all the way from Vubwi district, Eastern province. He wants to connect his two switches in order to extend his LAN to the friend's room. You, as a senior student has been asked to provide the color code for the cable that he is supposed to use for him to connect the two switches. [5]
- C. Consider the following destination addresses: How do you tell whether the address is broadcast, unicast or multicast MAC address between a, b and c? [5]
- i. 4B:30:10:21:10:1A,
 - ii. 4C:20:1B:2E:08:EE and
 - iii. FF: FF: FF: FF: FF: FF.
- D. Find the first two and last two valid IP addresses, to which the IP address 192.168.7.52 255.255.255.248 belong. [10]

[QUESTION_2]

- A. The effectiveness of a data communications system depends on four fundamental characteristics: delivery, accuracy, timeliness, and jitter. Briefly explain each of these terms as used in data communication. [8]
- B. For communication to take place, there are two types of connections that can be set up i.e. point-to point or multi-point. Clearly give the difference between the two. [4]
- C. Use suitable diagrams to explain how light is transmitted in the fiber optic cable. Clearly show all the angles and rays involved. [6]
- D. From the frequency band which communication channel and frequency range is used by Chinsali radio Station? [2]

SECTION B

[QUESTION_3]

- A. Explain in details the three impairments that can be experienced in data communication and networking. [3]
- B. A non-periodic composite signal has a bandwidth of 260 kHz, with a middle frequency of 115 kHz and peak amplitude of 15 V. The two extreme frequencies have an amplitude of 0. Draw the frequency domain of the signal. [7]
- C. A digital signal has sixteen levels. How many bits are needed per level? [2]
- D. The power of a signal is 10 mW and the power of the noise is 1 microW; what are the values of SNR and SNRdB? [8]

[QUESTION_4]

- A. What is modulation of a signal and why is modulation needed? [2]
- B. You have received a digital signal 110100101 and are required to use digital to analog conversion in order to carry out the implementation for OOK, FSK and PSK. Show the implementation clearly depicting the received signal, carrier signals and the modulated signals. [8]
- C. A constellation diagram helps us to define the amplitude and phase of a signal when we are using two carriers, one in quadrature of the other. Use the constellation diagram to modulate two signals combines as 101100001000010011110111 if the bit rate is 24 and baud rate is 8 [10]

[QUESTION_5]

- A. A signal is carrying data in which one data element is encoded as one signal element. If the bit rate is 100 kilobits per second, what is the average value of the baud rate if c is between 0 and 1? [3]
- B. Consider the multilevel 2B1Q scheme transition table below. You are required to encode the data pattern 0011011001 assuming positive original level [7]

	Previous level: positive	Previous level: negative
Next bits	Next level	Next level
00	+1	-1
01	+3	-3
10	-1	+1
11	-3	+3

Transition table

- C. We want to digitize the human voice. What is the bit rate, assuming 8 bits per sample? [5]

- D. Four channels, each with 120-kHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the link if there is a need for a guard band of 8 kHz between the channels to prevent interference? [5]

[QUESTION_6]

- A. We can divide today's networks into three broad categories: **circuit-switched networks**, **packet-switched networks**, and **message-switched**. Briefly explain each of the above switching techniques. [6]
- B. Differentiate between in-band and out of band signaling [4]
- C. Find the minimum Hamming distance of the coding scheme in the following: [5]
- i. $d(00000, 01011)$
 - ii. $d(01011, 10101)$
 - iii. $d(00000, 10101)$
 - iv. $d(01011, 11110)$
 - v. $d(00000, 11110)$
 - vi. $d(10101, 11110)$
- D. List and explain at least two protocols found at each of the layers of the OSI model. [5]

The end

The future is in your hands



SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
BACHELOR OF ICT WITH EDUCATION
ICT 350: Object Oriented Programming (Java)

SESSIONAL EXAMINATION

DATE:

TIME: 3 hours

INSTRUCTIONS

1. Write your Student Identification Number on the Answer Booklet provided
 2. This paper has only 2 sections. Section A and Section B. [60 marks]
 3. Section A contains open ended questions
 4. Section B answer any 3 questions
 5. Please write as clearly as possible as illegible handwriting cannot be marked.
 6. Number the answers to the questions clearly before answering
-

Section A (Answer all Questions) [4 marks each question]

1. Write a java program that asks a user to enter a grade then it determines whether it's a pass or fail.

Test Data:

Pass is 40 and above

Fail is less than 40

Enter your grade: 40 or 20

Expected Output: You have passed / You have failed

2. Write a Java program to print 'Hello' on screen and then print your name on a separate line.

Expected Output:

Hello

Mwansa Peter

3. Write a Java program to print the sum of two numbers.

Test Data:

74 + 36

Expected Output: 110

4. What is inheritance in Java? How does it differ from polymorphism?
5. Define the following terms and give one example for each in Java:
 - Encapsulation
 - Polymorphism

SECTION B (Answer any 3 Questions) [40 marks]

QUESTION 1

A hotel's occupancy rate in Lusaka is calculated as follows: Occupancy rate:

$$\text{Occupancy rate} = \text{Number of rooms occupied} / \text{Total number of rooms}$$

Write a program that calculates the occupancy rate for each floor of a hotel. The program should start by asking for the number of floors in the hotel. A loop should then iterate once for each floor. During each iteration, the loop should ask the user for the number of rooms on the floor and the number of them that are occupied. After all the iterations, the program should display the number of rooms the hotel has, the number of them that are occupied, the number that are vacant, and the occupancy rate for the hotel. [13.3 marks]

QUESTION 2

You are required to develop a simple graphical user interface (GUI) application using Java Swing. The application should:

- Display a window with two text fields for user input
- Allow the user to input numbers and click a button to calculate their sum
- Display the result in a label below the input fields

Provide the complete Java code and explain how event handling is used in your program.

