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Student ID:.....

Machine Number: .....

Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 1, Semester 1 (2024)

IT1010–Introduction to Programming
Session 3B

Duration: 3 Hours

April 2024

Instructions to Candidates:

- This paper has 4 questions. Attempt all four questions.
- The total mark for the paper is 100.
- This paper contains 9 pages, including the cover page.
- Save all the programs in the given folder on your desktop with the given file names.
- Include your IT number as a comment in all your programs.
- DO NOT TAKE THIS PAPER FROM THE EXAMINATION HALL

Question 1 **(20 marks)**

Design a C program for a vacation package booking system for "Tropical Getaways." The program should allow customers to select from different vacation packages and calculate the total cost based on their selection.

Vacation Package ID	Price Criteria
A	Number of participants * 350.00
B	Number of guests * 420.00 up to 6 participants, and the rate will increase to 490.00 for more than 6 guests. The event can have at most 10 participants in this package.
C	Number of participants * 530.00, and natural pool access and a camping facility will be given as per the request
D	Number of participants * 670.00, and one unique photograph (1200.00 per one) for all the participants presented. If a user requests this photograph facility, the user will be given a 12% discount from the total charge.

Write a C program to input the package ID and the other relevant details and based on that calculate the total charge for the vacation booking. Consider the payment for the natural pool access as Rs. 6000.00 and the charges for the camping facility will be Rs. 16000.00.

Your program should continue this process until the user enters 'X' as the package ID and displays the total charge for the vacation, to 2 decimal points.

If the user has input an invalid package type, terminate the program.

Save your program as **3BQ1.c**

Question 2 **(30 marks)**

Part 1

Write a C program to perform the following tasks related to 1-D arrays.

- Create a 1-D integer array, **array1** which can hold 7 values.
- Print a suitable message to assign numbers 4, 15, 6, 17, 10, 12, and 7 to the above **array1** from the keyboard.
- Find the maximum value of **array1**. Exchange the maximum value with the value in the first position of **array1**.
- Find the minimum value of **array1**. Exchange the minimum value with the last element of array1.
- Print the content of **array1** on the monitor/screen.

Save your program as **3BQ2a.c**

Part 2

Write a C program to swap two columns of a 4x4 matrix. Please follow the instructions given below:

- Ask the user to enter the elements of a 4x4 matrix by specifying the row number and column number.
- Print the matrix entered by the user to display the values entered for each element.
- Prompt the user to input the indices of two columns to swap.
- Check if the column indices provided by the user are valid. If any of the indices are less than 0 or greater than 3, display an error message and terminate the program.
- If the column indices are valid, swap the columns in the matrix as specified by the user.
- Print the matrix again to show the changes made after swapping the columns.

Your program should give an output similar to the illustration given below:

```
Enter the elements of the 4x4 matrix:
Enter element at row 0, column 0: 5
Enter element at row 0, column 1: 7
Enter element at row 0, column 2: 2
Enter element at row 0, column 3: 9
Enter element at row 1, column 0: 1
Enter element at row 1, column 1: 4
Enter element at row 1, column 2: 2
Enter element at row 1, column 3: 7
Enter element at row 2, column 0: 8
Enter element at row 2, column 1: 4
Enter element at row 2, column 2: 0
Enter element at row 2, column 3: 5
Enter element at row 3, column 0: 1
Enter element at row 3, column 1: 5
Enter element at row 3, column 2: 7
Enter element at row 3, column 3: 4

Matrix before swapping columns:
5 7 2 9
1 4 2 7
8 4 0 5
1 5 7 4

Enter the indices of the two columns to swap (0 to 3):
Column 1: 1
Column 2: 3

Matrix after swapping columns 1 and 3:
5 9 2 7
1 7 2 4
8 5 0 4
1 4 7 5

--------------------------------
Process exited after 40.79 seconds with return value 0
Press any key to continue . . .
```

Save your program as **3BQ2b.c**

Question 3 **(30 marks)**

In the new year season, an Ayurvedic beauty care product shop offers a discount for their customers based on the loyalty card type.

