



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 (MATHEMATICS AND COMPUTER SCIENCE)

BACHELOR OF SCIENCE (MATHEMATICS)

SMA 390: SCIENTIFIC PROGRAMMING

DATE: 18/4/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS

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

QUESTION ONE (30 MARKS)

- a) i State two merits of using a strongly typed language in application development (2 marks)
- ii State three guiding rules for naming variables in C++ programs. (3 marks)
- iii Explain the difference between signed and unsigned data type as used in C++. (4 marks)
- iv What should be the output? (2 marks)
- ```
int main()
{
 int new = -10;
 cout<<"new is: "<<new;
 return 0;
}
```
- b)     i         Outline four categories of operators used in C++ giving an example in each case. (4 marks)

- ii Outline three parts of a **for** loop as used in C++ programs. (3 marks)
- iii Define the term escape sequence and list two examples. (4 marks)
- iv What is type casting in C++ ? (2 marks)
- v Explain two types of errors in C++. (6 marks)

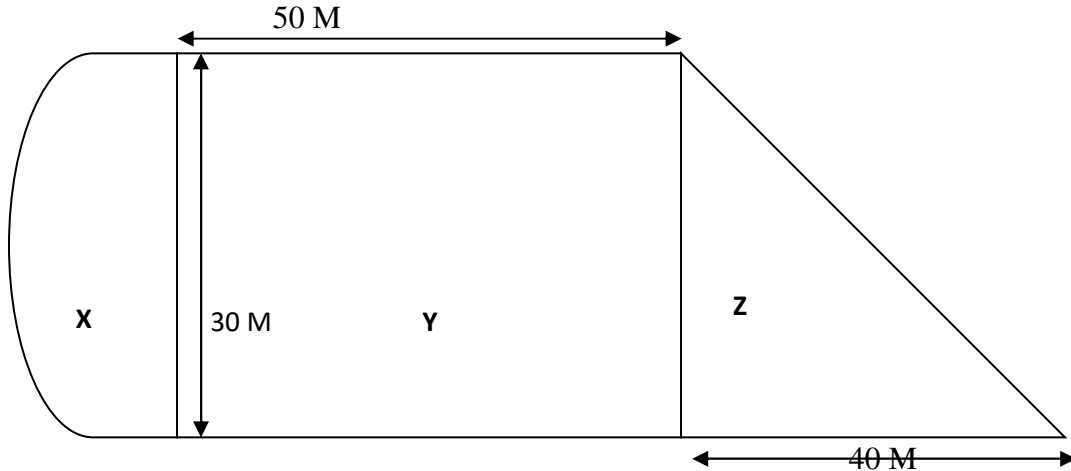
## QUESTION TWO (20 MARKS)

- a) Explain the difference between a recursion and iteration used in C++ (4 marks)
- b) Write a C++ program that will prompt a user to input a number and check whether number is even or odd use if... using **if else**. Statement. (8 marks)
- c) Table 1 shows country codes. Write a C++ program that will prompt a user for the country code then the program outputs the name of the country. Use **switch** statement. (8 marks)

| Country code     | Country name         |
|------------------|----------------------|
| 254              | Kenya                |
| 255              | Tanzania             |
| 256              | Uganda               |
| 257              | Burundi              |
| 258              | Mozambique           |
| Any other number | Invalid country code |

## QUESTION THREE (20 MARKS)

- a) Explain the difference between local variables and global variables. (4 marks)
- b) A computer lab technician wants to install a Dev C++ or Code Blocks on a computer with the following specifications:
  - Android operating system
  - A 32 MB RAM Hard disk space of 116 MB
 State two reasons that may make the installation not successful. (2 marks)
- c) The figure below shows a playground of a certain institution. Use it to answer the questions that follow.



For each of the parts labelled X, Y and Z write a C++ program to calculate the total area covered by the playground. The program should be able to output the area of the semi circle, triangle and the total area of the playground. Take  $\pi = 3.142$ , area of semi circle =  $\frac{1}{2} \pi r^2$ , triangle =  $\frac{1}{2} b \times h$ . (use functions) (14 Marks)

#### QUESTION FOUR (20 MARKS)

1. a) Contrast the features of a compiler and interpreter as used in high level languages. (4 marks)
- b) By use of a function write a C program that will calculate the volume of a sphere and return the calculated result. The function should accept radius as an argument.  
Hint  $V = \frac{4}{3} \pi r^3$ . (8 marks)
- c) Write a C++ program that would prompt the user to enter the choice of a fruit and display the message as shown in table 1. Use **if....else** statement. (8 marks)

| Character | Message                |
|-----------|------------------------|
| O,o       | I love oranges         |
| A,a       | My best fruit is apple |
| B,b       | Bananas are sweet      |
| Any other | I don't know the taste |

#### QUESTION FIVE (20 MARKS)

- a) Explain the difference between do.....while and while.....do as used in C++. (4 marks)
- b) i) Differentiate between an array and a structure as used as used in C++ programs. (4 marks)

- ii) Use C++ programming language to create a **structure** that can be used to store these details: *Name, IdNo, Gender, Age, Department, Salary*. (4 marks)
- iii) For the structure created in (ii), declare an appropriate variable that can be used to access the values. (2 marks)
- c) Write a program to find the factorial value of any number entered through the keyboard. Use for loop. (6 marks)