[13.3 marks]

QUESTION 3

Write a Java program that demonstrates the following concepts:

- Inheritance
- Method Overriding
- Encapsulation

Your program should contain a superclass Vehicle, a subclass Car, and demonstrate encapsulation with private attributes and public accessor methods.

[13.3 marks]

QUESTION 4

Write a simple program that demonstrates polymorphism using Java's inheritance. You have three classes: Animal, Dog, and Cat. The Animal class has a method called makeSound(), which is overridden by both Dog and Cat to provide their specific implementations. Write a program that includes the following:

1. A base class Animal with a makeSound() method that prints "Some generic animal sound".
2. A derived class Dog that overrides the makeSound() method to print "Bark".
3. A derived class Cat that overrides the makeSound() method to print "Meow".
4. A method that accepts an Animal object and calls its makeSound() method.
5. Demonstrate polymorphism by creating an array of Animal objects (containing both Dog and Cat instances) and invoking their makeSound() methods using a loop.

Expected Output: The program should print the respective sounds based on the actual object type at runtime. [13.3 marks]

QUESTION 5

Explain how event handling works in Java. Write a program that creates a simple GUI using Java Swing where:

- There is a button labeled "Click Me".
- When the button is clicked, it changes the text of a label to "Button Clicked".

[13.3 marks]



KAPASA MAKASA UNIVERSITY
Department of Education and Open Learning
BSc. in Information and Communication Technology
Course: ICT Teaching Methods
Course Code: TM310
SESSIONAL EXAMINATIONS
Venue: Upper Library
Date: October 21, 2024; Duration: 3 Hours

Instructions:

- This Sessional Examination consists of 7 questions
- Answer any 5 questions.

Question 1: (20 marks each)

GRADE 9 SYLLABUS

TOPIC	SUB TOPIC	SPECIFIC OUTCOME	KNOWLEDGE	SKILLS	VALUE
9.1 Introduction to Computers	9.1.1 Terminology 9.1.2 Peripheral devices 9.1.3 Input-process-output operations	9.1.1.1 Define the terminologies of a computer system 9.1.2.1 Connecting peripheral devices to their appropriate computer ports 9.1.2.1 Recognise that the speed of a CPU is measured in Megahertz (MHz) or Gigahertz (GHz) 9.1.3.1 Identify meaningful information as a result of processed input data by the computer 9.1.3.2 Appreciate that certain devices are both input as well as output (e.g. touch screens)	- Computer terminology, peripheral device PDAs, GB, MHz, GHz, BIT, BYTES, Megabytes etc - Defining basic computer terminology - Peripheral devices - Units of the processing speed and their relationship - Units of storage – BIT, Byte, Megabyte, Gigabyte and their conversions - Input, process and output devices	- Connecting peripheral devices to their appropriate computer ports - Converting of bytes into Bits and converting Bits into Bytes, Kilobytes & Megabytes - Interpreting the various files sizes - Relating file size to storage space	- Appreciating the various types of ports (serial, parallel & USB) - Relation between processing speed and file size - Appreciation of limitations of storage media regarding size

From the above extract prepare a

- two weeks scheme of work
- 40 minute lesson plan
- two weeks record of work
- discuss why you think the three instrument above are important.

Question 2: (20 marks)

- In his 1969 version of Audiovisual Methods in Teaching, Edgar Dale introduced 'rich experiences'. According to Dale, effective learning environments should offer memorable and rich experiences where learners can use multiple senses. He illustrated his proposition using a cone of experiences. Show your understanding of Edgar Dale's cone of experience in line with active and passive learning in classroom.
- Alvin Toffler (2005) proffered that "The illiterate of the future are not those who can't read or write but those who cannot learn, unlearn, and relearn." As a teacher living in the 21st century can you debate for or against this proposition?

Question 3: (20 marks)

- (a) Learning is usually said to be either teacher centred or learner centred. Define teacher-centered learning then state and describe any 9 factors that are seen in a teacher-centered learning environment.
- (b) What is Student-Centered Learning?. State and describe any 9 practices that are prevalent in student-centered learning environment.

Question 4: (20 marks)

Explain the "Three Domains of Learning" and provide one educational activity example for each domain. In your answer:

- (a) Define each of the three domains: *Cognitive*, *Affective*, and *Psychomotor*.
- (b) Provide an example of an activity or task that can be used to develop skills in each domain.
- (c) Discuss the significance of understanding these domains for effective teaching and learning.
- (d) Kapasa Makasa Debate club stated the motion that, "The Spiral curriculum is predicted on the cognitive theory advanced by Jerome Bruner (1960), who wrote, "We begin with the hypothesis that any subject can be taught in some intellectually honest form to any child at any stage of development (p. 33)". As a member of KMU debate club, you are chosen to discuss in favor of this motion. Use a class room practical example as you debate in support of the above motion.

Question 5: (20 marks)

- (a) Describe the proposition of problem solving made by Borasi (1986). Give a detailed explanation to show your understanding of the four structural elements Borasi proposed.
- (b) How can you develop learners literacy skills using ICT to locate relevant information, analyses,interpret it evaluate its usefulness, and and communicate results?
- (c) The use of strategies for teaching ICT skills, concepts and processes cannot be overemphasised. Discuss 5 of such strategies where possible give practical classroom examples to underscore your points.

