



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE INFORMATION TECHNOLOGY

SIT 106: PROGRAMMING METHODOLOGY

DATE: 29/4/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS

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

QUESTION ONE (30 MARKS) (COMPULSORY)

- a) Convert the following expressions to a programming statement:
- $m^n + e^x$ (2 marks)
 - $\sum_{k=0}^n a^{n-k}$ (2 marks)
- b) Define variables to represent the following entities
- A collection to hold days of the week (2 marks)
 - A type to manipulate memory location of a variable (2 marks)
 - A collection of floating point numbers (2 marks)
 - A collection for varying data (2 marks)
- c) Write a programming statement to represent the following narrative: Compute and print the weekly pay for a worker. All workers are paid an hourly rate and salary is based on hours times rate. Any work done in excess of 40 hours, is paid at 1.5 times the normal rate. (5 marks)
- d) Use a flow chart diagram to explain the phases of the loop control structure (4 marks)
- e) Study the code below and answer the questions that follow:
- `class Point3D : public Point {`
 - `int _z;`
 - `public:`

```

4.   Point3D() {
5.   setX(0);
6.   setY(0);
7.   _z = 0;}
8.   Point3D(const int x, const int y, const int z) {
9.   setX(x);
10.  setY(y);
11.  _z = z; }
13.  ~Point3D() { /* Nothing to do */ }
14.  int getZ() { return _z; }
15.  void setZ(const int val) { _z = val; };

```

- i) What is the purpose of line 1 (2 marks)
- ii) What is the purpose of line 4 (2 marks)
- iii) Distinguish between line 4 and line 13 (2 marks)
- iv) Distinguish between line 14 and line 15 (3 marks)

QUESTION TWO (20 MARKS)

- a) Given the following loop code:

```

float p = 1.0;

int n = 11;

int x=2;

for (int i=1; i<=n; i++) {

    if (n%2 == 1) p = p * x;

    cout << p << endl;

}

```

- i) What is the output of the program? (4 marks)
 - ii) Express the output in terms of x (3 marks)
 - iii) Rewrite the above code using a while...statement (3 marks)
 - iv) Draw a flow diagram to represent these structure (4 marks)
- b) Explain the following terms as used in programming
- i) Call-by-value (3 marks)
 - ii) Call-by-reference (3 marks)

QUESTION THREE (20 MARKS)

- a) Using an example distinguish between an object and a class as applied in object oriented programming (4 marks)

- b) Give the contents of the array `x[]` after the execution of the `for..` statement below. (6 marks)

```
int x[] = { 3, 7, 4, 9, 1, 5, 7};
int i, t;
for (i=0; i<6; ++i) {
    if (x[i] > x[i+1]) {
        t = x[i]; x[i] = x[i+1]; x[i+1] = t;
    }
}
```

- c) Write a program to find the largest element in an array of `n` elements (6 marks)

- d) Using an example in each case show the difference between the following control structures

- i. The `while...` statement (2 marks)
- ii. The `do...while` statement (2 marks)

QUESTION FOUR (20 MARKS)

- a) Using an example explain the difference between a **struct** and a **class** (5 marks)

- b) Write a function that can be used to find the greatest number among THREE floating point numbers (6 marks)

- c) Using examples of your choice explain what you understand by the following
- i. method overloading (3 marks)
 - ii. accessor method (3 marks)
 - iii. mutator method (3 marks)

QUESTION FIVE (20 MARKS)

- a) The table below shows how marks in an examination are graded at Machakos University.

Marks	Grade
Greater or equal to 70%	"A"
Between 70% and 60%	"B"
Between 60% and 50%	"C"
Less or equal to 50%	"F"

- i. Write down the code that can be used to create a system for grading the marks obtained in an examination (5 marks)
 - ii. Sketch a flow-chart for the grading system above (5 marks)
- b) Use a for statement to print 100 numbers in the following series of data one in each line
10.10 20.15 40.20 80.25 (5 marks)
- c) Construct a flow-chart diagram that can be used to find ALL the solutions of a quadratic equation (5 marks)