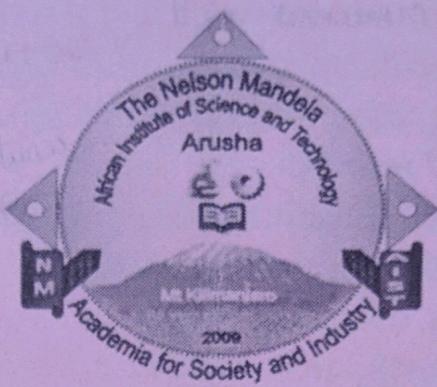


THE NELSON MANDELA AFRICAN INSTITUTION



OF SCIENCE AND TECHNOLOGY

SEMESTER EXAMINATIONS

SEMESTER II

SCHOOL OF COMPUTATIONAL AND COMMUNICATION SCIENCE AND ENGINEERING

EMoS 6308: System Development Methodology

Date: 15th October 2021;

Time: 09:00-12:00

1. Maximum allowed time is **3** hours
2. Mobile phones and any data storage devices are not allowed into the examination room
3. Observe all examination regulations
4. Answer any 5 questions out of 7 questions
5. For question number one and three, refer to the case study given on page 4/4
6. All answers are to be written in answer book provided

Question One (20 marks)

- (a) In brief, differentiate between user requirements definition and system requirements specification (**5 marks**)
- (b) From the given case study, analyze at least five (5) system requirements (**10 marks**)
- (c) Propose a high-level architecture diagram of the desired system in the presented case study (**5 marks**)

Question Two (20 marks)

The traditional Software Development Life Cycle (SDLC) gives several concerns in applications development which has given emphasis on the use of agile methodologies. In view of that, discuss the concerns behind the use of SDLC and related benefits on the same through the use of agile methodologies.

- (a) Team heterogeneity (**5 marks**)
- (b) Business requirements (**5 marks**)
- (c) Social change (**5 marks**)
- (d) Technological changes, (**5 marks**)

Question Three (20 marks)

From the given case study, propose a use case diagram that can cover at least three (3) important stakeholders/users of the proposed system to solve the challenges described in the ordering and distribution of the *Sipps* drink. For the proposed use case, identify relevant actors, use case description, stimulus/triggers and relevant responses across actors.

Question Four (20 marks)

- (a) The requirements engineering process distinguish between user requirements and system requirements. Justify the importance of this distinction with an example (**5 marks**)
- (b) With at least three (3) points, explain how the principles underlying the agile methodologies lead to an accelerated development process and software deployment (**15 marks**)

Question Five (20 marks)

- (a) Briefly differentiate between the use of a sequence and class diagrams in Unified Modeling Language (UML) **(5 marks)**
- (b) Briefly differentiate between state and activity diagrams in Unified Modeling Language (UML) **(5 marks)**
- (c) Develop a sequence diagram showing the interactions involved when a student registers for a course in a university. Courses may have limited enrolment, so the registration process must include checks that indicate availability of slots. Assume that the students accesses an electronic course catalog to find out about all available courses **(10 marks)**

Question Six (20 marks)

Provide brief notes and relevant examples on the following concepts:

- (a) Components/code reuse **(5 marks)**
- (b) Configuration management **(5 marks)**
- (c) Host-target development **(5 marks)**
- (d) Integrated Development Environment (IDE) **(5 marks)**

Question Seven (20 marks)

- (a) Briefly explain the concept of open-source software **(2 marks)**
- (b) Discuss at least three (3) advantages of open-source software **(6 marks)**
- (c) Open source development has brought several challenges of design, incentives and governance towards establishment of platform businesses. Discuss at least four (4) challenges in platform licensing and suggest solutions to the same **(12 marks)**

Case Study

Felix Straw, who represents one of the many U.S. distributors of the European soft drink Sipps, gazes unhappily at the weather app on his smartphone, which shows a map of the United States saturated with dark red, indicating that most of the country is experiencing an early spring heat wave, with no signs of a letup. Holding up the screen of his smartphone as he speaks to the assembled systems group, he says, "It's the best thing that could happen to us, or at least it should be. But when we had to place our orders three months ago, we had no idea that this spring monster heat wave was going to devour the country this way!" Nodding his head toward a picture of their European plant hung on the wall, he continues, "We need to be able to tell them when things are hot over here so we can get enough product. Otherwise, we'll miss out every time. This happened two years ago, and it just about killed us. "Each of us distributors meets with our district managers to do three-month planning. When we agree, we email our orders to European headquarters. They make their own adjustments, bottle the drinks, and then we get our modified orders about 9 to 15 weeks later. But we need ways to tell them what's going on now. Why, we even have some new superstores that are opening up here. They should know we have extra-high demand." Corky, his assistant, agrees, saying, "Yeah, they should at least look at our past sales around this time of year. Some springs are hot, others are just average." Straw concurs, saying, "It would be music to my ears, it would be really sweet, if they would work with us to spot trends and changes—and then respond quickly."

Stern's, based in Blackpool, England, is a European beverage maker and the developer and producer of Sipps. Sipps is a sweet, fruit-flavored, nonalcoholic, non-carbonated drink served chilled or with ice, and it is particularly popular when the weather is hot. Sipps has sold briskly in Europe and grown in popularity in the United States since its introduction five years ago, but the company has had a difficult time adequately managing inventory and keeping up with U.S. customer demand, which is affected by seasonal temperature fluctuations. Places with year-round, warm-temperature climates and lots of tourists (such as Florida and California) have large standing orders, but other areas of the country could benefit from a less cumbersome, more responsive order-placing process. A network of local distributors located throughout the United States and Canada distributes Sipps.

As a system analyst, you have noted the story and concerns from the U.S. distributors and assigned to work with the Sipps Company to design a system that can solve the existing challenges.