Question 6: (20 marks)

Discuss the concept of "Learning How to Learn" and its importance in lifelong education of pupils. In your answer:

- (a) Define "Learning How to Learn" and explain its key components.
- (b) Identify at least two strategies or techniques that help individuals improve their learning skills.
- (c) Discuss the role of "Learning How to Learn" in fostering independent learning and adaptability in a rapidly changing world.
- (d) Briefly discuss why you think the syllabus is important and state any differences you may have noticed between a curriculum and a syllabus.

Question 7: (20 marks)

- (a) Deductive and inductive methods are key in the learning and teaching of ICT. Using a class room practical example, demonstrate how you can achieve sequencing of instructions using either of the two methods.
- (b) As a teacher you are required to use teaching aids as you deliver the lessons. Imagine you are posted to a very remote small school that receives a very small grant and can not afford to purchase commercially produced teaching aids. Show how you can improvise and preserve the your locally produced teaching aids.
- (c) It is a duty of a teacher to prepare a good test at the end of every term. The features of a good test are (validity, reliability, fairness, discrimination, comprehensiveness, easy of administration and scoring). Justify how you can succeed in preparing the good test having these features.



KAPASA MAKASA UNIVERSITY

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

BACHELOR OF SCIENCE – (ICT with Education)

COURSE CODE: PE 330 (Principles of Education)

END OF THIRD YEAR SESSIONAL EXAMINATIONS

Date: 4th November, 2024.

Duration: 3 hours

Marks: 100

Instructions:

1. Write your Student Identification Number on the Answer Booklet provided
2. There are two sections in this paper; Sections A and B
3. Section A has eight (8) items, choose only five (5) and write brief notes about them.
4. Section B has four (4) questions, choose only two (2) questions.
5. Always clarify key concepts in a question.
6. Use examples relevant to your field of specialisation or study where possible.
7. There are three (3) typed pages in this examination paper.

Lecturer: Philip Siwale

SECTION A (40 Marks)

1. There are **eight (8)** items under this question, choose only **five (5)** and write brief notes about each one of them. Each question carries **8 marks**.
 - (a) Systematic sampling
 - (b) Problem statement
 - (c) Research questions
 - (d) Significance of the study
 - (e) Positivist paradigm
 - (f) Research ethics
 - (g) Parenthetical citations
 - (h) Case study

SECTION B (60 Marks)

Section B has four (4) questions. Choose only two (2). *Each question carries 30 marks.*

2.
 - (a) What is research? *(5 marks.)*
 - (b) Describe the characteristics of research. *(10 marks.)*
 - (c) What is the meaning of educational research and why do research in education? *(15 marks.)*
3. A questionnaire is a vital research instrument for survey designs:
 - (a) What is a questionnaire? *(5 marks)*
 - (b) Outline the qualities of a good questionnaire. *(25 marks)*
4. Consider a research title; *“Challenges faced by ICT teachers and pupils in the integration of ICT in rural areas.”*
 - (a) Identify the independent and dependent variables. *(4 Marks)*
 - (b) What is an experiment all about? *(3 Marks)*
 - (c) Consider a research design below:

R O X O Group A

R O - O Group B

- i. Identify this research design. *(3 Marks)*
 - ii. What is **Group A** called? *(2 Marks)*
 - iii. Why are the pre-test and the post- test important in this case?*(18 Marks)*
5. (a) What is literature review? *(5 Marks)*
- (b) Identify four areas of focus when reviewing literature. *(5 Marks)*
- (c) Why is reviewing literature important? *(20 Marks)*

End of Paper.

ICT
2025
YEAR 2 TO 4



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES AND OPEN LEARNING

Course Title: DATABASE SYSTEMS

Course Code: ICT 235.

Lecturer: KELA KAPAPULA

Date: 28/10/2025

Duration: 3 Hours.

Total Marks: 100

General Instructions to Candidates:

1. Answer questions as instructed.
2. No unauthorized materials are allowed
3. No electronic devices are allowed unless specified.
4. Start **each** answer on a new page and number each answer
5. Write clearly and legibly.

Exam Instructions:

Answer FIVE (5) questions only



ANSWER 5 QUESTIONS ONLY**Question 1**

Explain the significance of a database transaction and define the **four** ACID properties it must satisfy to ensure **data integrity** and **reliability**. For each property use an example of a bank transfer to illustrate its function. (20 marks)

Question 2

a) In the context of an international bank, describe what each of the following roles would involve in a database environment (provide a relevant example for each role):

- i. Data administrator
- ii. Database administrator
- iii. Database designer
- iv. End users

(10 marks)

b) Explain the process of transforming the table below from Unnormalised Form (UNF) to First Normal Form (1NF) (10 marks)

Student_ID	Student_Name	Courses_Registered	Lecturer
S01	John Banda	Database, Networking	Mr. Phiri, Mrs. Mwale
S02	Mary Zulu	Programming, AI, Math	Mr. Lungu, Dr. Tembo, Mr. Daka
S03	Peter Mwansa	Web Design, Graphics	Mrs. Chanda, Mr. Phiri
S04	Grace Mulenga	Accounting, Business Law	Dr. Zulu, Mrs. Mwale
S05	Brian Phiri	Cybersecurity, Networking, AI	Mr. Banda, Mr. Daka, Dr. Tembo

Question 3

- a) List five (5) components of the DBMS environment (5 marks)

