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UNIVERSITI TEKNOLOGI MALAYSIA

UNIVERSITI TEKNOLOGI MALAYSIA
TEST 2 (PRACTICAL)
SEMESTER 1, 2023/2024

SUBJECT CODE	:	**SECJ1013**
SUBJECT NAME	:	**PROGRAMMING TECHNIQUE I**
SECTION	:	**01,02,03,04,05,07,08,09,10,11**
TIME	:	**2 HOURS 30 MINUTES (8:00 - 10:30PM)**
DATE/DAY	:	**04 JANUARY 2024**
VENUES	:	**N28**

INSTRUCTIONS:

- This exam consists of **2 (TWO)** questions with a total of 100 marks.
- **Answer all** questions.
- You have **TWO HOURS** to complete the exam, including downloading the exam materials and submitting your programs.
- Your programs must adhere to the input and output requirements specified in the text and demonstrated in the examples. You must test the programs with (but not limited to) all the input provided in the examples.
- All the **COMMENT STATEMENTS** in the submitted program **WILL NOT BE EVALUATED.**

EXAM MATERIALS:

- You are given a program file with errors (**Test2Q1.cpp**) for Question 1.
- You are given a program file (**Test2Q2.cpp**) for Question 2.
- Download the files from UTM's e-learning.
- The provided program files should be used as the base for answering the questions in this exam.

SUBMISSION PROCEDURE:

- Only program file (with the extension .cpp) are required for the submission.
- Submit the program file (with the extension .cpp) through UTM's e-learning.

This question paper consists of **SEVEN (7)** printed pages excluding this page.

[35 MARKS]

QUESTION 1 - ERROR DEBUGGING

You are given a C++ program (**Test2Q1.cpp**) with 10 errors (syntax errors and / or logical errors, if any). The program is developed to calculate the total price of a book after the inclusion of tax. It has three (3) user-defined functions as listed **Table 1** below:

Table 1: User-defined functions

Function name	Description
price_original	To get the original price from the user. This function will keep asking the user to enter valid input if the price value entered is not a valid one.
choose_Option	To get a book category from the user. This function will repeatedly ask the user to enter a valid character (A, B, C or D) to represent the book category.
price_afterTax	To calculate the tax based on the book's original price and category. Read the comment section before the price_afterTax function definition for details about the percentage of tax to be imposed on the book based on its category.

The **main** function of the program has **cout** statements to display the book price that was previously entered by the user via the **price_original** function and book price after a call to **price_afterTax** function was made. The **price_afterTax** function should be able to update the book's price that includes the tax imposed on the book based on its category.

You are required to debug the errors, compile, and run the program. You are <u>**NOT ALLOWED**</u> to **remove** any statements in the program. You are only allowed to **update** the statements provided in the program and add a new statement(s) if necessary.

The program should produce the outputs as in **Figure 1**. ***Note:*** The values in **bold** are input by the user.

Sample Output for Program Execution 1

```
Please choose the book category:
A -> Encyclopedia
B -> Textbook
C -> Novel
D -> Magazine
Book category (A,B,C,D): E

Please choose the book category:
A -> Encyclopedia
B -> Textbook
C -> Novel
D -> Magazine
Book category (A,B,C,D): D

Please insert the book price (RM): -1
Please insert the book price (RM): 14
Original book price before tax = RM 14

Tax price = RM 0.07
Total book price after tax = RM 14.07
```

Sample Output for Program Execution 2

```
Please choose the book category:
A -> Encyclopedia
B -> Textbook
C -> Novel
D -> Magazine
Book category (A,B,C,D): a
```

```
Please choose the book category:
A -> Encyclopedia
B -> Textbook
C -> Novel
D -> Magazine
Book category (A,B,C,D): A

Please insert the book price (RM): 0
Please insert the book price (RM): 215
Original book price before tax = RM 215

Tax price = RM 6.45
Total book price after tax = RM 221.45
```

<u>Sample Output for Program Execution 3</u>

```
Please choose the book category:
A -> Encyclopedia
B -> Textbook
C -> Novel
D -> Magazine
Book category (A,B,C,D): C

Please insert the book price (RM): 45
Original book price before tax = RM 45

Tax price = RM 0.45
Total book price after tax = RM 45.45
```

Sample Output for Program Execution 4

```
Please choose the book category:
A -> Encyclopedia
B -> Textbook
C -> Novel
D -> Magazine
Book category (A,B,C,D): B

Please insert the book price (RM): 32
Original book price before tax = RM 32

Tax price = RM 0.64
Total book price after tax = RM 32.64
```

Figure 1: Example of outputs

QUESTION 2 - PROBLEM SOLVING **[65 MARKS]**

You are required to write a C++ program for a library book checkout system that assists librarians in calculating late fees for borrowed books. Write your answer in the provided **`Test2Q2.cpp`** file. The program should perform the following tasks:

(a) Task 1: Function - Calculate Late Fees (10 marks)

Write a function named `calculateLateFees` with the following specifications:

- Takes the number of days a book is overdue as an input parameter.
- Calculates late fees based on the following rules:
  - RM 0.50 per day for the first 7 days.
  - RM 1.00 per day for the next 7 days.
  - RM 2.00 per day for any additional days beyond 14 days.
- Returns the total late fees.

