



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (STATISTICS AND PROGRAMMING)

SMA 493: DEVELOPMENT OF SOFTWARE ENGINEERING

DATE: 3/5/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS

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

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Distinguish between Bespoke and generic software (2 marks)
- b) Name any 4 generic software process models (4 marks)
- c) What are the attributes of a good software (5 marks)
- d) In software engineering why is measurement essential? (3 marks)
- e) What do you understand by the following terms as used in software measurement
 - i. Software Quality Assurance. (2 marks)
 - ii. Software Quality Control (2 marks)
- f) Describe briefly the characteristics of software that make development of software quality assurance methodology and its successful implementation a professional challenge (Compare with other industrial products). (3 marks)
- g) Using an example in each case, briefly describe the THREE Measurement scales used for representing the empirical relation mappings (3 marks)
- h) What is the meaning of Good Data as used in software measurements? (3 marks)
- i) Briefly explain the Source lines of code (SLOC) metric of measurement (3 marks)

QUESTION TWO (20 MARKS)

Answer the following questions on Function Point Analysis method

- a) What are the benefits of Function Point Analysis (5 marks)
- b) In Function point analysis, what is the meaning of the following function types:
- i) Internal Logical File (ILF)
 - ii) External Interface File (EIF)
 - iii) External Input (EI)
 - iv) External Output (EO)
 - v) External Inquiry (EQ) (5 marks)
- c) In a software project the following characteristics were obtained as shown in the table below:

Function Type	Estimated Count	Weight
EI	20	Average(4)
EO	19	High(7)
EQ	21	Low(4)
ILF	3	Average(10)
ELF	4	High(10)

In addition, the software system had a low (2) degree of influence in all other general system elements except the ones shown in the table below:

General system characteristics	Degree of influence
Data communication	Strong Influence(5)
Transaction rate	Strong Influence(5)
Online update	Strong Influence(5)
Reusability	Moderate(4)
Ease of operation	Moderate(4)

- i. Compute the Total Unadjusted Function Point Count (UFP) (2 marks)
- ii. Compute the value of Total Degree of Influence (TDI) (3 marks)
- iii. Compute Value Adjustment Factor (VAF) (3 marks)
- iv. Estimate the Value of Function Point (FP) (2 marks)

QUESTION THREE (20 MARKS)

The following questions relate to McCabe's Cyclomatic Complexity Metric

- a) Briefly explain McCabe Cyclomatic Complexity Metric? (2 marks)
- b) According to McCabe Cyclomatic Complexity metric, what do you understand by the following terms?
 - i) Program structure? (5 marks)
 - ii) Directed Graphs? (2 marks)
- c) Given the following program fragment written in C programming language, answer the following questions:

```
public static boolean isPrime(int n) {
```

```
    A. boolean prime = true;
```

```
    B. int i = 2;
```

```
    C. while (i < n) {
```

```
        D. if (n % i == 0) {
```

```
            E. prime = false;
```

```
        }
```

```
        F. i++;
```

```
    }
```

```
    G. return prime;
```

```
}
```

- i. Draw a Directed graph for the program section (6 marks)
- ii. Compute the program section's Cyclomatic Complexity (5 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the meaning of the following terms:
 - i. Throw-away prototyping (2 marks)
 - ii. Evolutionary prototyping (2 marks)
 - iii. Process model (2 marks)
- b) Distinguish between system engineering and software engineering (2 marks)
- c) Briefly describe the steps in the Software Development Life Cycle (SDLC) (4 marks)
- d) Given the following fragment of a program written in C programming Language, compute the following Halstead's Software Metrics(show how you arrive at your answer):

```
int sort (int x[ ], int n)
```

```
{
```

```
    int i, j, save, iml;
```

```

/*This function sorts array x in ascending order */
If (n < 2) return 1;
for (i=2; i <= n; i++)
{
    iml=i-1;
    for (j=1; j <= iml; j++)
        if (x[i] < x[j])
        {
            Save = x[i];
            x[i] = x[j];
            x[j] = save;
        }
    }
return 0;
}

```

- i) Potential Program Volume (V*) (2 marks)
- ii) Program Level (L) (2 marks)
- iii) Programming Difficulty (D) (2 marks)
- iv) Programming Time (T) (2 marks)

QUESTION FIVE (20 MARKS)

- a) A given project has 5 user inputs, 10 user outputs, 7 inquiries, 5 files, and 3 external interfaces. All of these are average complexity EXCEPT 2 of the inputs are complex, two of the outputs are complex, and one of the outputs is simple. Adjustment factors are all moderate except that the system will require a significant amount of online data entry, and it is essential that the code is designed with reuse in mind. Calculate the number of Function Points for this system. (Show all your workings). (10 marks)
- b) Use an example in each case to describe any FIVE functional system components (10 marks)