Student

Stuld	LName	FName	City	Prov	S_Term	B_Date	Fac_Id	Major_Id	Phone
00100	Diaz	Jose	Kamloops	BC	F17	02/12/83	123	100	2508281000
00101	Tyler	Mickey	Vernon	BC	F17	03/11/84	555	500	2505552222
00102	Patel	Rajesh	Calgary	AB	W18	12/12/85	111	400	4032225000
00103	Rick	Deb	Halifax	NS	W18	11/28/85	345	600	9023334000
00104	Lee	Brian	Hope	BC	F15	07/07/84	222	500	2503457000
00105	Khan	Amir	Jasper	AB	W17	10/20/70	555	200	4034225000

Assume all related objects to this database are in the component tray. For each query you write display in a table the results returned

- b) Write a SQL SELECT statement that queries the student table for all students that are from AB. The query should only return the student LName, FName, City and S_term in **descending** order of LName.
- c) Write a SQL SELECT statement that would display LName, FName, City from BC and having a start term of F17. Sort your query in **ascending** order of LName.
- d) Write a SQL SELECT statement that would list student last name, first name whose Phone numbers begin with "250"
- e) Write a SQL SELECT statement that would list student last name, first name whose Faculty Id ends with "55"
- f) Write a SQL select statement that returns all students whose major id begins with "50". Sort your query in **ascending** order of LName. (15 marks)

Question 4

- a) Discuss the concept of data independence and explain its importance in a database environment. (3 marks)
- b) To address the issue of data independence, the ANSI-SPARC three-level architecture was proposed. Compare and contrast the three levels of this model. (9 marks)
- c) Differentiate between Physical Data Independence and Logical Data Independence, providing one example for each. (8 marks)

Question 5

- a) Discuss some of the advantages of the Database Management Systems (DBMSs). (12 marks)
- b) What is meant by the term 'client-server architecture' and what are the advantages of this approach? (8 marks)

Question 6

- a) Describe, with examples, the types of problem that can occur in a multi-user environment when concurrent access to the database is allowed. (8 marks)
- b) Describe the **Two-Phase Locking (2PL)** protocol and state one potential problem that can arise from using it. (4 marks)
- c) What are timestamps and how do timestamp-based protocols for concurrency control differ from locking-based protocols? (8 marks)

END OF EXAM



KAPASA MAKASA UNIVERSITY

SCHOOL OF APPLIED SCIENCES AND OPEN LEARNING

Course Title: Engineering Mathematics

Course Code: MA210

Date: 20 /10/ 2025

08: 00hrs

Duration: 3 Hours

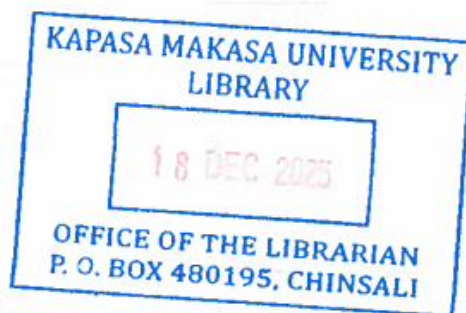
Total Marks: 100

General Instructions to Candidate:

1. Answer questions as instructed.
2. No unauthorized materials are allowed.
3. Scientific Calculators are allowed.
4. Start **each** on a new page.
5. Omission of **essential** working will results in loss of marks
6. Write clearly and legibly

Exam Instructions

1. There are **seven** questions in this paper, each carrying equal marks.
2. Answer **any five** questions



1. (a) Solve the equation $3\coth^2 x - 8\operatorname{cosech} x + 1 = 0$ giving your answer in exact simplified form in terms of natural logarithms [5]
- (b) Show that $\cosh^{-1} x = \ln(x + \sqrt{x^2 - 1})$, $x \geq 1$ [6]
- (c) Consider the following hyperbolic equation, given in terms of a constant k , $2\cosh^2 x = 3\sinh x + k$.
 - (i) Find the range of values of k , for which the above equation has no real solutions. [4]
 - (ii) Given further that $k = 1$, find in exact logarithmic form, the solutions of the above equation. [5]
2. (a) Find the point on the line $y = 2x + 3$ which is at minimum distance from the origin, when the distance is given by [4]

$$z = \sqrt{x^2 + y^2}$$

- (b) One car moves north at 40mph(iniles per hour) and passes a point P at time 1:00. Another car moves east at 60mph and passes the same point P at time 2:30. How fast is the distance between the two cars changing at the time 2:00? [7]
- (c) Calculate the period of $\sin x$ [2]
- (d) A woman wishes to rent a house. If she lives x miles from her work, her transportation cost will be ax dollars per year, while her rent will be $\frac{25a}{x+1}$ dollars per year.
How far should she live from work to minimize her rent and transportation expenses? [7]
3. (a) (i) Use the Heaviside method to evaluate [6]

$$\int \frac{x+4}{x^3+3x^2-10x} dx$$

- (ii) Find the area of the region between the graphs of $f(x) = 3x^3 - x^2 - 10x$ and $g(x) = -x^2 + 2x$ [4]
- (b) Use the washer method to find the volume of the solid formed by revolving the region bounded by the graphs of $y = \sqrt{x}$ and $y = x^2$ about the x-axis [5]
- (c) Find the fourier series for $f(x) = |\sin x|$ in $-\pi < x < \pi$ [5]

4. (a) Form the differential equation of $y^2 = Ax^2 + Bx + c$ by eliminating arbitrary constants and also write down the order of the differential equation obtained. [7]

