



# Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Midterm Examination, Fall 2025

Course Code: CSE113, Course Title: Programming and Problem Solving

Level: 1 Term: 2 Batch: 69

Time: 01:30 Hrs

Marks: 25

## Answer ALL Questions

*[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]*

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |     |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|
| 1  | From the following code <b>identify</b> and <b>list</b> all the keywords and identifiers present in the code.                                                                                                                                                                                                                                                                                                                                                                                                                                                         | [02] | CO1 |
|    | <pre>#include &lt;stdio.h&gt; int main() {     int total = 10;     float price = 25.5;     char greeting = '#';     if (total &gt; 0) {         total = total + 5;         printf("%c Your total is: %d\n", greeting, total);     } else {         printf("No items found.\n");     }     return 0; }</pre>                                                                                                                                                                                                                                                           |      |     |
| 2. | <p><b>a) Identify</b> the syntax errors in the following code snippet. Write down each error with the line number and why you think this is an error:</p> <pre>1. #include &lt;studio.h&gt; 2. int main() { 3.     int numbers[4] = {10, 20, 30, 40, 50}; 4.     int i; 5.     for (i = 0, i &lt;= 4, i++) { 6.         if numbers[i] &gt; 25 { 7.             printf("Number %d is greater than 25\n", numbers[i]); 8.         } else{ 9.             printf(Number %d is less than or equal to 25\n, numbers[i]); 10.        } 11.    } 12.    return 0 13. }</pre> | [02] | CO2 |
|    | <b>b) Write</b> a corrected version of the above program.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | [02] |     |
| 3. | Draw a flowchart to solve each of the following problems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      | CO3 |
|    | <p><b>a) At the DIU canteen, students get a discount based on their total bill amount:</b></p> <ul style="list-style-type: none"> <li>• If the total bill is less than 100 BDT, no discount is applied.</li> <li>• If the bill is between 100 and 300 BDT (inclusive), a 10% discount is given.</li> <li>• If the bill is more than 300 BDT, a 20% discount is applied.</li> </ul> <p><b>Draw</b> a flowchart that takes the total bill amount as input and calculates the final amount after applying the discount.</p>                                              | [02] |     |

|                                                     | b)                                          | Two DIU students are working on a problem to determine whether a positive integer N is a prime number. They first check if the input number is positive; if not, they ask the user to enter a positive number again and keep reading until a positive number is entered. Then, they check all numbers from 2 up to N-1 to see if any of them divides N without a remainder. If they find any such divisor, they conclude that N is not prime; otherwise, it is prime.<br>Draw a flowchart that inputs a number N, validates that it is positive, and then checks whether it is prime or not.                                                                                                                                                                                                                                                                                                                             | [02]         |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
|-----------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|---------------------------------|---------------------------------------------|-----------------------------------------------------|-------------------|-----------------------------------------|-------------------------------|-----------|----------------------------|------|--|
| 4.                                                  |                                             | Identify the problem scenarios given below and write a complete C program for each problem statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              | CO4           |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
|                                                     | a)                                          | You are working on an automated health data tracker for DIU Health Center. The system records a student's morning and evening pulse rate. Write a C program that takes these two integer values as input and displays their total pulse count for the day.<br><b>Input:</b> <ul style="list-style-type: none"><li>First line contains two integers separated by space representing the morning and evening pulse rate.</li></ul> <b>Output:</b> <ul style="list-style-type: none"><li>Print the total pulse count in a single line.</li></ul> <table><tr><th>Sample Input</th><th>Sample Output</th></tr><tr><td>65 75</td><td>Total pulse count in a day: 140</td></tr></table>                                                                                                                                                                                                                                         | Sample Input |               | Sample Output                   | 65 75                                       | Total pulse count in a day: 140                     | [02]              |                                         |                               |           |                            |      |  |
| Sample Input                                        | Sample Output                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
| 65 75                                               | Total pulse count in a day: 140             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
|                                                     | b)                                          | The DIU Health Analytics Lab tracks students' strength improvement during fitness programs. Each student starts with an initial strength score S, which increases by R% every month. Write a C program to calculate the final strength score after N months.<br>Hints: $\text{Strength} = S \left(1 + \frac{R}{100}\right)^N$<br><b>Input:</b> <ul style="list-style-type: none"><li>First line contains three numbers:<ul style="list-style-type: none"><li>Initial strength score S (integer)</li><li>Monthly growth rate R (floating-point number)</li><li>Number of months N (integer)</li></ul></li></ul> <b>Output:</b> <ul style="list-style-type: none"><li>Print the final strength score after N months rounded to two decimal places.</li></ul> <table><tr><th>Sample Input</th><th>Sample Output</th></tr><tr><td>100 10 3</td><td>Final strength score after 3 months: 133.10</td></tr></table>             | Sample Input | Sample Output | 100 10 3                        | Final strength score after 3 months: 133.10 | [03]                                                |                   |                                         |                               |           |                            |      |  |
| Sample Input                                        | Sample Output                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
| 100 10 3                                            | Final strength score after 3 months: 133.10 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
|                                                     | c)                                          | DIU Medical Center is developing a health monitoring system to analyze students' physical condition based on their BMI and average heart rate. Write a C program that classifies their health condition according to the following rules: <table><tr><th>Condition</th><th>Output</th></tr><tr><td>BMI &lt; 18.5 and heart rate &gt; 100</td><td>Underweight with Tachycardia</td></tr><tr><td>BMI between 18.5–24.9 and heart rate between 60–100</td><td>Healthy Condition</td></tr><tr><td>BMI between 25–29.9 or heart rate &gt; 110</td><td>Overweight or High Heart Rate</td></tr><tr><td>Otherwise</td><td>Consult Doctor Immediately</td></tr></table><br><b>Input:</b> <ul style="list-style-type: none"><li>Two numbers representing BMI (floating-point) and heart rate (integer).</li></ul> <b>Output:</b> <ul style="list-style-type: none"><li>Print the corresponding health condition message.</li></ul> | Condition    | Output        | BMI < 18.5 and heart rate > 100 | Underweight with Tachycardia                | BMI between 18.5–24.9 and heart rate between 60–100 | Healthy Condition | BMI between 25–29.9 or heart rate > 110 | Overweight or High Heart Rate | Otherwise | Consult Doctor Immediately | [03] |  |
| Condition                                           | Output                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
| BMI < 18.5 and heart rate > 100                     | Underweight with Tachycardia                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
| BMI between 18.5–24.9 and heart rate between 60–100 | Healthy Condition                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
| BMI between 25–29.9 or heart rate > 110             | Overweight or High Heart Rate               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |
| Otherwise                                           | Consult Doctor Immediately                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |               |                                 |                                             |                                                     |                   |                                         |                               |           |                            |      |  |

