



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 308: PROGRAMMING II

DATE: 21/5/2019

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer **question ONE** and any other **TWO** questions.

QUESTION ONE (30 MARKS)

- a) i Given the following mathematical expressions, solve the equations by applying operator precedence rules, given that $a=10$, $b=5$ and $c=2$ (4 marks)
- i) $X=2*(a \bmod 4)+(4(b-3)/\text{sqr}(c+2))$
- ii) $Y=(2(\exp b)+(\text{sqr}(a+1)*c))$
- ii Using relevant examples, explain pass by value and pass by reference as used in parameter passing (4 marks)
- b) i Factors of a number are numbers that, when multiplied you get another number. For instance, factors of 15 are 3 and 5; factors of 10 are 2 and 5. Write a program using C++ language that uses a nested for loop to find the factors of the numbers from 2 to 100. (4 marks)
- ii Explain why the following variable names are invalid (3 marks)
- main
 - name?
 - 67count
- c) i Discuss the iteration and selection program control structures giving the syntax of their implementation. (3 marks)
- ii At its closest point to Earth, Mars is approximately 34,000,000 miles away. Assuming there is someone on Mars that you want to talk with, what is the delay between the time a radio signal leaves Earth and the time it arrives on Mars? Write

a program that answers this question. (Recall that radio signals travel at the speed of light, approximately 186,000 miles per second. Thus, to compute the delay, you will need to divide the distance by the speed of light.) Display the delay in terms of seconds and also in minutes. (4 marks)

- d) Write a C++ program that can be used to sum all even numbers between 2 and 100. The program should not have user input. (3 marks)
- e)
 - i Describe TWO limitations of machine language. (2 marks)
 - ii Describe any three examples of high level programming paradigms and the areas they are used in writing computer programs. (3 marks)

QUESTION TWO (20 MARKS)

- a)
 - i The C++ standard library provides numerous built-in functions that your program can call. List and briefly describe four of these functions. (4 marks)
- b) Write a program that reads two values from the keyboard and calculates their sum. Use two functions ie **main** and **getsum** to write the program, making appropriate function calls. The function **getsum** is used to calculate the sum. (6 marks)
- c) C++ is a high level language with strong support for object oriented programming. Explain the meaning of the following OOP concepts. (6 marks)
 - i. Abstraction
 - ii. Inheritance
 - iii. Polymorphism
- d)
 - i Describe what is meant by an infinite loop. (2 marks)
 - ii Using C++, illustrate an example of an infinite loop. (2 marks)

QUESTION THREE (20 MARKS)

- a) The moon's gravity is about 17 percent that of Earth's. Write a program that displays a table that shows Earth pounds and their equivalent moon weight. Have the table run from 1 to 100 pounds. Output a newline every 25 pounds. (5 marks)
- b) Write a C++ program that creates an array of ten elements and assigns each element a value. The program should then compute the average of those values and find the minimum and the maximum value (ranging from 1-100) and display them. (7 marks)
- c)
 - i Given the flexibility inherent in all of C++'s loops, what criteria should one use when selecting a loop? i.e., how does one choose the right loop for a specific job? (2 marks)
 - ii Outline any three salient features of high level programming languages (3 marks)

- d) Explain the following programming terminologies, giving an example in each case.
- i. Identifiers
 - ii. Data structure
 - iii. Constant
- (3 marks)

QUESTION FOUR (20 MARKS)

- a) List any three compilers that can be used to write and execute C++ programs (3 marks)
- b) Write a C++ program that asks the user to enter an integer and then the program generates the multiplication table up to 10. (4 marks)
- c) i) Briefly describe three types of operators used in high level languages, giving example in each case. (3 marks)
- ii) Explain any two data structures used in C++, and explain circumstances under which each of the structures would be used. (4 marks)
- d) Write a program that will allow the user to enter names of the student and marks obtained in 3 subjects (Programming 1, Engineering Principles and Thermodynamics). The program should calculate the total and average marks for each student and assign the grading as shown below. (Use the *switch..case* statement) (6 marks)

Average score	Grade
Marks from 90 and above	one would get grade 'A'
Marks from 80 and above	one would get grade 'B'
Marks from 50 and above	one would get grade 'C'
Marks from 40 and above	one would get grade 'D'
Anyone whose score is less than 40	would get an 'F'

QUESTION FIVE

- a) Fibonacci series refers to a series of numbers in which each number is the sum of the two preceding numbers. For example 1, 1, 2, 3, 5, 8, 13, 21, 34, 55... etc. Write a program using a do...while loop to calculate and display the first 10 fibonacci numbers. (Hint: After the first two numbers in the series, each number is the sum of the two preceding numbers) (6 marks)
- b) i In recent times, there has been a simmering debate among computer professionals and working programmers regarding the role of C++ as a modern programming language. Some have opined that, the language C++ should be consigned to outer darkness and its use banned in all serious computer projects. Describe three benefits of C++ as a high level language (3 marks)

- ii What is function prototype? Give two reasons for use of function prototype?
(3 marks)
- c) i Name and explain two programming errors, giving an example of each type.
(2 marks)
- ii Write a C++ program to compare two strings without using any standard library
function
(4 marks)
- d) Differentiate between postfix and prefix operators as used in C++ programming (2 marks)