(b) Find the derivative of $y = \sinh^{-1} x$ [7]

(c) Show that $\tan^{-1} x = \sin^{-1} \frac{x}{\sqrt{1+x^2}}$ [6]

5. (a) (i) Find the solution of the initial-value problem [8]

$$x^2 y' + xy = 1 \quad x > 0 \quad y(1) = 2$$

(ii) Solve $y' + 2xy = 1$ [6]

(b) Show that $\cosh^2 x - \sinh^2 x = e^x$ [6]

6. (a) Use partial fraction to evaluate [7]

$$\int \frac{2x^3 - 4x^2 - x - 3}{x^2 - 2x - 3} dx$$

(b) Given that $\cosh^2 x - \sinh^2 x \equiv 1$

(i) Prove the validity of the above hyperbolic identity by using the definitions of $\cosh x$ and $\sinh x$ in terms of exponentials [4]

(ii) Hence solve the equation $10\cosh^2 x + 6\sinh^2 x = 19$, giving the answer in terms of natural logarithm [5]

- (c) Determine the value of x for which the power series

$$\sum_{n=1}^{\infty} \frac{1}{n^2} x^n$$

converges [4]

7. (a) Solve the differential equation $\frac{dy}{dx} + 3x^2 y = 6x^2$ [8]

(b) Evaluate $\int \frac{x^2}{\sqrt{9-x^2}} dx$ [8]

- (c) Given the function $W = Z \cos x + Z \sin y$ at the point $(0, 0, 3)$. Find the gradient vector and the derivative in the direction of $U = \frac{2}{3}i - \frac{1}{3}j + \frac{2}{3}k$ [4]

BEST WISHES



MANAGEMENT AND EDUCATION ADMINISTRATION

Time allowed: 3hrs

Instructions

- i. There are eight (8) questions in this paper.
- ii. You are required to attempt any five (5)
- iii. Each question carries twenty (20) marks

QUESTION ONE

Explain in 200 words 10 common health and safety hazards in Zambian secondary schools.
Explain why health and safety is largely ignored in schools.

QUESTION TWO

According to Michael Fullan (1995), what are the major problems in managing change in education? Suggest 4 solutions and 4 strategies in dealing with resistance to change. List the 5 various items in the 2024 curriculum change in the education system

QUESTION THREE

What are the differences between:

- a) Scientific management and Human relations management.
- b) Education management and Education administration.

QUESTION FOUR

Cite Examples of the following:

- a) Theory X As observed during your TP
- b) Theory Y As observed at any institution of your choice
- c) Scientific theory of managing staff.



- d) Human relations theories in managing staff.

QUESTION FIVE

- a) List the 14 principles of management postulated by management scholars.
- b) State the major proponent of these principles.
- c) Which of these principles are associated with theory Y.

QUESTION SIX

Write the full words of the following abbreviations;

- a) PESTEL
- b) SWOT
- c) PSBAT
- d) Draw a table to show examples of SWOT of KMU OR for a learning institution of your choice.

QUESTION SEVEN

- a) Explain why Abraham Maslows theory of needs is referred to as a **needs hierarchy**.
- b) Draw and label the diagram of the hierarchy.
- c) Write a critique of the following works in 100 words FW Taylor, A Braham Maslows theory Elton Mayo

QUESTION EIGHT

Write a 300 word essay on job satisfaction as postulated by Fredrick Henzeberg in the two factor theory.



KAPASA MAKASA UNIVERSITY

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

BACHELOR OF SCIENCE – (ICT with Education)

COURSE CODE: TM 310 (Teaching Methods)

END OF THIRD YEAR SESSIONAL EXAMINATIONS

Date: 10th October, 2025. **14:00 Hours** **Duration:** 3 hours **Marks:** 100

Instructions:

1. Write your Student Identification Number on the Answer Booklet provided.
2. There are two sections in this paper; Sections A and B.
3. Section A has Five (5) questions, **answer any four questions.**
4. Section B has Two (2) questions, **choose only one (1) question.**
5. Always clarify key concepts in a question.
6. Use examples relevant to your field of specialisation or study where possible.
7. There are two (2) typed pages in this examination paper.

Lecturer: Philip Siwale



Section A: Answer any four questions.

1. (a) Describe any four digital skills. **[8 Marks]**
(b) Briefly explain the meaning of the following terms: **[12 Marks]**
 - i. Peer-to-peer learning
 - ii. Kinaesthetic learning
 - iii. Implicit learning
 - iv. Behavioural learning
2. (a) Briefly explain five aims and objectives of teaching ICT. **[10 Marks]**
(b) What is meant by sequencing of instructional materials in ICT teaching? **[4 Marks]**
(c) Why is sequencing of instructions important? **[6 Marks]**
3. (a) Identify any three purposes of giving homework. **[6 Marks]**
(b) What is problem solving? **[2 Marks]**
(c) List six common steps into problem solving. **[12 Marks]**
4. (a) What is spiral curriculum according to Jerome Bruner? **[4 Marks]**
(b) List three principles by Bruner for the structuring of the school curriculum. **[6 Marks]**
(c) Describe five factors affect selection of strategies and teaching methods? **[10 Marks]**
5. (a) Write two merits of inductive approach. **[4 Marks]**
(b) How can you improve the weaknesses of a lecture method? **[6 Marks]**
(c) Write brief notes on the following: **[10 Marks]**
 - i. Self-evaluation
 - ii. Remedial work
 - iii. Schemes of work
 - iv. Rationale
 - v. Record of work

