

University of Ruhuna - Faculty of Technology
BACHELOR OF ENGINEERING TECHNOLOGY
Level 2 (Semester 1) Examination, October 2019

COURSE UNIT: ENT2142, OBJECT ORIENTED PROGRAMMING

Time Allowed: 2 hours

Answer all four (04) questions

Question 01

- a) Briefly explain the meaning of the concepts “Class” and “Object” in the object-oriented programming language (OOP).
- b) Explain **Data Encapsulation** in OOP using an example.
- c) Create a class called *AirFreight*, which will store information related to air freights. *AirFreight* should have two data members (instance variables) to store *weight* of the freight in kilograms and *cost* of the freight in Rupees. It has a function named *calculateCost()* in float type to calculate the cost of the air freight. For the first 5 kg, it costs Rs.4000.00 and each additional 1 kg, it will cost Rs 1000.00, (Hint: use “getter” and “setter” methods)
 - i. Write the definition for the above member class.
 - ii. Write a main function to create two objects (called *firstbage* and *Secondbage*) of the class you created in c (i) and perform the following.
 - Set the weight of firstbage and secondbage as 15 kg and 8 kg respectively.
 - Calculate the coast for each object
 - Display the weight and the cost of each object

Question 02

- a) Explain the difference between Default constructor and Parameterized constructor ? with examples.
- b) Briefly explain the difference between the **constructor/s** and **method/s** of a class.
- c) Consider a part of a simple computer game where a “Player” is capturing cities. The player has three attributes, “Health”, “Power”, and “Strength. Initially, the player’s health should be assigned 100. At the instantiation of an object, of type player, it should be possible to set a value for the strength. The value (100 – strength) should be calculated and must be assigned as the player’s initial power.

Create three methods called *shot ()*, *capture_city()* and *message()*.

- The *shot()* method is to be used when the player gets shot and when the method is called, the player’s health and strength should be reduced by 10.
- The *capture_city()* method is to be used when the player capture’s a city which is a victory. Therefore the player’s power should be increased by 100, and the strength should be increased-by 25.

- The message() method should be used to display the three attributes of the player, namely health, power, and strength

Perform the following,

- Use a constructor to create an object of the type player
- Perform the operations given above and call shot(), capture_city(), method at least once
- Display the attributes after each method call

Question 03

- State the difference between **Multiple inheritance** and **Multilevel inheritance**.
- Compare the meaning of “**Subclass**” and “**Superclass**” using an example.
- An IT company employes, Software Engineers, QA engineers, and DB administrators in an hourly contract basis, on software development projects. Create a base class called “**Employee**” and three derived classes called “**Software Engineer**”, “**DB Administrators**” and “**QA Engineer**”. It is required to create separate objects for each employee and pass the number of hours they have worked and their hourly payment. Your program should calculate the weekly salary of the employees according to the information given in Table 1 below.

Employee Name	Designation	Number of hours worked(per week)	Hourly Payment (Rs.)
Nimal	Software Engineer	61	400
Thilini	Software Engineer	49	375
Chathuea	DB Administrator	51	500
Lasika	QA Engineer	45	275

Table 1

- If a Software Engineer works for more than 55 hours a week, he/she is entitled for a Rs:1000 extra payment for the week.
- Every DBAdministrator is entitled to a Rs 1500 bonus payment other than his/her total hourly payments for the week. This value differs from one project to another
- QA Engineers are not entitled to any extra payments other than his/her total hourly payments for the week

Question 04

- a) Briefly explain the term “**Polymorphism**”.
- b) State the difference between ‘**Overloading**’ and ‘**Overriding**’.
- c) “Tartu Club” is a sports club and it has two types of memberships, namely Gold and Platinum. Members of the club need to pay the relevant membership fee at the end of each month. The membership fee for each membership is calculated as follows.

- Gold Members:
Monthly Payment = Rate per hour*No of hours + Rs.200
- Platinum Member:
Monthly Payment = Rate per hour*No of hours

Write the C++ program using the concept of **pure virtual functions and abstract base classes** to calculate the membership fee for four members as given in Table 2.

Name of the Member	Membership Type	No of Hours	Rate per hour
Shahid	Gold	10	Rs.200
Saman	Platinum	5	Rs.300
Shehan	Platinum	12	Rs.200
Malith	Gold	7	Rs.300

Table 2