MACHAKOS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND SEMESTER, 2021/2022 ACADEMIC YEAR

SECOND YEAR SUPPLIMENTARY/SPECIAL EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

SIT 264: UNIFIED MODELING LANGUAGE

DATE: _____ **TIME:** 2 HRS

EXAMINATION SESSION: JUNE **YEAR** 2022

INSTRUCTIONS

- **i) Answer question ONE and any other TWO questions**
- **ii) Write on both sides of the answer sheet**
- **iii) Keep your Phones away**
- **iv) Begin each new answer on a separate page of the answer sheet**

QUESTION ONE (Compulsory 30 marks)

a) Define

i) Object **(2 marks)**

ii) Class **(2 marks)**

b) Explain the following Object Oriented Analysis techniques

i) object modelling, **(2 marks)**

ii) dynamic modelling, **(2 marks)**

iii) functional modelling **(2 marks)**

c) Provide *three* reasons why an object-oriented approach has an important advantage over traditional, non-object-oriented approaches to information systems development. **(6 marks)**

d) Briefly describe any TWO diagrams used in UML for:

i) Dynamic modeling **(4 marks)**

ii) Static modeling **(4 marks)**

e) Outline the importance of using the object oriented approach to information systems design **(6 marks)**

QUESTION TWO (20 marks)

a) Distinguish between sequence diagrams and message sequence charts. Illustrate using a diagram **(8 marks)**

b) The equation of a circle is given as $(x - a)^2 + (y - b)^2 = r^2$ where **a** and **b** are the coordinates of the center (a, b) and r is the radius. A programmer wishes to find the area, circumference and scale of the circle using the Object Oriented modelling technique. Use UML Notations to draw a figure that represents the Circle Class in the problem domain **(6 marks)**

a) Companies may employ many people, and people may work for many companies. Every employee in a company has a manager who may manage many subordinate employees. Show the relationship between the Employee and Company class in UML. **(6 marks)**

QUESTION THREE (20 marks)

a) What are the main principles of object orientation? Explain briefly **(6 marks)**

b) List down all candidate objects, and candidate actions in the following usage scenario **(6 marks)**

This is a student registration system. There are full-time and part-time students. Each class has a set of scheduled times and a number of credit hours. When a user tries to register for a class, the system checks their schedule for time-conflicts. If there is a conflict, an error is returned. If there is no error, then the system checks to see if the total number of hours including this class is no more than the maximum number of hours for a full-time student. If so, then the system returns an error. If no problems are found, the system registers the student for the class, and informs the user of success.

c) Produce a class diagram to model the system. **(8 marks)**

QUESTION FOUR (20 marks)

a) Using diagrams distinguish between association and aggregation relationship as applied in object oriented systems **(6 marks)**

b) Describe briefly the meaning and application of principles of object oriented systems **(6 marks)**

c) To give an exam, an instructor first notifies the students of the exam date and the material to be covered. She then prepares the exam paper (with sample solutions), gets it copied to produce enough copies for the class, and hands it out to students on the designated time and location. The students write their answers to exam questions and hand in their papers to the instructor. The instructor then gives the exam papers to the TAs, along with sample solutions to each question, and gets them to mark it. She then records all marks and returns the papers to the students.

   i. Draw a sequence diagram that represents this process (Make sure you show when each actor is participating in the process.) **(4 marks)**

   ii. Show the operation that is carried out during each interaction, and what its arguments are. **(4 marks)**

QUESTION FIVE (20 marks)

a) Describe a use case scenario of a software system **(6 marks)**

b) Construct a *use case diagram* showing the major processes involved **(7 marks)**

c) Using your use case diagram produced in a) above, explain the terms: *actor*, *include*, *extend*. Clearly indicate these on your diagram. **(7 marks)**