Section B: Answer only one question

6. Compare and contrast the traditional teaching aids and the commercially produced teaching aids. **[20 Marks]**
7. Compared and contrast the philosophical approaches to curriculum construction on the basis of their focus, goals and curriculum design. **[20 Marks]**

END OF PAPER



KAPASA MAKASA UNIVERSITY

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

BACHELOR OF SCIENCE – (ICT with Education)

COURSE CODE: PE 330 (Principles of Education)

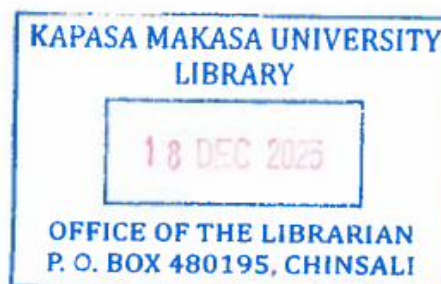
END OF THIRD YEAR SESSIONAL EXAMINATIONS

Date: 10th October, 2025. **14:00 Hours** **Duration:** 3 hours **Marks:** 100

Instructions:

1. Write your Student Identification Number on the Answer Booklet provided
2. There are two sections in this paper; Sections A and B
3. Section A has eight (8) items, choose only five (5) and write brief notes about them.
4. Section B has four (4) questions, choose only two (2) questions.
5. Always clarify key concepts in a question.
6. Use examples relevant to your field of specialisation or study where possible.
7. There are two (2) typed pages in this examination paper.

Lecturer: Philip Siwale



SECTION A (40 Marks)

1. There are **eight (8)** items under this question, choose only **five (5)** and write brief notes about each one of them. Each question carries **8 marks**.
- (a) Literature review
 - (b) Significance of the study
 - (c) Purpose of the study
 - (d) Transcription in research
 - (e) Research paradigm
 - (f) Research design
 - (g) Nominal variables
 - (h) Independent variable

SECTION B (60 Marks)

Section B has four (4) questions. Choose only two (2). *Each question carries 30 marks.*

2. (a) What is research? **(5 marks)**
(b) Describe the characteristics of research. **(10 marks)**
(c) What is educational research and why do research in education? **(15 marks)**
3. Consider a research title; ***“The Role of ICT teachers in the Digital Citizenship Transformation Agenda in Zambian Schools.”***
- (a) Identify the independent and dependent variables. **(4 Marks)**
 - (b) Briefly explain the characteristics of a good research title **(6 Marks)**
 - (c) What is a survey? **(10 Marks)**
 - (d) Outline the qualities of a good questionnaire. **(10 marks)**
4. Given the data set: 0, 4, 5, 5, 1, 8, 3, 6.
- (a) Calculate the standard deviation. **(10 Marks)**
 - (b) Analyse this set of scores via a **Whisker and Box Plot**. **(20 Marks)**
5. Compare and contrast qualitative research vis-à-vis quantitative research approaches in terms of data collection methods. **(30 Marks)**

End of Paper.



SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
ICT 350: Object Oriented Programming (Java)

2025 SESSIONAL EXAMINATION

DATE: 4th November 2025

TIME: 3 hours

TOTAL MARKS: 60 MARKS

INSTRUCTIONS

1. Write your Student Identification Number on the Answer Booklet provided
2. This paper has only 2 sections, Section A and Section B. [60 marks]
3. Section A contains open-ended questions
4. Section B answer any 3 questions
5. Please write as clearly as possible as illegible handwriting cannot be marked.
6. Number the answers to the questions clearly before answering

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Section A (Answer all Questions) [4 marks each question]

1. Consider the following code fragment

```
int sum = 0;
int i = 0;
while (i < 5)
{
    sum += i;
    i++;
}
```

System.out.print(sum);

Replace the while loop in the fragment above with a for loop that prints the same value of sum variable. [4 marks]

2. Write a Java program to print 'Hello' on screen and then print your name on a separate line.

[4 marks]

Expected Output:

Hello

Mwansa Peter

3. Write a Java program to print the sum of two numbers. [4 marks]

Test Data:

74 + 36

Expected Output:

110

4. Write a Java program that takes two numbers as input and display the product of two numbers. [4 marks]

Test Data:

Input first number: 25

Input second number: 3

Expected Output:

25 x 3 = 75

5. Write a Java program to take three numbers from the user and print the greatest number. [4 marks]

Test Data:

Input the 1st number: 25

Input the 2nd number: 78

Input the 3rd number: 87

Expected Output:

- The greatest: 87

SECTION B (Answer any 3 Questions) [40 marks]

QUESTION 1

Create a class BankAccount with the following features:

- Private variables: accountNumber, balance
- Methods: deposit(), withdraw(), getBalance()
- Ensure that withdrawal cannot exceed the current balance.

[13.3 marks]

QUESTION 2

Write a Java class Rectangle with the following specifications:

- Two private instance variables: length and width
- A constructor to initialize these variables
- A method area() that returns the area of the rectangle
- A method perimeter() that returns the perimeter of the rectangle.

[13.3 marks]

QUESTION 3

Write a Java program that demonstrates the following concepts:

- Inheritance
- Method Overriding
- Encapsulation

Your program should contain a superclass Vehicle, a subclass Car, and demonstrate encapsulation with private attributes and public accessor methods.

[13.3 marks]

QUESTION 4

Inheritance & Polymorphism:

Create a base class Employee with attributes name and salary.

- Create a derived class Manager with an additional attribute department.
- Implement a method displayDetails() in both classes to show employee info.

