Strathmore
UNIVERSITY

SCHOOL OF COMPUTING AND ENGINEERING SCIENCES
BACHELOR OF SCIENCE INFORMATICS & COMPUTER SCIENCE
END OF SEMESTER EXAMINATION
ICS 2201: SOFTWARE ENGINEERING

DATE: 20th April 2021 **TIME: 2 Hours**

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.
3. Do **NOT** write on the question paper.

QUESTION ONE (30 Marks)

SECTION A (5 Marks)

a) Computer Aided Software Engineering Tools such as code generators have revolutionized the Software Development Life Cycle. As a software developer discuss two advantages and two disadvantages of using the tools **(4 Marks)**

b) Version Control systems have helped development teams in maintaining their code repositories. Highlight the difference between centralized and distributed version control systems. **(1 Mark)**

SECTION B (25 Marks)

Read the following case study and answer the questions that follow:

Wachoraji Art Studios is a well established art studio that specializes in the printing of merchandise such as TShirts, Caps, Hoods and Jackets. Further, the studio also markets different designs by artists. Additionally, the studio occasionally partners with different businesses to print their business cards and brand their products. At the moment, the studio markets its portfolio through their official social media pages. However, managing customers via social media platforms is costly for the studio. Therefore, the management of the studio proposed that they should set up a website that would enable them to effectively communicate with their customers. The system should have an authentication system to ensure correct details are captured and an additional payment system. The payment system is linked to the government system to capture the record of sales made by the company.

The Website to be developed has to be interactive to greatly improve the User Experience. Additionally, the management requires that they should be able to deploy a basic Website first as the rest of the system is being actively developed. This will ensure smooth business continuity for the studio. Lastly, the management team decided to make the project as a top priority for the studio hence will allocate more time if requested.

Your company was awarded the contract to build the Website by the management of the Art Studio.

c) Identify and name three stakeholders on the system, and state the interest of each stakeholder to the system. **(3 Marks)**

d) Outline and explain the BEST approach that you would use to elicit the requirements. **(2 Marks)**

e) Write down a scenario of a user interacting with the art studio to buy a design from an artist. In the scenario, indicate any assumptions made and any other optional alternatives. **(4 Marks)**

f) Draw Use Case Diagram for the above scenario (*question h*) **(5 Marks)**

g) One of your employees has suggested that you can build the website using available content management systems that would make the development process faster. Highlight and explain two factors that you would consider before choosing a content management system **(4 Marks)**

h) Your team consists of software developers in different regions of the country. Due to the current restrictions, you chose to use a version control software in the development of the proposed system. Highlight and explain two advantages of using this approach in developing your project. **(4 Marks)**

i) Software Testing is a critical step in Software Development. Highlight and explain two testing styles that you may use for the developed system. **(3 Marks)**

QUESTION 2 (15 Marks)

a) A system is required to keep track of students who belong to a Gaming club. The maximum number of club members is 100. Some of the typical functions provided by the system are as follows:

- **i.** register (studentNumber) – to register a new student (whose number is studentNumber) to the club provided that the number 100 is not exceeded,
- **ii.** exit (studentNumber) – to deregister a student (whose number is studentNumber) from the club,
- **iii.** output (studentNumber) – to retrieve details of the student whose number is studentNumber,
- **iv.** is_a_member (studentNumber) – to return true if a student (whose number is studentNumber) is a member of the club and false otherwise,
- **v.** club_number – to return the current number of club members.

Define and develop a form-based specification for this system for the functions register and exit. State all assumptions made. Check the Appendix Section for an outline. **(8 Marks)**

b) Explain the following terms as used in requirements validation **(3 Marks)**

- **i.** Validity
- **ii.** Realism
- **iii.** Consistency

c) Explain the following categories of CASE tools. **(2 marks)**

- **i.** Upper CASE tools
- **ii.** Lower CASE tools

d) Consider the following scenario. Angel and Beatrice are working a software system and are using git, a distributed version control system to manage their code. Beatrice pulls from the master repository and updates her working copy. She realizes there is a bug in the code and works to fix it. When she is finished, she commits her code. The next day, Angel begins working on the code by pulling from the master repository and updating her working copy. She too realizes the code has a bug (the same one Beatrice saw) and spends the whole day fixing it. What went wrong? Why didn't Angel benefit from Beatrice's work? **(2 Marks)**

QUESTION 3 (15 marks)

a) Discuss the 4 types of software maintenance activities. **(4 Marks)**

b) Watembezi tours and travel company, the leading tours and travel company has hired you to develop an interactive travel planning system. The system will be used by customers to plan for their journey. Notably, users must be able to interact with the system extensively as they plan their schedule.

