CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR SEMESTER TWO EXAMINATION FOR BACHELOR OF SCIENCE IN APPLIED COMPUTER SCIENCE

ACSC 224: OBJECT ORIENTED PROGRAMMING II

STREAMS: BSC (APPLIED. COMP. SCI)   **TIME: 2 HOURS**

DAY/DATE: TUESDAY 16/4/2019   **8.30 A.M – 10.30 A.M.**

INSTRUCTIONS: Answer Question One and any other two questions

Question One (30 marks)

(a) Explain the difference between a class and an object.   Use java code to illustrate their differences.   (2 marks)

(b) Explain the role of use case diagram and class diagrams in object oriented analysis and design.   (4 marks)

(c) In object oriented analysis and design, explain why object is the key concept. (4 marks)

(d) Show the output when the following code executes. Explain.   (4 marks)

```
int y = 53, count = 7;
while (true){
    System.out.println("Y value: " + y);
    count = y % count;
    y += count;
    if (count > 100 ){
        break;
    }
}
```

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(e) Discuss the difference between aggregation and composition types of relationships in a class diagram. (4 marks)

(f) In the try … catch … finally block, explain the type of code expected in each block. Use their syntax to show the answer. (4 marks)

(g) Explain what is Exception propagation? Illustrate your answer with Java code snippet using `throw new ArgumentException("Illegal input to the method.")`. (4 marks)

(h) Write a simple linear search method in Java code for searching an element in a list. The method takes array list and search item as arguments. It then returns true if item is found in the list or false if item is not in the list. (4 marks)

Question Two (20 marks)

(a) Using sample code sample, explain the importance of exceptions handling in a program. (4 marks)

(b) Define a class Person with the private data members: first name, last name, and date of birth; public methods: get name and get date of birth and a constructor to initialize the data members. (8 marks)

(c) Define another class Student that inherits from class Person and has with the following properties: student registration number, address, and programmme and the public methods: get grade and a constructor to initialize student address and programme. Ensure that the Person constructor is called in the Student constructor. (8 marks)

Question Three (20 marks)

(a) Using Java code sample, explain the differences between method overloading and method overriding. (4 marks)

(b) Show the expected print out when the program below executes. (4 marks)

```
class A
{
    public A()
    {
        super();
        System.out.println("Class A");
    }
}
```

```
    void print(){
         System.out.println("Hello in A");
    }
}

class B extends A
{
    public B()
    {
         super();
         System.out.println("Class B");
    }
    void print(){
         System.out.println("Hello in B");
    }
}

class C extends B
{
    public C()
    {
         super();
         System.out.println("Class C");
    }
    void print(){
        System.out.println("Hello in C");
        super.print();
    }
}


public class MainClass
{
    public static void main(String[] args)
    {
        C c = new C();
        c.print();
    }
}
```

(c) Given the database StudentDB and three tables *student, course* and *studentcourse*. The course table has (*coursecode, coursename*) details. The student table has the following attributes *(regno, firstname, lastname, programme, status)*. The studentcourse has *(regno, coursecode, semester)*.

   (i)   Write Java code for inserting a new student record in the database.   (6 marks)
   (ii) Write search code for listing the courses a student is taking in a given semester.
                                                                                (6 marks)

Question Four (20 marks)

(a) Explain the difference between encapsulation and abstraction in Java. Use code snippet to illustrate the differences in the two concepts. (4 marks)

(b) Explain what an interface in Java is. Using a Java code snippet, show the definition of an interface and how they are utilized in a computer program.   Use the example of a Shape and a Circle where shape is the interface with a method draw and circle is the concrete class.
(6 marks)

(c) Produce a Use Case diagram for the below scenario. (10 marks)
Sports World is an Events Management Company that organise the running of major sporting games, such as the Commonwealth Games.

Before being used to host a sporting event, venues are assessed by an Administrator who checks that they are for fit for purpose. If the venue can hold more than 10,000 people, the Administrator conducts additional health and safety checks to ensure that the venue is safe. A year before the games begin, a Team of Staff are appointed to run the day-to-day operations, including booking successfully assessed/safety-checked venues. Six months before the games begin, the Team of Staff produce a Programme that lists the date, time and location of each sporting event. At this point, Athletes can register for an event by giving their name, address, date of birth and best time for their event. Some overseas athletes need to apply for a visa and the system needs to record whether they were successful.

A week before the games begin, staff produce a Schedule that shows when the registered athletes will participate in their event. At the end of each event, staff produce a Table of Results that records the positions of each athlete.

Once all the events are completed, the administrator checks the Table of Results for accuracy and produces a Medals Table.

Question Five (20 marks)

(a) Discuss four coding practices that would facilitate smooth operations in a team of programming professionals working on the same project. (4 marks)

(b) Identify and explain the two types of inheritance. Use an illustration in UML to demonstrate the differences. (6 marks)

(c) Develop a class diagram for the scenario discussed below. (10 marks)

CrackIt Consultancy Services is organized into departments. Each department has employees working in it. The attributes of department are department code and department name. The

attributes of employee include employee number, name, date of birth, gender, date of employment, basic pay and designation. Each department has a manager managing it. There are supervisors in each department who supervise a set of employees. Each department controls a number of projects. A project is controlled by one department. The attributes of project include project code and project name. An employee can work on any number of distinct projects in a day. The date an employee worked for a particular project, the time in and the time out has to be kept track.