LAB 11

| Question | Task | TIME ALLOCATION | REMARKs |
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| 1, 2 | Single Inheritance | 60 minutes |  |
| 3 | Multiple Inheritance | 60 minutes |  |

**Question 1**

Create a complete program based on the following criterias:

A) Create class **Staff**.

1. protected data members : name (string), id(string), age(int), salary(float),

nett\_salary(float).

1. public member functions

* **void setdata()**To get user input for all except nett\_salary.

B) Create class **Executive** which inherits **publicly** from class **Staff**.

1. private data members : OT\_hrs(int), rate(int).
2. public member functions

* **void setExecutive()**

To get user input for OT\_hrs and rate.

* **void cal\_salary\_exec()**

To calculate nett\_salary using **Formula :** **nett\_salary = salary + (OT\_Hrs \* rate)**.

* **void display()**   
  Display name, ID, age, salary, OT\_Hrs, rate and nett\_salary.

C) Create class **Salesperson** which inherits **publicly** from class **Staff**.

1. private data members : units(int), bonus(float).
2. public member functions

* **void setSalesperson()**  
  To get user input for units.
* **void cal\_salary\_sales()**  
  To calculate nett\_salary. Refer to given table below for the bonus entitlement for a salesperson.

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| **Units** | **Bonus (RM)** |
| Greater than 500 | 500.00 |
| Less than or equals to 500 | 250.00 |

**Formula** : **nett\_salary = salary + bonus**

* **void display()**

Display name, ID, age, salary, units, bonus and nett salary.

D) In **main()**

Ask the user to select between Executive and Salesperson.

* If the user selects Executive, create an object for class Executive and call the appropriate member functions.
* If the user selects Salesperson, create an object for class Salesperson and call the appropriate member functions.

**[Note: refer to sample output screens below]**

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| **Sample Output Screen #1** |
| Enter [1] for Executive OR [2] for Salesperson : ***1***  Enter Name : ***James Wong***  Enter ID : ***203112***  Enter Age : ***23***  Enter salary : RM ***3000***  Enter OT\_hrs : ***50***  Enter Rate : RM ***6.80***  Name : James Wong  ID : 203112  Age : 23  Salary : RM 3000.00  OT Hours : 50  OT Rate : RM 6.80  Nett Salary : RM 3340.00  Press any key to continue . . . |

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| **Sample Output Screen #2** |
| Enter [1] for Executive OR [2] for Salesperson : ***2***  Enter Name : ***Megan Watson***  Enter ID : ***1021224***  Enter Age : ***30***  Enter salary : RM ***4000***  Enter Units : ***300***  Name : Megan Watson  ID : 1021224  Age : 30  Salary : RM 4000.00  Units : 300  Bonus : RM 250.00  Nett Salary : RM 4250.00  Press any key to continue . . . |

**Question 2**

Modify **main()** of question 1 in order for repetitions to be allowed as long as user desires. The program should also output the total number of staffs and total payouts to the company staffs. You may include additional accessor function (to return nett\_salary) in the Staff class. **[Note: refer to sample output screen below]**

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| **Sample Output Screen** |
| Do you want to continue ? ***Y***  Enter [1] for Executive OR [2] for Salesperson : ***1***  Enter Name : ***Peter Roy***  Enter ID : ***2302321***  Enter Age : ***30***  Enter salary : RM ***3000***  Enter OT\_hrs : ***50***  Enter Rate : RM ***6.60***  Name : Peter Roy  ID : 2302321  Age : 30  Salary : RM 3000.00  OT Hours : 50  OT Rate : RM 6.60  Nett Salary : RM 3330.00  Do you want to continue ? ***Y***  Enter [1] for Executive OR [2] for Salesperson : ***2***  Enter Name : ***Mandy Gan***  Enter ID : ***20322***  Enter Age : ***20***  Enter salary : RM ***3050***  Enter Units : ***505***  Name : Mandy Gan  ID : 20322  Age : 20  Salary : RM 3050.00  Units : 505  Bonus : RM 500.00  Nett Salary : RM 3550.00  Do you want to continue ? ***Y***  Enter [1] for Executive OR [2] for Salesperson : ***1***  Enter Name : ***Salmiah Khan***  Enter ID : ***2032186***  Enter Age : ***36***  Enter salary : RM ***2500***  Enter OT\_hrs : ***30***  Enter Rate : RM ***6.80***  Name : Salmiah Khan  ID : 2032186  Age : 36  Salary : RM 2500.00  OT Hours : 30  OT Rate : RM 6.80  Nett Salary : RM 2704.00  Do you want to continue ? ***N***  Total Staff:3  Total Payouts is RM 9584.00 |

**Question 3**

Riley Piano Music Center is organizing a piano recital program. Students will need to recite their 3 selected piano pieces which will be rated by invited examiners. Therefore, the center needs a program that can determine the results of the participating students and provide a reward based on their achievement. Write a C++ program based in the following guidelines:

A) Create class **Participant**

1. protected data members: name (string), location (string), age   
   (int).
2. public member functions : - constructor to display ***“ Participant Details ”*** .

B) Create class **Progress**

1. protected data members : date[3] (string), rate[3] (float) , grade (char).
2. public member functions

* **void mark\_entry()**

Using a for loop, get user input for date array and rate array. Rate should be between 1 to 5. Determine the average and call set\_grade(….), passing the average.

