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| **Programming II**  Diploma in IT / FI / CSF  Year 1 (2019/20) Semester 2 | Week **8** |
| **1.5** hour |
| **Common Test Revision** | |

All questions refer to the Class Diagram of the Payroll Application shown in Figure 1.

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| --- |
| ***Employee*** |
| -id:int  -name:string |
| +Employee()  +Employee(int,string)  *+CalculatePay():double*  +ToString():string |

|  |  |  |
| --- | --- | --- |
| **FullTimeEmployee** |  | **PartTimeEmployee** |
| -basicPay:double  -allowance:double |  | -dailyRate:double  -daysWorked:int |
| +FullTimeEmployee()  +FullTimeEmployee(int,string,double,double)  +CalculatePay():double  +ToString():string |  | +PartTimeEmployee()  +PartTimeEmployee(int,string,double,int)  +CalculatePay():double  +ToString():string |

|  |  |  |  |
| --- | --- | --- | --- |
| **SalesEmployee** |  |  | |
| -salesAmount:double |  |  | |
| +SalesEmployee()  +SalesEmployee(int,string,double,double,double)  +DetermineCommissionRate():double  +CalculatePay():double  +ToString():string |  |  |

Figure 1: Class Diagram of the Payroll Application

Note

* The (monthly) pay of a full-time employee is calculated as shown below:

pay = basic pay + allowance

* The (monthly) pay of a part-time employee is calculated as shown below:

pay = days worked x daily rate

* The (monthly) pay of a sales employee is calculated as shown below:

pay = basic pay + allowance + (sales amount x commission rate#)

# The method DetermineCommissionRate() determines and returns the commission rate based on the salesAmount (the rate is 0.2 if sales amount is below $1000, otherwise, 0.5).

1. (a) List **ALL** inherited attributes in the SalesEmployee class. Id, name, basicPay, allowance

(b) List **TWO** methods that enable polymorphism. calculatePay(), toString()

(6 marks)

1. (a) List one method that is overloaded. Give your reason. Employee(), this method is in many class but the parameters is different

(b) List one method that is overridden. Give your reason. CalculatePay() or toString(), this method is in many class with same parameters

(8 marks)

1. Implement the Employee class.

(13 marks)

1. Explain clearly the effect if the default constructor is not included (i.e. omitted) in the Employee class.

The default constructor is not included (i.e omitted) in the Employee class, the default constructor of the derived class (i.e FullTimeEmployee and PartTimeEmployee) cannot be implemented as they will look for the default constructor in the base class (i.e Employee class)

(5 marks)

1. Implement the CalculatePay() method of FullTimeEmployee and PartTimeEmployee class.

Use comments to clearly indicate the class that each method belongs to.

(10 marks)

1. Implement the SalesEmployee class.

(12 marks)

1. Write code to create an employeeList to store FullTimeEmployee, PartTimeEmployee and SalesEmployee objects.

Create 3 employees with the following information and add them to the employeeList.

|  |  |  |
| --- | --- | --- |
| employee1 | FullTimeEmployee | Id: 103  Name: John  Basic pay: 1500  Allowance: 100 |
| employee2 | PartTimeEmployee | Id: 101  Name: Mary  Daily rate: 50  Days worked: 10 |
| employee3 | SalesEmployee | Id: 102  Name: Apple  Basic pay: 1000  Allowance: 50  Sales amount: 10000 |

(11 marks)

1. Write the method DisplayOutput() to display the Id, Name and Pay of all employees in the list passed into the method. The list passed in may contain many FulltimeEmployee, PartTimeEmployee and SalesEmployee objects. Sample output is shown in figure 8 below:

|  |
| --- |
| ID Name Pay  ===== ========== ==========  103 John 1600.00  101 Mary 500.00  102 Apple 6050.00 |

Figure 8. Sample output from DisplayOutput()

(10 marks)

1. Write the method IncreasePay() to increase the basic pay of all FullTimeEmployee in the list passed into the method by 10%. The list passed in may contain many FulltimeEmployee, PartTimeEmployee and SalesEmployee objects.

(15 marks)

1. Assume a list employeeList has been created to store FullTimeEmployee, PartTimeEmployee and SalesEmployee objects. Implement interface IComparable<T> in the appropriate class to sort the employeeList by id. Show the class header and the method.

(10 marks)