

UNIVERSITY OF KWAZULU-NATAL

School of Electrical, Electronic and Computer Engineering

(Howard College Campus)

Main Examinations: December 2016

ENEL2SE H2: Software Engineering I

Duration: 2 Hours

Total Marks: 100

Examiners : Prof. J. A. Okello
: Prof. J.R. Tapamo

Instructions:

1. This examination has a total of 5 pages including this cover sheet with instructions
2. There is a total of 5 questions
3. All 5 questions must be answered correctly in order to score a maximum of 100 marks
4. No smartphone, or any kind of communication device shall be used during the test
5. All electronic communications devices MUST be switched off during the examination
6. All data in the memory of your calculator must be deleted before you open this question paper.
7. Make sure you write your student number on the answer sheet before opening this question paper.

Question 1.**(Total: 20 Marks)**

- (a.) Some of the important issues that are taken into account while talking of a software process are deliverables, roles and conditions.

Define what one implies by pre- and postconditions in software engineering, and differentiate between precondition and post-conditions as applied to architectural design.

[5 Marks]

- (b.) What is an agile process and why can't this method of development be used in the embedded software of an airplane?

[6 Marks]

- (c.) Explain using a diagram what a software engineer refers to while talking of the waterfall model from the perspective of software development life cycle.

[5 Marks]

- (d.) Provide four areas where waterfall model can be applied.

[4 Mark]

Question 2.**(Total: 20 Marks)**

- (a.) Explain using at least three reasons why feasibility study has to be done before software development.

[6 Marks]

- (b.) One of the steps in software development life cycle (SDLC) is software specification. Who does high-level statement and detailed specification, respectively, target?

[2 Marks]

- (c.) Other than requirement elicitation and analysis, which are the other two activities that are performed during the stage of software specification?

[2 Marks]

- (d.) State at least five of the difficulties that are faced by a software engineer during requirement elicitation?

[5 Marks]

- (e.) Provide five reasons why it may be necessary to make a requirement change after completing a document on requirement specification?

[5 Marks]

Question 3.**(Total: 25 Marks)**

Read the following statement very carefully before answering the following questions.

As a chief software engineer, you have been tasked with developing a software that manages students who can do part time job, and pay students who have worked at the university after being approved to do so.

- The software system (henceforth referred to as software) must allow a teaching staff to *record performance* of a student, and approve the tasks which the software has been automatically assigned to a student.
- The software must allow human resource department to record information related to behavior of all students irrespective of whether a student would like a part time job or not.
- The system must be able to allow a student to register for a part-time work at the university.
- There must be a separate database for keeping records on behavior.
- There must also be another separate database for keeping records of students' performance based on the grade provided by a teaching staff.
- The software should be able to automatically evaluate if a student is fit to do work based on his performance record, and behavior record, and assign a task on temporary basis. Based on the result of evaluation, the system must create a database of working students. The teaching staff should be able to disapprove or approve the automatic assignment of tasks to students.
- The software should also be able to evaluate and pay students who have worked.

Answer the following questions based on the above information.

- (a.) Develop a data flow diagram (DFD) for the above mentioned software with as much atomic modeling as possible.

[22 marks]

- (b.) Write down at least three actors in the system designed in (a.).

[3 Marks]

Question 4.**(Total: 25 Marks)**

From an analysis, it was found that the following delivered code of lines were associated with only the tasks shown below.

Data entry:	0.6 thousand delivered code of lines (KDLOC)
Data update:	0.6 thousand delivered code of lines
Query:	0.8 thousand delivered code of lines
Report generator:	1.0 thousand delivered code of lines

Further, ratings of the different cost driver attributes were assessed. These ratings, along with their multiplying factors are as follows:

Complexity	high	1.15
Storage	high	1.06
Experience	low	1.13
Programmer capability	high	0.17

a.) What is the total KDLOC?

[7 Marks]

b.) What is the effort adjustment factor (EAF)?

[7 Marks]

c.) What is the initial estimate for the project? Assume a COCOMO model (not COCOMO II) where $a = 3.2$ and $b = 1.05$.

[5 Marks]

d.) What is the adjusted effort estimate?

[6 Marks]

Question 5.

(Total: 10 Marks)

(a.) What are the two levels of abstraction for designing software architectures?

[2 Marks]

(b.) In almost all cases of software design there are no standard and unique methods for representing a design in software. It is therefore a common practice to provide a design in multiple views. An example of such a presentation is the 4+1 view model.

List and explain the four views from the perspective of a 4+1 view.

[8 Marks]