- Write a main method to demonstrate polymorphism using an array of Employee objects that includes Manager objects.

[13.3 marks]

QUESTION 5

Explain how event handling works in Java. Write a program that creates a simple GUI using Java Swing where:

- There is a button labeled "Click Me".
- When the button is clicked, it changes the text of a label to "Button Clicked".

[13.3 marks]



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES AND OPEN LEARNING
DEPARTMENT OF INFORMATION AND COMMUNICATION
TECHNOLOGY

WEBSITE DEVELOPMENT

ICT 361

DURATION: 3 HRS

DATE: 21st October, 2025.

Total Marks: 100

General Instructions to Candidates:

1. Answer questions as instructed.
2. No unauthorized materials are allowed
3. No electronic devices are allowed.
4. Start **each** answer on a new page.
5. Write clearly and legibly.

Exam Instructions:

This question paper contains two sections; SECTION A and SECTION B. Answer all questions in SECTION A and answer two questions from SECTION B. Note that question one in SECTION B is Compulsory.



SECTION A (Answer all questions in this section – 50 Marks)

1. Write short notes on the following;
 - i. Web designing vs. web development [5 Marks]
 - ii. Server-side vs. Client-side scripting [5 Marks]
 - iii. Front-end vs. back-end designing [5 Marks]
 - iv. HTML vs XML [5 Marks]
2. What are the differences between **Get** and **Post** methods in form submitting? Give the case where we can use get and we can use post methods. [10 Marks]
3. List and explain the types of Style sheets in CSS. [6 Marks]
4. Define Table tag and their attributes with an example. [4 Marks]
5. Explain variables and operators with example in PHP. [4 Marks]
6. Explain the predefined and user defined functions in PHP with an example. [4 Marks]
7. Define Ordered list with an example. [2Marks]

SECTION B (COMPRISES OF 3 QUESTIONS. QUESTION ONE IS COMPULSORY AND CHOOSE ONE FROM THE REMAINING TWO QUESTIONS - TOTAL MARKS: 50)

1. A company's website has experienced multiple downtime incidents and data breaches. Discuss a maintenance and security plan for the website. Include:
 - i. Common website vulnerabilities and prevention measures [10 Marks]
 - ii. Regular maintenance and backup strategies [10 Marks]
 - iii. Importance of updates and user education [5 Marks]
2. A small business website is live but not attracting visitors. Propose strategies to improve its visibility using SEO techniques. Include:
 - i. On-page optimization (keywords, titles, meta tags) [10 marks]
 - ii. Off-page optimization (backlinks, social media) [10 marks]
 - iii. Evaluation of SEO performance [5 marks]
3. A bookshop wants an online catalog where users can search for books and view details. Explain how you would implement the back-end system. Include:
 - i. Database design (tables and relationships) [10 marks]
 - ii. Server-side scripting logic [10 marks]
 - iii. Explanation of security measures [5 marks]



SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
ICT DEPARTMENT
BACHELOR OF SCIENCE ICT WITH EDUCATION

ICT445: COMPUTER SECURITY
SESSIONAL EXAMINATION 2025
DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your Student Identification Number on the Answer Booklet provided
 2. Each question carries 25 marks. Answer **FOUR** questions only
 3. Clearly number the questions you have answered.
-



INSTRUCTIONS:

- Each question carries 25 marks. Answer **FOUR** questions only
 - Clearly number the questions you have answered.
-

Question 1

A small e-commerce startup, "MyShop," is designing its system architecture. They want to ensure the **confidentiality, integrity and availability** (CIA) of their customer data (payment information and shipping addresses) and their website functionality.

- a) Explain the three core components of the CIA Triad in the context of MyShop's customer data. Give a specific security control for each component that MyShop could implement. (9 marks)
- b) MyShop decides to use encryption for storing customer passwords. Explain the difference between a **symmetric encryption** algorithm and a **hashing function**. Which encryption method should MyShop choose and why? (10 marks)
- c) MyShop is concerned about a Distributed Denial of Service (DDoS) attack on its public-facing web server. Briefly explain what a DDoS attack is and how it impacts the **Availability** component of the CIA Triad. (6 marks)

Question 2

A mid-sized hospital experienced a ransomware attack where all patient records were encrypted, and the attackers demanded 50 Bitcoin for decryption keys. The hospital's operations were severely impacted, forcing some patients to be transferred to other facilities.

Consistency

- a) Describe the kind of vulnerabilities that the attackers might have exploited to gain access to the hospital's network? (10 marks)
- b) How can ransomware be prevented or mitigated in healthcare systems? (6 marks)
- c) What are the ethical implications of paying or not paying the ransom? (4 marks)
- d) What incident response steps should the hospital take immediately after discovering the attack? (5 marks)

Question 3

An employee at a software development company was caught leaking proprietary source code to a competitor. This caused major financial loss and damaged the company's reputation.

