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

KCS 2102: OBJECT ORIENTED PROGRAMMING I

DATE: 4TH DECEMBER 2024
TIME: 2:30PM-4:30PM

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

QUESTION ONE: COMPULSORY (30 MARKS)

a) Explain the meaning of the following Objected Oriented Programming terms:
   i) Class **(1 Mark)**
   ii) Object **(1 Mark)**
   iii) Inheritance **(1 Mark)**
   iv) Polymorphism **(1 Mark)**

b) Discuss **FOUR** characteristics of Objected Oriented Programming that differentiates it from other programming paradigms. **(4 Marks)**

c) Using illustrations, explain any **THREE** types of inheritance used in Java **(6 Marks)**

d) Discuss the following terms in Objected Oriented Programming.
   i) Method overloading and Method overriding **(2 Marks)**
   ii) Encapsulation and data hiding **(2 Marks)**

e) An object of the class Student consists of the following data attributes:
   - A registration number of type string
   - The name of the student of type string
   - The fees paid of type float.
   - A static field named feetobepaid that is initialized to the fixed fee to be paid by all students.

   A constructor is required that accepts three parameters to assign to the first three attributes. Accessor and mutator methods shall get and set the registration number, name and feespaid of the student. A method calcBalance( ) will be used to calculate the fees balance of a student based on the fees to be paid and the fees paid. The toString() method will allow a Student object to define itself in terms of the name, registration number, feestobepaid, feespaid and the remaining balance.
   i) Sketch a class diagram for the Student class. **(3 Marks)**
   ii) Write a Java program to illustrate the Student class. **(6 Marks)**
   iii) Develop a StudentApp class with the main( ) method to test the running of the Student class. **(3 Marks)**

QUESTION TWO: (20 MARKS)

a) Control Structures are just a way to specify flow of control in programs. Any algorithm or program can be clearer and understood if they use control structures. Discuss the working of a *do..while* loop and how different it is from a *for* loop. **(2 Marks)**

b) Explain **FIVE** benefits of OOP as a programming paradigm compared to other programming paradigms. **(5 Marks)**

c) i) Describe the role of a constructor as applied in Objected Oriented Programming. **(2 Marks)**

ii) Highlight **THREE** differences between a method and a constructor. **(3 Marks)**

d) Write the code of a class named Exam with the following description. **(8 Marks)**

Data Members;

- ✓ exmCode of type String
- ✓ exmDescription of type String
- ✓ noCandidate of type Integer.
- ✓ centersRequired of type Integer.

Member Functions;

- ✓ A function schedule( ) to allow user to enter values for exmCode, xmDescription, noCandidate.
- ✓ A function dispxm( ) to allow user to view the content of all the member data.

QUESTION THREE: (20 MARKS)

a) Discuss the **SEVEN** software development stages involved in object-oriented design of a program in Java. **(7 Marks)**

b) Write a Java program to overload the function calculateArea() with one method calculating the area of a circle and the other the area of a rectangle. **(6 Marks)**

c) Write a Java program that prompts the user for the length, width and height of a solid cuboid, computes and outputs both the volume and total surface area of the cubiod.

[Algebraically; Vol = l x w x h and S. A. = 2(lh + lw + wh)] **(7 Marks)**

QUESTION FOUR: (20 MARKS)

a) Using an example in program code, compare the usage of primitive variables to the use of reference variables. **(2 Marks)**

b) Describe the three access specifiers in OOP. **(6 Marks)**

c) i) Discuss **THREE** benefits of inheritance **(3 Marks)**

ii) Define the following terms.

I. Super class **(1 Mark)**

II. Subclass **(1 Mark)**

iii) Assume a class hierarchy is to be created containing the following classes:

- An Employee having a first name, last name and social security number.
- A Salaried Employee having a monthly salary
- A Commission Employee having monthly total sales and commission rate
- An Hourly Employee having an hourly wage and the number of hours worked in a month.

Based on the above information, devise a suitable class hierarchy to model the presented employees. Clearly indicate which data items each object will store and likely methods. No program is required. **(7 Marks)**

QUESTION FIVE: (20 MARKS)

a) Highlight **THREE** conventions of naming a class in Java. **(3 Marks)**

b) Describe the differences between the following terms:

i) An abstract class and an interface. **(2 Marks)**

ii) An accessor method and a mutator method **(4 Marks)**

c) Explain the **TWO** ways of achieving polymorphism in OOP. **(4 Marks)**

d) Write a simple program in Java that computes the squares of all even numbers between 11 and 29 and displays the numbers and their squares in a suitable format using JOptionPane. **(7 Marks)**