|                    | <table><tr><th>Sample Input</th><th>Sample Output</th></tr><tr><td>26.3 115</td><td>Overweight or High Heart Rate</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Sample Input | Sample Output | 26.3 115 | Overweight or High Heart Rate |                    |                              |      |  |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|----------|-------------------------------|--------------------|------------------------------|------|--|
| Sample Input       | Sample Output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |               |          |                               |                    |                              |      |  |
| 26.3 115           | Overweight or High Heart Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |               |          |                               |                    |                              |      |  |
| d)                 | <p>The DIU Health Club monitors students' daily water intake to encourage proper hydration. Write a C program that takes the number of days and the amount of water (in liters) consumed each day, then prints the total and average water intake.</p> <p><b>Input:</b></p> <ul style="list-style-type: none"><li>First line contains an integer N representing the number of days.</li><li>Second line contains N space-separated integers representing the daily water intake in liters.</li></ul> <p><b>Output:</b></p> <ul style="list-style-type: none"><li>Print the total water intake and average intake per day (up to two decimal places).</li></ul> <table><tr><th>Sample Input</th><th>Sample Output</th></tr><tr><td>7</td><td>Total water intake: 14 liters</td></tr><tr><td>2 1 2 3 2 1 3</td><td>Average per day: 2.00 liters</td></tr></table> | Sample Input | Sample Output | 7        | Total water intake: 14 liters | 2 1 2 3 2 1 3      | Average per day: 2.00 liters | [03] |  |
| Sample Input       | Sample Output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |               |          |                               |                    |                              |      |  |
| 7                  | Total water intake: 14 liters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |               |          |                               |                    |                              |      |  |
| 2 1 2 3 2 1 3      | Average per day: 2.00 liters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |               |          |                               |                    |                              |      |  |
| e)                 | <p>Two DIU students are analyzing the daily health improvement scores of a student over N days. The scores can be <b>positive</b> (improvement) or <b>negative</b> (decline). They want to find the <b>second maximum</b> score recorded during these days to identify the runner-up best health day.</p> <p><b>Input:</b></p> <ul style="list-style-type: none"><li>First line contains an integer N representing the number of days.</li><li>Second line contains N space-separated integers representing the daily health improvement scores.</li></ul> <p><b>Output:</b></p> <ul style="list-style-type: none"><li>Print the second maximum score among the N days.</li></ul> <table><tr><th>Sample Input</th><th>Sample Output</th></tr><tr><td>8</td><td>Second Maximum Score: 5</td></tr><tr><td>-3 4 6 -2 5 -7 3 4</td><td></td></tr></table>           | Sample Input | Sample Output | 8        | Second Maximum Score: 5       | -3 4 6 -2 5 -7 3 4 |                              | [04] |  |
| Sample Input       | Sample Output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |               |          |                               |                    |                              |      |  |
| 8                  | Second Maximum Score: 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |               |          |                               |                    |                              |      |  |
| -3 4 6 -2 5 -7 3 4 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |               |          |                               |                    |                              |      |  |