FACULTY OF SCIENCE, TECHNOLOGY AND INNOVATION

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

BACHELOR OF SCIENCE IN INFORMATION AND COMMUNICATION TECHNOLOGY

BICT 3601: OBJECT-ORIENTED ANALYSIS AND DESIGN

END OF SEMESTER EXAMINATION

DATE: MARCH 2021 **TIME ALLOWED: 3 HOURS**

INSTRUCTIONS

1. This paper contains **2** pages. Please check.
2. There are **five questions** in this paper. Please check.
3. Answer **ALL** questions.
4. Marks for each question are indicated.

1.

a. Describe the following:
   i. SCRUM. **[2 Marks]**
   ii. Throw-away Prototype. **[2 Marks]**
   iii. Dynamic Binding. **[2 Marks]**
   iv. Structural modelling. **[2 Marks]**

b. Describe any **five** basic characteristics of object-oriented systems. **[10 Marks]**

c. What is the difference between an as-is system and a to-be system? **[2 Marks]**

2.

a. With the aid of a diagram, illustrate the concept of polymorphism when a student sends a message *"Draw yourself"* to the following objects: aTrapezium, aCircle and aTriangle. **[3 Marks]**

b. Discuss the **three** basic characteristics of all object-oriented systems analysis and design approach. **[6 Marks]**

c. Assume that you have been assigned the task of creating an object-oriented system that could be used to support students in finding an appropriate apartment to live in next semester.
   i. Define the classes or objects you would include in your system. Include two attributes and two methods in your definition. **[12 Marks]**
   ii. Implement an inheritance hierarchy in your definition. **[3 Marks]**

3.

a. Suppose Mzuzu university is having a dramatic increase in enrollment and is having difficulty finding enough seats in courses for students.
   i. Perform technical analysis to identify any **three** new ways to help students complete their studies and graduate. **[6 Marks]**
   ii. Describe **four** requirements gathering techniques you would use to implement your solution in question 3(a)i. **[8 Marks]**

b. Explain **three** important user interface design principles. **[6 Marks]**

c. How can a system be designed to be used by both experienced and first-time users? **[2 Marks]**

4. A banking system provides users with several services: (i) to check their accounts to see recent transactions and balances; (ii) to pay bills online; (iii) to buy and sell investments. All of these services require a secure log-in. If the system crashes or the network connection fails during a transaction, all the financial data must be left in a consistent state.

   a. Draw use case diagrams for these requirements. **[6 Marks]**

b. Give the use case specification for paying a bill online. **[5 Marks]**

c. Draw an activity diagram of the given scenario in question 5. **[5 Marks]**

d. Perform a verification and validation walkthrough of the functional models of the banking system given in question 5(a) and 5(d). Give **four** points. **[4 Marks]**

5. Think about the system that handles student admissions at a university. The primary function of the system should be able to track a student from the request for information through the admissions process until the student is either admitted to the school or rejected.

   a. Write a use-case description that can describe an Admit Student use case. Assume that applicants who are children of alumni are handled differently from other applicants. Also, assume that a generic Update Student Information use case is available for your system to use. **[5 Marks]**

   b. Create a use-case diagram that includes all of the above use cases. Assume that an admissions form includes the contents of the form, University Entrance Examination information, and references. Additional information is captured about children of alumni, such as their parent's graduation year, contact information, and college major. Also, be sure to include the above information. **[8 Marks]**

   c. Create a class diagram for the use-cases identified in question 5(b). Assume that a temporary student object is used by the system to hold information about people before they send in an admission form. After the form is sent in, these people are considered students. **[5 Marks]**

   d. Create sequence diagrams for the scenarios of the above use cases. **[6 Marks]**

   e. Create a communication diagram for the scenarios of the above use cases. **[6 Marks]**

   f. Create a behavioral state machine to depict a person as he or she moves through the admissions process. **[5 Marks]**

END OF QUESTION PAPER