Card Type	Description	Discount
S	Sapphire Loyalty card	25%
R	Ruby Loyalty card	20%
D	Diamond Loyalty Card	15%
N	No Loyalty Card	No Discount

a) Write a function called `calcDiscount()` to calculate and return the discount amount of a customer when the card type and the bill payment are passed as parameters.

*(Discount Amount = bill payment * discount rate / 100)*

The function prototype is given below.

```
float calcDiscount ( char cardType, float payment );
```

b) Write a function called `calcNetPayment()` to return the net payment of a customer after deducting the discount amount from the bill payment. The discount amount and the bill payment are passed as parameters.

(Net Payment = Bill Payment – Discount)

The function prototype is given below.

```
float calcNetPayment( float discount, float payment );
```

c) Write a function called `displayDetails()` to display the discount amount and net payment amount for a customer when the discount amount and the net amount are the parameters.

The function prototype is given below.

```
void displayDetails(float discount, float netPay)
```

d) In the main program,

i. Write two assert statements to test `calcDiscount()` function.

ii. Input the card type and the bill payment of the customer from the keyboard.

iii. Display the discount amount and net payment of the customer by calling the required functions.

iv. Read the details of five customers and display the discount amount and net payment of each customer.

Save your program as **3BQ3.c**

Question 4 **(20 marks)**

a) Write a C program to record the employee ID, their grade(integer), and the salary in a file called ***salary.txt.*** Input the employee ID, grade, and salary from the keyboard for 6 employees. The grade should be either 1,2, 3, or 4.

Save your program as **3BQ4a.c**

b) Modify the above program to read the details from ***salary.txt*** and find the allowance given. The allowance is calculated as follows,

$$Allowance = Salary * Rate$$

The rate depends on the grade of the employee and is given below.

Grade 1 – 25.0%
Grade 2 – 15.0%
Grade 3 – 12.5%
Grade 4 – 10.0%

Calculate and display the allowance of all the employees as shown below.

Employee ID	Salary	Allowance
---	---	---
---	---	---
---	---	---
---	---	---

Save your program as **3BQ4b.c**

Grading Sheet

Question 1

Compile correctly	1.0
Execute correctly	
• Inputs	2.0
• Outputs	1.0
Correct use of Repetition	4.0
Correct Processing	
• Use of Selection	4.0
• Correct calculations	4.0
Display the output	1.5
Formatting the output	0.5
Coding conventions	2.0

Question 2 – Part 1

Compile correctly	0.5
Create and assign values to array1	2.5
Print the content of array1	2.0
Find the maximum value exchange of the values	3.0
Exchange the values using a temporary variable	2.0
Find the minimum value exchange of the values	3.0
Print the content of array1	1.0
Coding standards	1.0

Question 2 – Part 2

Compiles Correctly	0.5
Defining and assigning values to the matrix	2.5
Print the content of matrix	2.0
Validate column numbers in the correct range	2.0
Exchange values using a temporary variable	6.0
Print the matrix after swapping	1.0
Coding Standards	1.0

Question 3

Compile correctly	1.0
Execute correctly	
- Inputs	1.0
- Outputs	2.0
Function implementation	
- Function 1	5.0
- Function 2	4.0
- Function 3	4.0
Calling the functions with correct values	
- Function 1	2.0
- Function 2	2.0
- Function 3	2.0
Entering values from the keyboard	1.0
Entering multiple records	2.0
Assert statements	2.0
Coding conventions	2.0

Question 4

Compile correctly	1.0
Execute correctly	
- Data is written to the file	1.0
- Display the allowance	2.0
Writing to file	
- Open file for writing	1.0
- Input records from keyboard	1.0
- Validate the record	1.0
- Write them to the file	3.0
Reading from file	
- Open file for reading	1.0
- Read all the records	3.0
- Find the allowance	4.0
- Display	1.0
Proper coding standards are used	1.0