- a) What signs might indicate insider threats before a breach happens? (5 marks)
- b) Describe the technical and administrative controls that can be used to detect and prevent insider threats? (6 marks)
- c) How could the company have secured its source code better? (4 marks)
- d) Briefly discuss if the employee should face criminal charges or internal disciplinary action? (10 marks)

Question 4

- a. With the use of a suitable example explain the difference between Authentication and Authorization? (6 marks)
- b. What is the role of access control mechanisms in preventing unauthorized access to systems and data? (4 marks)



KAPASA MAKASA UNIVERSITY
BACHELOR OF ICT WITH EDUCATION
INTERNET TECHNOLOGIES EXAM - 2025

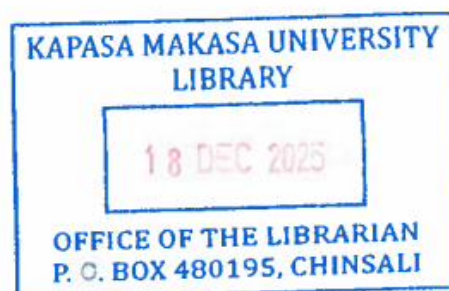
COURSE CODE: ICT460

TIME: 3 HOURS

TOTAL MARKS: 100

INSTRUCTIONS:

1. Do not turn over the page until you are told to do so.
2. There are **seven (7)** questions in this paper. Attempt any **five (5)** questions.
3. Credit will be given for legible writing, proper punctuation and correct use of English.
4. Cell phones are not allowed in this exam.
5. Calculators are allowed in this exam.
6. Textbooks, laptops, exercise books, phones and other devices are not allowed in the examination room. If found a candidate will be disqualified.



DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

QUESTION 1

- a) Zanaco network system has been growing exponentially due to the new employees and branches established countrywide recently. You have been tasked to create secure networks between company branches within Lusaka and other cities. Discuss the equipment and protocols you would use to create these robust and secure connections. (5 marks)
- b) World over, IP addresses are managed by Internet Corporation for Assigned Names and Numbers (ICANN) and Internet Registries in continents. Internet registries sell IP addresses to Internet Service Providers (ISP). Three (3) methods are used to assign these IP addresses to hosts. With the help of one (1) example in each case, discuss these methods. (9 marks)
- c) Address resolution protocol is used to convert an IP address to a MAC address. Explain the need for this protocol on a network and three (3) methods used. (6 marks)

[Total: 20 marks]

QUESTION 2

Zamnet company has decided to subnet their network in order to create 32 subnets, this will suit business organization needs because they are expanding business rapidly. Given that the IP address 192.168.16.0 is to be subnetted, compute and explain the following:

- a) What class is the IP address and why? (2 marks)
- b) The number of bits that were borrowed to create the subnets (show your working) (2 marks)
- c) Subnet mask (2 marks)
- d) Number of subnets (2 marks)
- e) Number of Hosts (2 marks)
- f) Subnet Addresses (At least 4) (4 marks)
- g) Host addresses (Give a range of host addresses each of the 4 subnets) (4 marks)
- h) Broadcast Addresses (At least 4) (2 marks)

[Total: 20 marks]

QUESTION 3

- a) The Domain Name System (DNS) handles the growing number of Internet users. DNS performs an important function on TCP/IP-based networks of converting hostnames to IP addresses. Discuss the three (3) entries used by DNS. (6 marks)
- b) Address resolution protocol (ARP) is used to convert IP addresses to MAC addresses. Describe this protocol and three (3) methods used for this process (8 marks)
- c) IPv6, a successor to IPv4, was published by the IETF (Internet Engineering Task Force) as a draft standard in December 1998, then it was implemented fully in June 2012. Describe three (3) reasons that necessitated the change from IPv4 to IPV6. (6 marks)

[Total: 20 marks]

QUESTION 4

- a) Transport Control Protocol (TCP) and User Datagram Protocol (UDP) are the two common protocols used for transportation of data on a network. Stating the services, discuss three (3) application of each of these protocols in industry. (6 marks)
- b) Imagine you have been employed as a network technician and your manager has instructed you to undertake network troubleshooting because some users are having challenges to access Internet. Discuss three (3) steps you would undertake in order to solve the problem. (6 marks)
- c) Networks have got a carrying capacity called maximum transmission unit (MTU). Discuss the process of fragmentation, re-assembly, its importance and outlining how it is performed in both IPv4 and IPv6. (8 marks)

[Total: 20 marks]

QUESTION 5

- a) File transfer protocol (FTP) is used to transfer files on the Internet from server to the client. However, FTP uses two kinds of connections, describe these connections stating the port numbers. (6 marks)
- b) Explain the process and need for encapsulation on the network. (5 marks)
- c) Transmission Control Protocol (TCP) is a reliable transmission protocol compared to User Datagram Protocol (UDP). Discuss how TCP ensures its reliability. (5 marks)

- d) The Data Link Layer consists of two sublayers, Logical Link Control (LLC) and Media Access Control (MAC). Explain the differences between these sublayers. (4 marks)

[Total: 20 marks]

QUESTION 6

- a) With the use of one (1) example, differentiate between limited broadcast IP address and directed broadcast IP address. (4 marks)
- b) Internet Control Message Protocol (ICMP) is used to report errors on the network. Describe any three (3) ICMP error messages. (6 marks)
- c) Explain the following special IP addresses.
- i) Loopback IP address (2 marks)
 - ii) Network IP address (2 marks)
 - iii) Unspecified IP address (2 marks)
- d) Describe two (2) reasons why the Open System Interconnection (OSI) model was developed. (4 marks)

[Total: 20 marks]

QUESTION 7

- a) A network needs implementation of private addresses. With the use of three (3) examples of private IP addresses, discuss the importance of these addresses. (6 marks)
- b) Discuss the need for Network Address Translation (NAT) on a network. (4 marks)
- c) With the use of two (2) examples of protocols that use such mode of communication, differentiate between a Client and Server. (6 marks)
- d) Automatic Private Internet Protocol Addressing (APIPA) or Link local protocol is a Microsoft protocol used on a local network. Explain the need to have this protocol running and the IP address used. (4 marks)

[Total: 20 marks]