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# KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
## UNIVERSITY EXAMINATIONS, 2024/2025 ACADEMIC YEAR
## SECOND YEAR, SECOND SEMESTER EXAMINATION
## FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

### KCS 2307: OBJECT ORIENTED ANALYSIS AND DESIGN

**DATE:9TH DECEMBER, 2024**
**TIME: 8:30AM-10:30AM**

**INSTRUCTIONS TO CANDIDATES**
**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

## QUESTION ONE: COMPULSORY (30 MARKS)

a) Briefly explain the difference between the following pairs of terms. Include an example to illustrate your answers.

    i)      Class and object **(2 Marks)**

    ii)     Attribute and operation **(2 Marks)**

    iii)    Encapsulation and data hiding **(2 Marks)**

**b)** Discuss four advantages of object-oriented methodology especially for its mode of analysis and design.
**(4 Marks)**

c) Visibility is used to specify which attributes and operations can be seen by the class objects. Discuss the Four levels of Visibility. **(4 Marks)**

d) The UML is largely process-independent, meaning that it is not tied to any particular software development life cycle. However, to get the most benefit from the UML, discuss three factors that should be considered in a process. **(6 Marks)**

e) A hospital admission system records the details of the admission, treatment and discharge of all patients. It also provides a number of official reports to satisfy the requirements of external authorities. Admission consists of the following tasks: Administration staff enters the patient's personal details from a completed hospital admission form and sometimes helping them to complete the form. Next they allocate appropriate hospital accommodation if one or more nights stay is required. Following this they assign a doctor to attend for an initial examination, and check (in the case that private medical care is required) that the patient has valid medical insurance. Doctors and nurses use the system to record medical care given to patient during their stay. (This medical care consists of treatments given and drugs administered). Only a doctor may prescribe drugs to a patient, and this information is also recorded in the system. Both doctors and nurses may administer drugs and doses are similarly recorded. Only doctors have the authority to discharge a patient, and this information is, again, recorded within the system. From the above narrative:

    i)  Identify the use cases and actors of the hospital admissions system. **(4 Marks)**

    ii) Develop a possible use case diagram for the above narrative. **(6 Marks)**

## QUESTION TWO: (20 MARKS)

a) Explain the following inheritance among objects giving an example to each.

    i)   Hierarchical inheritance **(2 Marks)**

    ii)  Multilevel inheritance **(2 Marks)**

    iii) Hybrid inheritance **(2 Marks)**

b) Provide a comparison of structured and Object oriented analysis and design in program design.
**(6 Marks)**

c) Consider the process of ordering a meal over an online application. Draw an activity diagram representing each step of the process, from the moment you pick up the phone to the point where you start eating your meal. Do not represent any exceptions. Include activities that others need to perform. **(8 Marks)**

## QUESTION THREE:(20 MARKS)

a) Using proper symbols outline the three UML relationships **(6 Marks)**

b) Describe the three major phases of software development using object–oriented methodology.
**(6 Marks)**

c) Draw a state chart diagram to illustrate the behavior of a child's bank account, where no Overdraft is allowed. The account is empty to start with. Money can then be deposited, to put the account in credit, and taken out as long as the account does not become overdrawn. The account can only be closed when the balance is Zero. **(8 Marks)**

## QUESTION FOUR:(20 MARKS)

a) Using an illustration distinguish between generalization and specialization. **(4 Marks)**
b) With the help of an example explain the role of Inheritance and Polymorphism. **(4 Marks)**
c) Discuss the significance of Object Model in Object-Oriented Analysis Design. **(4 Marks)**
d) Draw a sequence diagram for the following case study; **(8 Marks)**
   - ✓ The customer can log into the order management system
   - ✓ The order system has an option of special order or normal order
   - ✓ The customer can order ANY one of the two mentioned orders
   - ✓ The order system updates the order
   - ✓ The customer confirms the order
   - ✓ The order system sends the order to the customer
   - ✓ The customer receives the order

## QUESTION FIVE: (20 MARKS)

Consider the following Library Management System problem statement:

The Library Management System is library management software for the purpose of monitoring and controlling the transactions in a library. This case study on the library management system gives us the complete information about the library and the daily transactions done in a Library. We need to maintain the record of news and retrieve the details of books available in the library which mainly focuses on basic operations in a library like adding new member, new books, and up new information, searching books and members and facility to borrow and return books. It features a familiar and well thought-out, an attractive user interface, combined with strong searching, insertion and reporting capabilities. The report generation facility of library system helps to get a good idea of which are then borrowed by the members, makes users possible to generate hard copy.

The following are the brief description on the functions achieved through this case study:

End-Users:

- Librarian: To maintain and update the records and also to cater the needs of the users.
- Reader: Need books to read and also places various requests to the librarian.
- Vendor: To provide and meet the requirement of the prescribed books.

Using the above case study, analyze and design the following components of Unified Modelling Language:

a) Class Diagram showing objects and methods **(5 Marks)**
b) Use-case Diagram **(5 Marks)**
c) Sequence Diagram **(5 Marks)**
d) State Chart Diagram **(5 Marks)**