



# MACHAKOS UNIVERSITY

University Examinations for 2021/2022

**SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY**  
**SECOND YEAR SPECIAL / SUPPLEMENTARY EXAMINATIONS FOR**  
**BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)**  
**SIT 209: OBJECT ORIENTED DESIGN**

**DATE:**

**TIME:**

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**INSTRUCTIONS:**

- i) Answer question ONE and any other TWO questions**
- ii) Write on both sides of the answer sheet**
- iii) Keep your Phones away**

**QUESTION ONE (30 MARKS, COMPULSORY)**

- a) Use an example to explain the following
  - i) Object (3 marks)
  - ii) Class (3 marks)
- b) Describe the following Object Oriented Analysis techniques
  - i) dynamic modelling, (4 marks)
  - ii) functional modelling (4 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 ONE diagram used in UML for:
  - i) Dynamic modeling (5 marks)
  - ii) Static modeling (5 marks)

### QUESTION TWO (20 MARKS)

- a) Using a diagram in each case describe THREE types of relationships that can be represented in UML (7 marks)
- b) 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 classes in UML. (7 marks)
- c) What are the challenges faced by Object Oriented Designers? (6 marks)

### QUESTION THREE (20 MARKS)

- a) 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.
- i) Use UML Notations to draw a figure that represents the Circle Class in the problem domain (6 marks)
- ii) Use any Object Oriented Programming language to implement the notation in (i) provided above (8 marks)
- b) In a software process, list the diagrams that are essential for each of the following activities:
- i) object oriented analysis, (3 marks)
- ii) object oriented design (3 marks)

### QUESTION FOUR (20 MARKS)

- a) Using a well labeled diagram, describe the components of any TWO Behavioral Diagrams (10 marks)
- b) 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. Draw a behavioral diagram that represents this process (Make sure you show when each actor is participating in the process.) (10 marks)

**QUESTION FIVE (20 MARKS)**

- a) Explain the following type of diagrams used in UML
- i) Deployment Diagrams (3 marks)
  - ii) State Machines (3 marks)
- b) Briefly describe any THREE Principles of Object Oriented Design (6 marks)
- c) A bank has many branches. In each zone, one branch is designated as the zonal head office that supervises the other branches in that zone. Each branch can have multiple accounts and loans. An account may be either a savings account or a current account. A customer may open both a savings account and a current account. However, a customer must not have more than one savings account or current account. A customer may also procure loans from the bank. Construct a Structural diagram for this problem domain (8 marks)