* **void set\_grade(..)** --- determine grade based on average parameter.

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| **average** | **grade** |
| 4.00 and above | A |
| 3.00 and above but less than 4 | B |
| All above is false | C |

C) Create class **Result** which inherits **publicly** from **class Participant** and **class Progress.**

(i) private data members : prize (string).  
(ii) public member functions

* **void setdetailst()**

Get user input for name, location, age.

* **void display()**   
  Display name, location, age, all the ratings and grade.

If the grade is A, assign prize with “Mug + RM 10 book voucher" else assign prize with “BPA free Water Bottle". Display the congrats message and the prize (refer to sample output).

* Friend function **void summary(Result [], int )**. Refer to D) for more details.

D) **void summary(….)**

* Two Parameters: an array of Result objects and integer that stores the size of the array.
* Display the summary of students’ data that was entered. Example (for 4 students):

**Grade A: \* \***

**Grade B: \***

**Grade C: \***

***[Hint: Access the grade data member of each array element and declare some counter variables to keep track of the total A’s, B’s and C’s.]***

E) In main()

1. Get user input for how many students’ data to be entered.
2. Declare a pointer called Stud1 that points to a dynamic array of objects of **Result** class.
3. For each object element, call the required member functions. Refer to sample output.
4. Display a summary by passing the array of objects and number of students to friend function ***summary(…)***
5. Deallocate memory of the dynamic array.

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| **Sample Output Screen** |
| Enter number of participants : ***4***  -----------------------------------------  PARTICIPANT DETAILS  -----------------------------------------  -----------------------------------------  PARTICIPANT DETAILS  -----------------------------------------  -----------------------------------------  PARTICIPANT DETAILS  -----------------------------------------  -----------------------------------------  PARTICIPANT DETAILS  -----------------------------------------  Enter Name : ***John Ng***  Enter Location : ***Melaka***  Enter Age : ***20***  -----------------------------------------  RECITAL PROGRESS DETAILS  -----------------------------------------  Enter date (dd/mm/yy) : ***11/11/2017***  Enter rating (between 1-5) : ***4***  Enter date (dd/mm/yy) : ***12/11/2017***  Enter rating (between 1-5) : ***5***  Enter date (dd/mm/yy) : ***13/11/2017***  Enter rating (between 1-5) : ***4.2***  -----------------------------------------  RESULT SLIP  -----------------------------------------  Name : John Ng  Location : Melaka  Age : 20  Rating 1 : 4  Rating 2 : 5  Rating 3 : 4.2  Grade : A  Congrats, you can claim your Mug + RM 10 book voucher!  Enter Name : ***Hanisah Ali***  Enter Location : ***KL***  Enter Age : ***18***  -----------------------------------------  RECITAL PROGRESS DETAILS  -----------------------------------------  Enter date (dd/mm/yy) : ***13/11/2017***  Enter rating (between 1-5) : ***3***  Enter date (dd/mm/yy) : ***13/11/2017***  Enter rating (between 1-5) : ***3.5***  Enter date (dd/mm/yy) : ***14/11/2017***  Enter rating (between 1-5) : ***3***  -----------------------------------------  RESULT SLIP  -----------------------------------------  Name : Hanisah Ali  Location : KL  Age : 18  Rating 1 : 3  Rating 2 : 3.5  Rating 3 : 3  Grade : B  Congrats, you can claim your BPA free Water Bottle!  Enter Name : ***Cassie Teoh***  Enter Location : ***Bangi***  Enter Age : ***21***  -----------------------------------------  RECITAL PROGRESS DETAILS  -----------------------------------------  Enter date (dd/mm/yy) : ***11/11/2017***  Enter rating (between 1-5) : ***1.3***  Enter date (dd/mm/yy) : ***12/11/2017***  Enter rating (between 1-5) : ***3.2***  Enter date (dd/mm/yy) : ***14/11/2017***  Enter rating (between 1-5) : ***3***  -----------------------------------------  RESULT SLIP  -----------------------------------------  Name : Cassie Teoh  Location : Bangi  Age : 21  Rating 1 : 1.3  Rating 2 : 3.2  Rating 3 : 3  Grade : C  Congrats, you can claim your BPA free Water Bottle!  Enter Name : ***Walter Mathhews***  Enter Location : ***Melaka***  Enter Age : ***20***  -----------------------------------------  RECITAL PROGRESS DETAILS  -----------------------------------------  Enter date (dd/mm/yy) : ***11/11/2017***  Enter rating (between 1-5) : ***4***  Enter date (dd/mm/yy) : ***11/11/2017***  Enter rating (between 1-5) : ***4.5***  Enter date (dd/mm/yy) : ***12/11/2017***  Enter rating (between 1-5) : ***4.5***  -----------------------------------------  RESULT SLIP  -----------------------------------------  Name : Walter Mathhews  Location : Melaka  Age : 20  Rating 1 : 4  Rating 2 : 4.5  Rating 3 : 4.5  Grade : A  Congrats, you can claim your Mug + RM 10 book voucher!  ====================================  Summary Results  ====================================  Grade A: \*\*  Grade B: \*  Grade C: \* |