MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

UNIVERSITY POSTGRADUATE EXAMINATION

2018/2019 ACADEMIC YEAR

FIRST YEAR **FIRST** SEMESTER EXAMINATION FOR PHD IN INFORMATION TECHNOLOGY

SCS 702 – SOFTWARE DESIGN AND ARCHITECTURE

DURATION: 3 HOURS

DATE: 6/5/2019

TIME: 9-12 P.M.

Instructions to candidates:

1. Answer **ANY FOUR** questions.

2. Mobile phones are not allowed in the examination room.

3. You are not allowed to write on this examination question paper.

QUESTION ONE (25 MARKS)

a) Discuss the object oriented development lifecycle. (7 marks)

b) Compare and contrast the following UML tools used in object modeling:

    i.   Sequence diagrams and state diagrams. (6 marks)

    ii.   Class diagrams and use case diagrams. (6 marks)

c) Differentiate architectural styles from architectural patterns. (6 marks)

QUESTION TWO (25 MARKS)

a) Use examples to discuss the following types of relationships which show how elements are associated with each other:

    i.   Dependency (2 marks)

    ii.   Association (2 marks)

    iii.   Generalization (3 marks)

    iv.   Realization (2 marks)

    v.   Aggregation (2 marks)

    vi.   Composition (2 marks)

    vii.   Multiplicity (2 marks)

b) Murang'a University of Technology (MUT) wishes to start using a software architecture approach when developing all the software to be used within it. As a software architect, write a justification to convince the management that they will have chosen the right approach. (10 marks)

QUESTION THREE (25 MARKS)

a) Draw a use case diagram for the scenario of inventory system below. (8 marks)
In order to generate an invoice, a clerk most log in. There should be an option for the user to register oneself within the log in page. Any user can use the system to view products online. The option of log in is also provided when a user views products online.

b) Explain the importance of object constraint language (OCL) in UML modeling.

(7 marks)

c) Compare and contrast the following design patterns:

    i.   Singleton and Iterator. (5 marks)

    ii.   State and strategy. (5 marks)

QUESTION FOUR (25 MARKS)

a) Explain the difference between the functional and non-functional requirements (NFRs) of a system. (7 marks)

b) Discuss the approaches to Non-Functional Requirements (NFRs). (8 marks)

c) Give a brief description of the layered architecture indicating its advantages and disadvantages. (10 marks)

QUESTION FIVE (25 MARKS)

a) Explain how the quality of software can be measured. (8 marks)

b) Explain how software requirements can be made measurable. (7 marks)

c) One of the primary goals of software architecture in an organization is to identify requirements that affect the structure of a software application. With this in mind, discuss:

   i.   The role of software architect. (4 marks)

   ii. Deliverables of the software architect. (6 marks)