- **i.** Outline the software process model that would be used in this case and explain the reasons for choosing the model. **(2 Marks)**
- **ii.** Using a well labelled diagram, outline the steps involved in the software process model chosen above *(a)(i)*. **(6 Marks)**
- **iii.** Highlight **three** scenarios where the process model may be used or implemented **(3 Marks)**

QUESTION 4 (15 marks)

a) As a Software Engineering consultant, you have been asked to advise a small company on the advantages and disadvantages of using an externally provided payroll system provided as a software service. In your answer, outline both the advantages and disadvantages to the company. **(4 marks)**

b) Configuration Management (CM) is concerned with the policies, processes and tools for managing changing software systems. CM is important because it is easy to lose track of what changes and component versions have been incorporated into each system version.

- **i.** What is the difference between a system version and a system release? **(1 Mark)**
- **ii.** What features are normally provided by version management systems? **(2 Marks)**
- **iii.** What may be included in a system release? **(2 Marks)**

c) Briefly explain the term '**software reengineering**' and explain two advantages of software reengineering. **(3 Marks)**

d) The figure below (*Figure 1*) represents a system model for an order-delivery system.

- **i.** Label and explain the different sections of the diagram. **(3 Marks)**

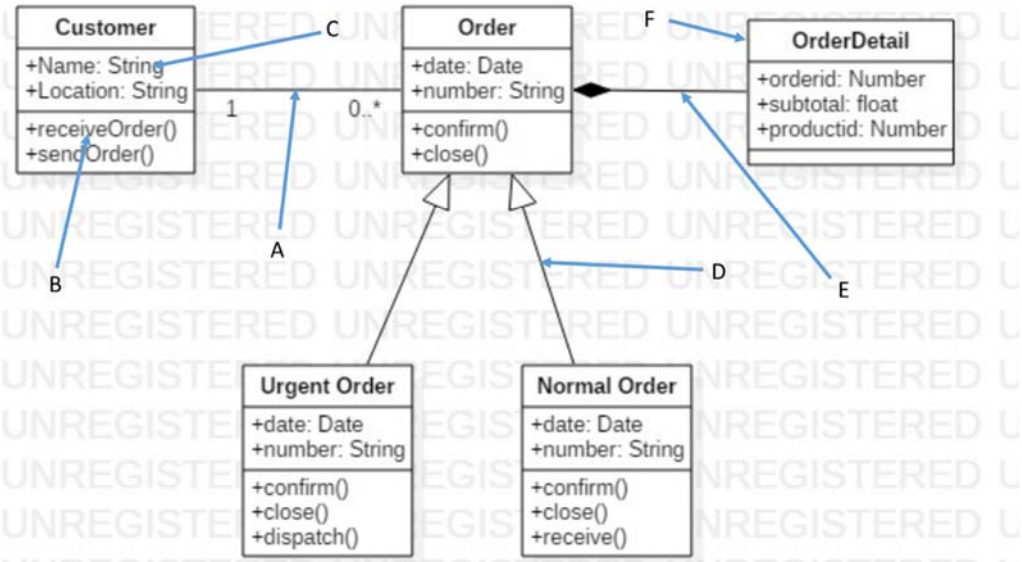

Figure 1 Simple Class Diagram

QUESTION 5 (15 marks)

a) Assume that you are to use **Basic** COCOMO to cost an **organic** project. Essentially, the project is simple application for a laundry company. Notably, the estimated KLOC for the project is 450. Using this information and the table (*Table 1*) below:

PROJECT TYPE	a	b	c	d
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Table 1 COCOMO

i. Calculate the estimated effort for the project. **(2 Marks)**
ii. Calculate the scheduled time for the project. **(2 Marks)**
iii. Calculate the average resource size required for the project **(2 Marks)**

b) Briefly explain any 3 attributes of a well-engineered software. **(3 Marks)**

c) Software delivery model plays a vital role in the success of a project. Currently, software developers have adopted 'software as a service'.

i. Explain the term 'software as a service'. **(1 Mark)**
ii. Outline and explain two benefits to the developer for using this approach. **(4 Marks)**
iii. Highlight two examples of software using the approach **(1 Mark)**

APPENDIX I

NAME	DESCRIPTION
Function	
Inputs	
Source	
Outputs	
Destination	
Action	
Requirements	
Pre-condition	
Post-condition	
Side effects	