

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF
COMMERCE**

**COSC 104: INTRODUCTION TO COMPUTER PROGRAMMING
METHODOLOGIES**

STREAMS: BCOM (ODEL)

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 06/10/2021

11.30 A.M – 1.30 P.M.

INSTRUCTIONS:

- Answer QUESTION ONE and any other TWO questions.
- This is a CLOSED BOOK exam. No reference materials are allowed in the exam room.
- No mobile phone is allowed in the exam room (*make sure to switch it off and leave it with the invigilator if you carried one*).
- Write your answers legibly and use your time wisely
- Time **2 hours**

SECTION A (COMPULSORY) [30 MARKS]

- a) Define the following terms [4 marks]
- i) Array
 - ii) Heap
- b) Outline the advantages of linked linear lists over arrays [4 marks]
- c) Discuss three rules of naming variables [3 marks]
- d) Enumerate three advantages of modular programming compared to procedural programming language. [3 marks]

Explain the popularity of object oriented programming as an appropriate approach towards problem solving. [3 marks]

e) Discuss the stages of C program compilation. [4 marks]

f) Using a function write a program that adds and subtracts two numbers and displays the result. [6 marks]

g) State any three characteristics of a good algorithm. [3 marks]

SECTION B: Choose two questions

QUESTION TWO (20 MARKS)

a) **A company requires a program to enter employee name, hours worked and rate per hour of an employee then calculate basic pay= hours worked multiplied with rate per hour. Tax is calculated on basic pay as follows:**

Basic pay	Tax
Over 50000	20% of basic pay
Between 20000 and 50000	10% of basic pay
Below 20000	No discount

Design a C program that will enable the user to enter the above details and calculate basic pay, tax and net pay = basic pay – tax.

[5

marks]

b) Distinguish between Local variables and Global variables as used in programming [4 marks]

c) Using examples, describe the following mathematical operators as used in C programming:

- i. Arithmetic operators
- ii. Logical operators

iii. Relational operators [3 marks]

d) For a C/C++ program to be understood clearly by novice programmers, comments are used among other features.

i. Explain two roles of commenting when programming in C [2 marks]

ii. Differentiate between the following symbols as used in comments:

//..... and /*.....*/

[2 marks]

e) Abel wrote the C program below but did not run. Study it and rewrite the correct code by removing the errors [4 marks]

```
#include<stdio.>
void main()
{
    int a, b, sum, product
    double saverage;
    printf("Enter a value for a\n");
    scanf("%d",a);
    printf("Enter a value for b\n);
    scanf("%d",&c);
    sum = a + b;
    product=a*b;
    average = (double) sum/2;
    printf("\n%d+%d=%d",num1,num2,sum);
    printf("The average is %4.2lf\n");
    return 0;
}
```

QUESTION THREE (20 MARKS)

a) Clearly explain the following terms [6 marks]

i. Linking

ii. Data type

iii. Operand

b) CHINA WU-YI Construction Company will pay employees gratuity on termination of the SGR contract computed as follows:

$$\text{gratuity} = (\text{basic_salary} \times \text{fixed_rate} \times \text{months_worked}).$$

i) Identify the variables in the problem. [2 marks]

ii) State any **FOUR** rules used in naming the variables in b (i) above. [2 marks]

iii) Formulate an algorithm that can be used to calculate gratuity.[4 marks]

iv) Represent the algorithm in b (iii) above using a program flow chart. [2 marks]

v) Write a program using C to implement b (iv) above [4 marks]

QUESTION FOUR (20 MARKS)

a) Using examples, discuss the three types of control structures as used in C programming language. [6 marks]

b) Consider the code below.Show and explain the final output of the program. [7 marks]

```

1 // my first pointer
2 #include <iostream>
3 using namespace std;
4
5 int main ()
6 {
7     int firstvalue, secondvalue;
8     int * mypointer;
9
10    mypointer = &firstvalue;
11    *mypointer = 10;
```

```

12 mypointer = &secondvalue;
13 *mypointer = 20;
14 cout << "firstvalue is " << firstvalue << endl;
15 cout << "secondvalue is " << secondvalue << endl;
16 return 0;
17 }

```

- c) Peterson invests Kshs.1000, 000 in savings account yielding 5% interest. Assuming that all interest is left on deposit account, write a program will compute and display the interest after 5 years. [7 marks]

QUESTION FIVE (20 MARKS)

- a) List and explain two disadvantages of using pointers. [2 marks]
- d) The following code fragment is a pseudo-code used to solve a computer problem:
- i. Declare the variables x, y, z and the result to be of type int (in separate statements).
 - ii. Prompt the user to enter three integers.
 - iii. Read three integers from the keyboard and store them in the variables x, y and z.
 - iv. Compute the product of the three integers contained in variables x, y and z and assign the result to the variable result.
 - v. Print “the product is ” followed by the value of the variable result
- i) Write a program to implement the above pseudo-code. [4 marks]
- ii) Use a flowchart to implement the fragment in (i) above. [4 marks]
- b) A learning institution wishes to develop C software system for registering students. The program should prompt the User to enter Marks for 3 Courses undertaken by a student within a particular semester, declare an array structure and to store the above information if the institution would not wish to register more than 100 students in the current academic year. [10 marks]

