THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME : LEVEL 04
DEPARTMENT OF COMPUTER SCIENCE
FINAL EXAMINATION – 2019/2020
CSU4301 : OBJECT ORIENTED PROGRAMMING
DURATION : Two hours only (2 Hours)

Date: 29.12.2019 **Time :1.30 p.m – 3.30 p.m**

Answer FOUR Questions ONLY.

Q1) a) Explain Object Oriented Programming and Procedure Oriented Programming by giving 3 features of each.

b) Explain the following terms in brief by giving suitable example for each.

i. Class / Object
ii. Constructor
iii. Abstraction
iv. Exception

c) Define a class in **Java** to represent an **Invoice** with following data members and methods

i. Data members – Item number, Item quantity and Price per item.
ii. Default constructor with default values
Item number - 0000
iii. A parameterized Constructor and Copy Constructor.
iv. Write a 'main' Class called **Test**. Create objects of the Invoice class by using all Constructors.

d) What is meant by 'Overloading Constructor'? Explain by providing an example from the Class defined in part(c)

e) What is an **Abstract Class?** Write three differences between Abstract Class and Normal Class.

Q2 a) Explain the process of converting a JAVA stand-along program (source code) into the machine language.

b) Explain four (4) **relationships** between Classes using appropriate examples.

c) Fill in the blanks using the appropriate term from the list given below.
(private, public, protected)

i. In order to allow data to be visible to all other Classes, members are declared as .....

ii. .....members cannot be accessed from outside the class, however, they can be accessed within inherited Classes.

iii. The Derived Class cannot access the..... members in the base Class, however, derive class has access to the ..... and ..... members of the base class.

d) Write **Java** statements for the following.

i. Declare an Interface called *Drawable* with a method called *Draw* and an Interface called *Countable* with a method called *Count*.

ii. Square class implements the *Drawable* Interface partially.

iii. Rectangle class implements the *Drawable* and *Countable* Interface

iv. Circle class inherits the *Drawable* Interface.

v. Create a class called *MyOne* with a variable called *Number* (value =10) Create an inner class called MyTwo with a method called print, to print the Number variable.

e) Explain the purpose of an **Inner class** by providing three (3) advantages.

Q3) a) What is **Single Inheritance** and **Multiple Inheritance**. Explain with an example.

b) A JAVA class called **ThreeDShape** cannot be instantiated. It also has a method called **getArea()** that do not have implementation details. Additional it has the following properties.

i. Attribute – Height

ii. Selector and Modifier method for attribute height

Create a subclass called **Cylinder** inherited from ThreeDShape class which contains the following properties (π =3.14159).

i. A special attribute called radius.

ii. Override the getArea() method .

Write suitable complete class definitions for the above two classes including additional variables and methods.

c) State whether the following statements are **TRUE** or **FALSE with respect to Q3(b)**. If the statement is FALSE correct it by explaining the reason.

i. The following is a valid statement.

```
ThreeDShape obj= new ThreeDShape();
```

ii. getArea() is a final Method.

iii. Selector and Modifier methods of height attribute are class methods.

iv. Cylinder class inherits a member of ThreeDShape if the Subclass declares a member with the same name.

v. Every individual Object created from the Class has its own copy of instance method(s) of that Class.

d) Explain dynamic binding and static binding providing suitable example using ThreeDShape and Cylinder classes.

Q4) a) "JAVA is a Platform independent language". Explain the platform independency related to JAVA language.

b) Write a complete JAVA class definition to illustrate the **Constructor Chaining** including the following features. Define a class to represent a **Rectangle** with following data members and methods

i. Data members - Width and Length

ii. Default constructor with default values - Width =2, Height=4

iii. A parameterized Constructor and Copy Constructor.

c) i. Explain how Constructor Channing happens within the same class by providing example from Q4(b)

ii. Explain how Constructor Channing happens between subclass and super class by creating a subclass called **Cuboid** from Rectangle class in Q4(b)

d) JAVA free up the occupied memory that is no longer used automatically. What is the process that is used in JAVA for this? Explain three situations.

Q5) a) Explain following terms in brief by giving suitable examples

i. Polymorphism

ii. Generalization/Specialization

iii. Operator Overloading

iii. Thread

iv Multithreaded programming

b) What is the purpose of using **Super** Keyword when accessing variables, constructors and methods in JAVA . Explain briefly by providing examples for each case.

c) Write **Java** statements for the following.

i. Create a thread using Runnable Interface

ii. Create a thread using Thread class

iii. Create a class called MyFirst with variable count. create a inner class called Mysecond with method print() to print the value of count variable. Instantiating an Mysecond class from within the MyFirst class

d) What is an Interface? Differentiate it with Abstract class and normal class

Q6) a) Explain the difference between **Method Overloading** and **Method Overriding by** providing suitable method signatures.

b) Define a class in **Java** called **Cuboid** with the following methods using method overloading concept.

i. Data members - Width, Height, Length

ii. A method to change width by a given amount

iii. A method to change width and height by a given amount

iv. A method to change width, height and length by a given amount

v. Write a main class called **Test.** Create an object of Cuboid class and call all methods defined in above (b- ii,iii,iv).

c) What is the purpose of using **final** keyword when declaring variables, methods and classes? Explain briefly by providing examples for each case.

d) JAVA Exception Handling is done by using five keywords. Explain them briefly providing example JAVA statements.