



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

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: 19/10/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer question ONE and any other TWO questions.

QUESTION ONE (COMPULSORY, 30 MARKS)

- a) Distinguish between the following terms
 - i. Software and a program (2 marks)
 - ii. a metric and a measure (2 marks)
 - iii. A software process and a software model (2 marks)
 - iv. Software Engineering and Systems engineering (2 marks)
- b) List down any THREE for each of the following
 - i. Size metrics (3 marks)
 - ii. Control Flow metrics (3 marks)
- c) In software engineering why is measurement essential? (4 marks)
- d) Name any FOUR CASE tools used in software engineering (4 marks)
- e) Use an example in each case to explain the meaning of the following measurement scales
 - i. Nominal (2 marks)
 - ii. Ordinal (2 marks)
 - iii. Ratio (2 marks)
 - iv. Interval (2 marks)

QUESTION TWO (20 MARKS)

- a) What are the characteristics of the following software products
 - i. Generic (3 marks)
 - ii. Bespoke (3 marks)
- b) Discuss why software engineering is different from other engineering disciplines (6 marks)
- c) Using a diagram show the phases of the waterfall model (8 marks)

QUESTION THREE (20 MARKS)

- a) What are the attributes of good software? (5 marks)
- b) According to McCabe Cyclomatic Complexity metric, what is the meaning of 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:

```
while (c) {
    x = y + 1;
    y = 2 * z;
    If(d) x = y + z;
    z = 1;
}
```

- i. Draw a Directed graph for the program section (5 marks)
- ii. Compute the program section's Cyclomatic Complexity (3 marks)

QUESTION FOUR (20 MARKS)

- a) Describe briefly how Halstead's Software Metric works (5 marks)
- b) In Function point analysis, what is the meaning of the following function types:
 - i. Internal Logical File (ILF) (2 marks)
 - ii. External Interface File (EIF) (2 marks)
 - iii. External Inquiry (EQ) (2 marks)
- c) 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). (9 marks)

QUESTION FIVE (20 MARKS)

- a) Use an example in each case to describe any FIVE functional system components (10 marks)
- b) Using a diagram describe the phases of the spiral model (10 marks)