

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE  
(CHEMISTRY, PHYSICS AND MATHEMATICS)

COSC 221: STRUCTURED PROGRAMMING

STREAMS: BSC. (CHEM,PHYSICS, MATHS)

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 07/07/2021

11.30 A.M. – 1.30 P.M.

**INSTRUCTIONS**

- Question one compulsory and any other two

**QUESTION ONE (30 marks)**

- (a) Differentiate between iteration and recursion in C++ programming. (4marks)
- (b) What is the difference between declaration and definition as applied to variables (2 marks)
- (c) Write a C++ program that would calculate the volume of a sphere using the
- (d) Formulae  $v = \frac{4}{3} \pi r^3$ . Where  $\pi = 3.14$ ;  $r = 28.7$ . your program should be well commented. (3 marks)
- (e) Describe the need for functions on programming (3 Marks)
- (f) Recursion is a function that repeatedly calls itself severally. Why and where would a programmer use recursion? (2 marks)
- (g) Consider the following segment of a program:-

```
.....  
If(sex is male)
```

```

{
    If (salary > 10000)
    Bonus=0.05 * balance;
    Else
    Bonus=0.02 * balance;
    }
    Else
    {
    Bonus=0.02 * balance;
    }
    Balance=balance * bonus;

```

(h) Required:-

- (i) Identify what type of If statement is this and why? (1 mark)
  - (ii) Explain the execution flow for the above program segment. (2 marks)
  - (iii) Draw a well labeled flow chart to represent the above execution procedure. (2 marks)
- (i) f. Using the while statement write a C++ program to print the numbers 1 to 10 (2 marks)
- (j) Define a constructor and hence explain its function and characteristics (3 marks)
- (k) Define Polymorphism. Hence write a program to show function overloading. (4 marks)
- (l) Write a C++ program that computes a person's body mass index BMI. The program should prompt the user to enter her height in meters and weight in kilograms. The program should then display the BMI number along with a message about their weight, according to the National Institute of Health official categories, i.e.
- i. Underweight for BMI less than 18.5
  - ii. Normal for BMI from 18.5 up to 25
  - iii. Overweight for BMI from 25 to 30
  - iv. Obese for BMI over 30
- Use the formula  $BMI = \text{weight} / (\text{height} * \text{height})$  to calculate the BMI.
- i. (4 marks)

(m) Write a C++ program function that will calculate the square of number 1 to 20.

(2

marks)

**SECTION B ANSWER ANY THREE QUESTIONS**

**QUESTION TWO (20 Marks)**

- a) Write a program that shows how a constructor can be overloaded and hence indicate its possible output. It should be well commented (4 marks)
- b) Explain FIVE standard libraries usable in C++ programming (5 marks)
- c). Explain what is meant by the term class member visibility. (3 marks)
- d) The students doing IT at Chuka University Embu campus are required to pay each Ksh. 50,000/= for this semester's fees.

Design and write a program in C++ to input the fees paid for each student and give some output as per the rules below. (4 marks)

<u>Input fee range</u>	<u>Output</u>
Above 0 and less than 50000	Output the balance
50000	Output "No balance"
Above 50000	Output the amount to be credited for the next semester

e) Differentiate between an overloaded function and inline functions as used in object oriented languages (4 marks)

**QUESTION THREE (20 Marks)**

- a) Using case statement, write a C++ or C program to display the day depending on the Choice entered by the user from the key board (4 marks)

- b) i) What is inheritance? (1 mark)  
 ii). Write a program that shows the implementation of multilevel inheritance as used in C++ (4 marks)

- c) The marks obtained by students in four subjects are input through the keyboard. Write a program that allows for inputting of marks for the four subjects for 30 students. The program should output the class of each student as per the following rules:

Average between 70 and 100 -	First Class
Average between 60 and 69 -	Second Class (Upper Division)
Average between 50 and 59 -	Second Class (Lower Division)
Average between 40 and 49 -	Pass
Average between 0 and 39 -	Fail

(7 marks)

- d) (i) What is a null Pointer? (2 marks)  
 (ii) Describe four advantages of using pointers (2 marks)

**QUESTION FOUR (20 Marks)**

- a) (i) What is variable. (2 marks)  
 (ii) What are the rules followed when declaring it. (3 marks)

- b) What is a Constant? How are they defined? (2 marks)

- c) Explain the two classification of base class. Also illustrate that by sample syntax (2 marks)

- d) Explain the following terms as used in OOP:

i). Pure virtual functions (3 marks)

ii).Encapsulation (3 marks)

- e) Discuss the following Operators used in C++:-

i) Conditional Operators (2 marks)

- ii) Increment and decrement operator (explain both prefix and postfix in all the cases

(3marks)

**QUESTION FIVE (20 Marks).**

- (a) Write a program that checks whether a given number is odd or even. (5 marks)
- (b) What is a class? Explain the syntax of a class. (5 marks)
- (c) Explain the class members. Use examples. (5 marks)
- (d) Explain two ways in which comments can be implicated in C++ (use examples). (5 marks)
- .....