(b) Task 2: Function - Display Menu (6 marks)

Write a void function named `displayMenu` to display a menu with the following options:

1. Calculate Late Fees
2. Display Library Information
3. Quit

(c) Task 3: Function - Display Library Information (6 marks)

Write a function named `displayLibraryInfo` with the following specifications:

- This is a non-returning function.
- Displays information about the library, such as the library name, address, and contact details.

(d) Task 4: Function - Get User Input (6 marks)

Write a function named `getUserInput` with the following specifications:

- Takes the number of days a book is overdue as input.
- Prompts the user to enter the number of days overdue.
- Sends the entered value back to the calling module through the use of **reference parameter**.

(e) Task 5: Main Function

(25 marks)

Write the main function to perform the following tasks:

- Use a **post-test loop** to display the menu and perform the corresponding action until the user selects the option to quit.
- Utilize **if-else** and **switch-case** statements appropriately.
- Call the functions defined in Tasks 1, 2, 3 and 4 where appropriate based on the user's selection.
- Display appropriate messages for each option.

(f) Task 6: Function Prototypes

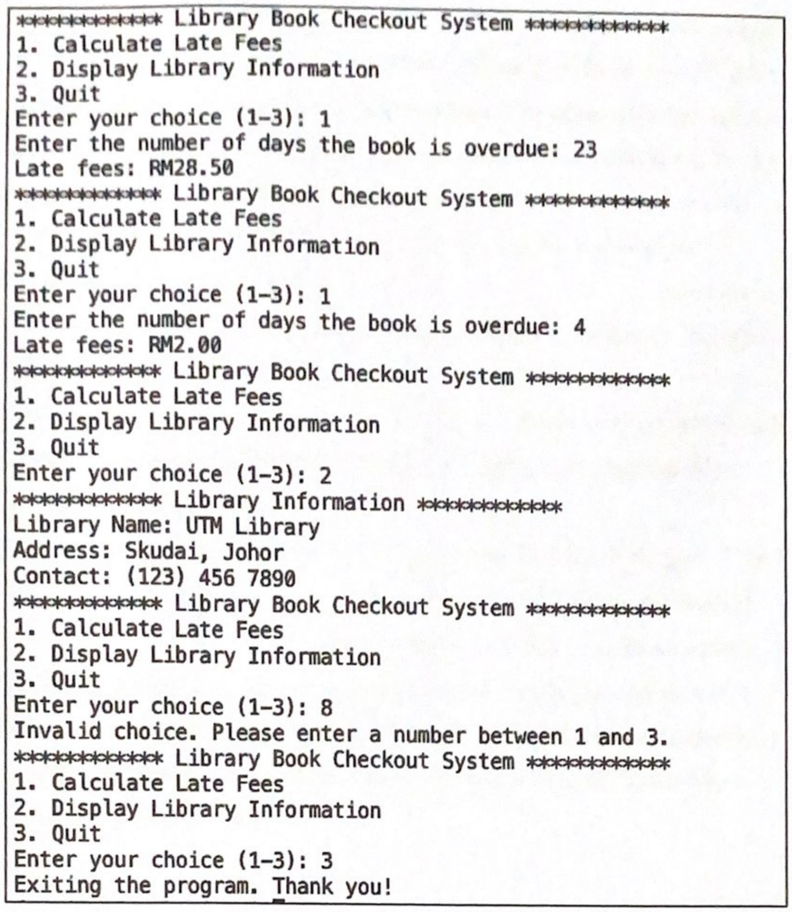
(8 marks)

- List all the function prototypes for the functions defined in Tasks 1, 2, 3, and 4.

(g) Task 7: Program Syntax

(4 marks)

- Include appropriate directive, library, etc.
- Ensure the program follows the correct syntax.
- You must test the program by demonstrating how the program displays the menu, accepts user input, and performs the corresponding actions including a scenario where the late fees are calculated. Example output of program execution is shown in **Figure 2**.



```
************ Library Book Checkout System ************
1. Calculate Late Fees
2. Display Library Information
3. Quit
Enter your choice (1-3): 1
Enter the number of days the book is overdue: 23
Late fees: RM28.50
************ Library Book Checkout System ************
1. Calculate Late Fees
2. Display Library Information
3. Quit
Enter your choice (1-3): 1
Enter the number of days the book is overdue: 4
Late fees: RM2.00
************ Library Book Checkout System ************
1. Calculate Late Fees
2. Display Library Information
3. Quit
Enter your choice (1-3): 2
************ Library Information ************
Library Name: UTM Library
Address: Skudai, Johor
Contact: (123) 456 7890
************ Library Book Checkout System ************
1. Calculate Late Fees
2. Display Library Information
3. Quit
Enter your choice (1-3): 8
Invalid choice. Please enter a number between 1 and 3.
************ Library Book Checkout System ************
1. Calculate Late Fees
2. Display Library Information
3. Quit
Enter your choice (1-3): 3
Exiting the program. Thank you!
```

Figure 2: Example of program output